

Общество с ограниченной ответственностью  
«Инвестиции Строительство Менеджмент» (ООО «ИСМ»)

**Заказчик – Общество с ограниченной ответственностью «ЕвроХим Северо-Запад-2» (ООО «ЕвроХим Северо-Запад-2»)**

**ПРОИЗВОДСТВО АММИАКА И КАРБАМИДА, КИНГИСЕПП  
ОБЪЕКТ А17.710.2 (ЗДАНИЕ АЗОТНОЙ УСТАНОВКИ И УЗЛА  
ДЕМИНЕРАЛИЗОВАННОЙ ВОДЫ)**

**РАБОЧАЯ ДОКУМЕНТАЦИЯ**

**Отопление, вентиляция**

**Е230-0001-8000571851-РД-01-10.20.010-ОВ**

| Изм. | № док.  | Подп.                                                                               | Дата     |
|------|---------|-------------------------------------------------------------------------------------|----------|
| 1    | 1618-24 |  | 25.09.24 |
|      |         |                                                                                     |          |
|      |         |                                                                                     |          |

Общество с ограниченной ответственностью  
«Инвестиции Строительство Менеджмент» (ООО «ИСМ»)

Заказчик – Общество с ограниченной ответственностью «ЕвроХим Северо-Запад-2» (ООО «ЕвроХим Северо-Запад-2»)

**ПРОИЗВОДСТВО АММИАКА И КАРБАМИДА, КИНГИСЕПП  
ОБЪЕКТ А17.710.2 (ЗДАНИЕ АЗОТНОЙ УСТАНОВКИ И УЗЛА  
ДЕМИНЕРАЛИЗОВАННОЙ ВОДЫ)**

**РАБОЧАЯ ДОКУМЕНТАЦИЯ**

**Отопление, вентиляция**

**E230-0001-8000571851-РД-01-10.20.010-ОВ**

Главный инженер проекта

Главный инженер

О.В. Неофидова

М.Б. Афремов



2024

|            |      |                                                                      |                                                                                     |                                                                                                                      |                              |            |  |      |        |
|------------|------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------|------------|--|------|--------|
| Разрешение |      | Обозначение                                                          |                                                                                     | Е230-0001-8000571851-РД-01-10.20.010-ОВ                                                                              |                              |            |  |      |        |
| 1618-24    |      | Наименование<br>объекта<br>строительства                             |                                                                                     | ПРОИЗВОДСТВО КАРБАМИДА-2, КИНГИСЕПП<br>Объект А17.710.2 (Здание азотной установки и узла<br>деминерализованной воды) |                              |            |  |      |        |
| Изм.       | Лист | Содержание изменения                                                 |                                                                                     |                                                                                                                      | Код                          | Примечание |  |      |        |
| 1          | ОЛ   | ОЛЗ-6 – добавлены требования к щитам<br>управления (примечания п.9). |                                                                                     |                                                                                                                      | 3                            |            |  |      |        |
|            | ОД   | Внесены данные об изменениях                                         |                                                                                     |                                                                                                                      | 3                            |            |  |      |        |
| Изм. внес  |      | Кулишевский                                                          |  | 25.09.24                                                                                                             | ООО «ИСМ»<br>Санкт-Петербург |            |  | Лист | Листов |
| Составил   |      | Чунарёва                                                             |  | 25.09.24                                                                                                             |                              |            |  | 1    | 1      |
| ГИП        |      | Неофидова                                                            |  | 25.09.24                                                                                                             |                              |            |  |      |        |
| Утв.       |      | Неофидова                                                            |  | 25.09.24                                                                                                             |                              |            |  |      |        |

Согласовано

Н. контр.

Акулова

17.04.23



| Ведомость рабочих чертежей основного комплекта |                                                  |            |
|------------------------------------------------|--------------------------------------------------|------------|
| Лист                                           | Наименование                                     | Примечание |
| 1                                              | Общие данные                                     |            |
| 2                                              | Общие данные (продолжение)                       |            |
| 3                                              | Общие данные (продолжение)                       |            |
| 4                                              | Принципиальные схемы систем теплоснабжения       |            |
| 5                                              | Принципиальные схемы систем вентиляции           |            |
| 6                                              | План на отм. 0,000 (+100.200)                    |            |
| 7                                              | Фрагмент плана на отм. 0,000 (+100.200)          |            |
| 8                                              | Разрез 2-2                                       |            |
| 9                                              | Разрез 3-3                                       |            |
| 10                                             | Разрез 4-4                                       |            |
| 11                                             | Разрез 5-5                                       |            |
| 12                                             | План кровли                                      |            |
| 13                                             | Изометрические схемы систем вентиляции           |            |
| 14                                             | Изометрические схемы систем отопления            |            |
| 15                                             | Типовые опоры, подвесы и крепления               |            |
| 16                                             | Типовые опоры, подвесы и крепления (продолжение) |            |
| 17                                             | Типовые опоры, подвесы и крепления (продолжение) |            |
| 18                                             | Типовые опоры, подвесы и крепления (продолжение) |            |
| 19                                             | Типовые опоры, подвесы и крепления (продолжение) |            |

### Ведомость ссылочных и прилагаемых документов

| Обозначение                      | Наименование                             | Примечание |
|----------------------------------|------------------------------------------|------------|
| <i>Ссылочные документы</i>       |                                          |            |
| серия 5.904-1, вып. 0, 1 ч. 1, 2 | Детали крепления воздухопроводов         | Изм.1      |
| серия 5.904-51                   | Зонты и дефлекторы вентиляционных систем |            |
|                                  |                                          |            |

| Прилагаемые документы                      |                                                 |              |
|--------------------------------------------|-------------------------------------------------|--------------|
| E230-0001-800057851-РД-01-10.20.010-ОБ.СД  | Спецификация оборудования, изделий и материалов |              |
| E230-0001-800057851-РД-01-10.20.010-ОБ.БОР | Ведомость объемов работ                         |              |
| E230-0001-800057851-РД-01-10.20.010-ОБ.011 | Опросный лист на вентиляционное оборудование    |              |
| E230-0001-800057851-РД-01-10.20.010-ОБ.012 | Опросный лист на вентиляционное оборудование    |              |
| E230-0001-800057851-РД-01-10.20.010-ОБ.013 | Опросный лист на вентиляционное оборудование    | Изм.1        |
| E230-0001-800057851-РД-01-10.20.010-ОБ.014 | Опросный лист на вентиляционное оборудование    | Изм.1        |
| E230-0001-800057851-РД-01-10.20.010-ОБ.015 | Опросный лист на вентиляционное оборудование    | Изм.1        |
| E230-0001-800057851-РД-01-10.20.010-ОБ.016 | Опросный лист на вентиляционное оборудование    | Изм.1        |
| 4124-ВН-СГ-2000000001-IS03                 | Технические условия для системы ОВКВ            | Изм.3 (Нов.) |

Ведомость основных комплектов рабочих чертежей

| Обозначение                                                | Наименование                                                                  | Примечание |
|------------------------------------------------------------|-------------------------------------------------------------------------------|------------|
| E230-0001-8000571851-РД-01-10.02.110-АР                    | Архитектурные решения                                                         |            |
| E230-0001-8000571851-РД-01-10.02.110-КЖ                    | Конструкции железобетонные                                                    |            |
| E230-0001-8000571851-РД-01-10.02.110-КМ                    | Конструкции металлические                                                     |            |
| E230-0001-8000571851-РД-01-10.02.110-ОВ                    | Отопление, вентиляция                                                         |            |
| E230-0001-8000571851-РД-01-10.02.110-ВК                    | Водоснабжение, канализация                                                    |            |
| E230-0001-8000571851-РД-01-10.02.110-СС                    | Сети связи                                                                    |            |
| E230-0001-8000571851-РД-01-10.02.110-ЗМ                    | Силосовое электрооборудование и электроосвещение                              |            |
| E230-0001-8000571851-РД-01-10.02.110-АОВ                   | Автоматизация отопления и вентиляции                                          |            |
| E230-0001-8000571851-РД-01-10.02.110-СМ                    | Сметная документация                                                          |            |
| E230-0001-8000571851-РД-01-10.20.010-КЖ.ЛС-Г02-01-П-00-00  | Локальный сметный расчет.<br>Железобетонные конструкции                       |            |
| E230-0001-8000571851-РД-01-10.20.010-КМ.ЛС-Г02-01-П-00-00  | Локальный сметный расчет.<br>Металлические конструкции                        |            |
| E230-0001-8000571851-РД-01-10.20.010-АР.ЛС-Г02-01-П-00-00  | Локальный сметный расчет.<br>Архитектурные решения                            |            |
| E230-0001-8000571851-РД-01-10.20.010-ВК.ЛС-Г02-01-П-00-00  | Локальный сметный расчет.<br>Водопровод, канализация                          |            |
| E230-0001-8000571851-РД-01-10.20.010-ОВ.ЛС-Г02-01-П-00-00  | Локальный сметный расчет.<br>Отопление и вентиляция                           |            |
| E230-0001-8000571851-РД-01-10.20.010-СС.ЛС-Г02-01-П-00-00  | Локальный сметный расчет.<br>Сети связи                                       |            |
| E230-0001-8000571851-РД-01-10.20.010-ЗМ.ЛС-Г02-01-П-00-00  | Локальный сметный расчет.<br>Силосовое электрооборудование и электроосвещение |            |
| E230-0001-8000571851-РД-01-10.20.010-АОВ.ЛС-Г02-01-П-00-00 | Локальный сметный расчет.<br>Автоматизация отопления и вентиляции             |            |

## ОБЩИЕ УКАЗАНИЯ

1. Рабочая документация разработана на основании:
  - технического задания на разработку рабочей документации;
  - проектной документации "Производство аммиака-2, Кингисепп", шифр 30931.1-А17.710.2-ОВ;
  - проектной документации "Производство аммиака-2, Кингисепп", шифр 30931.1-ИОС.ОВ1.ТС1.ТЧ;
  - рабочей документации "Производство аммиака и карбамида, Кингисепп. Объект А17.710.2 (здание азотной установки и узла деминерализованной воды)", шифр Е230-0001-8000571851
  - рабочей документации "Производство аммиака и карбамида, Кингисепп. Объект А17.710.2 (здание азотной установки и узла деминерализованной воды)", шифр: Е230-0001-8000571851-РД-01-10.20.010-АР.
2. Технические решения в рабочей документации соответствуют требованиям технического задания, требованиям экологических, противопожарных и других норм, действующих на территории Российской Федерации, которые обеспечивают безопасную эксплуатацию объекта при соблюдении предусмотренных техническими решениями мероприятий.

3. Рабочие чертежи разработаны в соответствии с действующими нормами:
- СП 60.13330.2020 «Отопление, вентиляция и кондиционирование воздуха. Актуализированная редакция СНиП 41-01-2003»;
  - СП 61.13330.2012 «Тепловая изоляция оборудования и трубопроводов»;
  - СП 131.13330.2020 «Строительная климатология. Актуализированная редакция СНиП 23-01-99\*»;
  - №384-ФЗ от 30 декабря 2009 г. «Технический регламент о безопасности зданий и сооружений»;
  - СП 7.13130.2013 «Отопление, вентиляция и кондиционирование. Требования пожарной безопасности»;
  - ГОСТ 12.1.005-88 «Система стандартов безопасности труда (ССБТ). Общие санитарно-гигиенические требования к воздуху рабочей зоны»;
  - СанПиН 1.2.3685-21 «Гигиенические нормативы и требования к обеспечению безопасности и безвредности для человека факторов среды обитания»;
  - СП 56.13330.2021 «Производственные здания. Актуализированная редакция СНиП 23-02-2003»;
  - ГОСТ Р 21.101-2020 «Система проектной документации для строительства (СПДС). Основные требования к проектной и рабочей документации»;
  - ГОСТ 21602-2016 Система проектной документации для строительства (СПДС). Правила выполнения рабочей документации систем отопления, вентиляции и кондиционирования.

4. Для проектирования отопления и вентиляции приняты следующие параметры наружного воздуха:
- расчетная зимняя температура для проектирования отопления и вентиляции минус 24 °С;
  - расчетная летняя температура для проектирования вентиляции +22°С;
  - средняя температура отопительного периода – минус 1,3°С;
  - продолжительность отопительного периода – 213 сут.

5. Принципиальные решения по отоплению.

В помещении насосной деминерализованной воды и узла деминерализованной воды температура воздуха  $+10^{\circ}\text{C}$  поддерживается за счет тепловыделений от оборудования и обогрева воздуха за счет нагрева его в отопительный период приточной установкой вентиляции. В помещении азотной установки температура воздуха  $+10^{\circ}\text{C}$  поддерживается за счет тепловыделений от оборудования. При остановке оборудования температура воздуха  $+5^{\circ}\text{C}$  поддерживается за счет нагрева воздуха воздушным отоплением, совмещенным с приточной вентиляцией.

Для защиты трубопроводов отопления (Т1, Т2) от наружной коррозии предусматривается антикоррозийное покрытие. Трубопроводы изолируются рулонами тепловой изоляции толщиной 50 мм, Roskwool из негорючих материалов. Для защиты теплоизолированных трубопроводов от атмосферных осадков предусматривается покровный слой из оцинкованного стального листа.

6. Принципиальные решения по системам вентиляции.

В помещениях напастной деминерализованной воды и узла деминерализованной воды, азотной установки предусматриваются общеобъемные приточно-вытяжные системы вентилиации. Вентиляция предусматривается для обеспечения параметров воздуха по допустимым нормам. Расчетный воздухообмен определен по избыткам явной теплоты из условия обеспечения 5 кратного воздухообмена для помещений здания азотной установки и узла деминерализованной воды и по

расчетной суммарной концентрации вредных веществ, выделяемых от строительных материалов, отделочных материалов и изделий (деталей) мебели – параметр соответствует данному проектной документации шифр 30931.1-ИОС.ОВ1.ТС1.ТЧ. Суммарная расчетная концентрация не превышает ПДК данных веществ в воздухе рабочей зоны. Системы общеобменной приточной вентиляции предназначены для круглогодичного обеспечения параметров воздуха в здании. Приточные установки предусматриваются с резервными вентиляторами и резервным циркуляционным насосом для воздушонагревателя приточной системы. Приточный воздух подается в рабочую зону, вытяжка из верхней зоны. Предусматривается 2 приточные системы, обслуживающие здание азотной установкой и узла деминерализованной воды. Дополнительно предусмотрено отключение приточных установок и вытяжных систем от сигнала наружных газоанализаторов аммиака.

Приточная П1 установка предусматривается:

- с одним блоком фильтров: грубой (класса G3) очистки;
- с блоком воздушонагревателя водяным для поддержания расчетной температуры приточного воздуха.

Приточная П2 установка предусматривается:

- с одним блоком фильтров: грубой (класса G3) очистки;
- с блоком воздушонагревателя водяным для поддержания расчетной температуры приточного воздуха.

Оборудование приточной системы размещается снаружи здания и предусматривается в общепромышленном исполнении. Приточные установки автоматизированы и приняты наружного исполнения с защитой от атмосферных осадков и герметизации всех стыков и неплотностей.

Забор воздуха приточной системой вентиляции осуществляется снаружи здания на отметке выше 6 м, что исключает попадание взрывоопасных и химически опасных паров и газов при всех режимах работы здания. Воздуховоды снаружи здания изолируются матом теплоизоляционного материала толщиной 30 мм, Rockwool из негорючих материалов. Для защиты теплоизолированных воздуховодов от атмосферных осадков предусматривается покровный слой из оцинкованного листа.

В помещении азотной установки объемная доля кислорода в воздухе должна составлять не менее 19% и не более 23% и обеспечиваться бесперебойной работой систем общеобменной и аварийной вентиляции. Производительность аварийной вентиляции составляет в крат по полному объему помещения. Для аварийной вентиляции используются системы основной общеобменной вентиляции с резервными вентиляторами. Система аварийной вентиляции включается автоматически от сигнала газоанализатора на содержание доли кислорода в воздухе помещения. Вытяжной воздух в аварийном режиме удаляется механической системой вентиляции из рабочей и верхней зон помещения. Для возмещения расхода воздуха, удаляемого аварийной вентиляцией, предусматривается дополнительная механическая система приточной вентиляции. Приточный воздух в аварийном режиме подается в рабочую зону помещения.

В помещении склада баллонов предусматривается общеобменная вентиляция с естественным поджуддением. Приток естественный через жалюзийные решетки, вытяжка естественная из верхней зоны через жалюзийные решетки.

Предусматриваются 3 вытяжные системы (2 основные и 1 резервная) обслуживающие помещение азотной установки. Оборудование вытяжной системы размещается на крыше здания и предусматривается в общепромышленном исполнении.

Предусматриваются 4 вытяжные системы обслуживающие помещение насосной деминерализованной воды и узла деминерализованной воды. Оборудование вытяжной системы размещается на крыше здания и предусматривается в общепромышленном исполнении.

Размещение выбросов в атмосферу из систем вентиляции предусматривается на расстоянии от приемных устройств для наружного воздуха не менее 10 м по горизонтали и на 6 м по

## Основные показатели по чертежам марки ОВ

| Наименование<br>(здания, сооружения,<br>помещения)          | Периоды года<br>при t нар. °C | Расход теплоты, кВт |                  |       | Установленная<br>мощность<br>эл. двигателя, кВт |
|-------------------------------------------------------------|-------------------------------|---------------------|------------------|-------|-------------------------------------------------|
|                                                             |                               | на<br>отопление     | на<br>вентиляцию | Общий |                                                 |
| Здание А 17.710.2                                           | Холодный<br>-24               | -                   | 808,1            | 808,1 | 37,45                                           |
| (Здание азотной установки и<br>и цикла демеркаризации воды) | Теплый<br>+22                 | -                   | -                | -     | 37,45                                           |

вертикали при горизонтальном расстоянии менее 10 м.

*Электроснабжение систем общеобменной и аварийной вентиляции предусматривается первой категорией надежности.*

- ### 7. Указания по монтажу.

Производство работ разрешено организации, имеющей допуски СРО.  
Персонал Подрядчика проходит комплекс инструктажей в соответствии с действующим регламентом на объекте.

Монтаж и наладку систем вентиляции выполнять в соответствии с СП 73.13330.2016 «Внутренние санитарно-технические системы зданий. СНиП 3.05.01-85» с учетом смежных инженерных коммуникаций.

Индивидуальные испытания, комплексное опробование оборудования  
вести в соответствии с данным комплектом рабочей  
документации, технической документацией на оборудование  
(инструкциями по монтажу, паспортами) и действующей  
нормативной документацией.

*Металлоконструкции и опоры из углеродистой стали подлежат антикоррозийной защите.*

Система антикоррозионной защиты должна соответствовать следующим требованиям:

- толщина не менее 260 мкм;
- гарантийный срок службы не менее 8 лет;
- расчетный срок службы не менее 15 лет при условии эксплуатации в среде С-4 по ISO 12944.

*Подготовку поверхности, технология окраски и контроль качества покрытий производить по ВСН 214-82 «Сборник инструкций по защите от коррозии», СП 72.13330.2016 «Защита строительных конструкций и сооружений от коррозии».*

Расчетное расстояние между опорами стальных трубопроводов:  
 Ду15 – 2,5 м, Ду20 – 3 м, Ду25 – 3,5 м, Ду32 – 4,0 м, Ду40 – 4,5 м,  
 Ду50 – 5 м. Расчетное расстояние между опорами воздуховодов: 3 м.  
 Интервал между подвесами горизонтальных участков  
 воздуховодов зависит от размера воздуховодов, но в любом случае  
 не должен превышать 4 м; если в трубопроводе имеются короткие  
 трубные компоненты, интервал между подвесами следует  
 уменьшить.

8. В соответствии с Федеральным законом от 27.12.2002 №184-ФЗ «О техническом регулировании» всё указанное в рабочих чертежах оборудования, изделия и материалы, используемые при строительстве, должны иметь документ подтверждения соответствия продукции (сертификат соответствия или декларацию о соответствии), санитарно-эпидемиологическое заключение, сертификат пожарной безопасности, если, по действующему на момент строительства законодательству, они подлежат обязательному подтверждению соответствия продукции, обязательной санитарно-эпидемиологической экспертизе, обязательной сертификации в области пожарной безопасности.
9. В процессе эксплуатации воздухопроводов и трубопроводов следует осуществлять постоянный контроль за их состоянием.
10. При контроле отбраковку производить по толщине стенок трубопроводов деталей трубопроводов и арматуры.
11. За нулевую отметку уровня принять пол здания азотной установки и узла деминерализованной воды (соответствует отметке +100,200).
12. Тепловою изоляцию трубопроводов и воздухопроводов выполнять в соответствии с требованиями СП 61.13330.2012.
13. Опознавательную окраску трубопроводов производить в соответствии с ГОСТ 14.022-69 "Трубопроводы промышленных предприятий. Опознавательная окраска, предупреждающие знаки и маркировочные щитки".
14. Узел прохода воздухопровода системы вытяжной вентиляции через кровлю здания разрабатывается в отдельном комплекте рабочей документации на основе данного комплекта.
15. Размеры справочные - уточняются по месту проведения работ.

|                                                        |        |          |      |       |          |                                                                                                            |      |        |              |  |  |
|--------------------------------------------------------|--------|----------|------|-------|----------|------------------------------------------------------------------------------------------------------------|------|--------|--------------|--|--|
|                                                        |        |          |      |       |          | E230-0001-8000571851-РД-01-10.20.010-08                                                                    |      |        |              |  |  |
|                                                        |        |          |      |       |          | Производство аммиака и карбамида, Кингисепп<br>Россия, Ленинградская область, Кингисеппский район          |      |        |              |  |  |
| Изм.                                                   | Колч.ч | Лист     | №док | Подп. | Дата     |                                                                                                            |      |        |              |  |  |
| Разработал                                             |        | Савдеев  |      |       | 25.02.23 | Объект А17.710.2<br>(задание ээотной установки и<br>узла деминерализованной воды)<br>Отопление, вентиляция |      |        |              |  |  |
| Проверил                                               |        | Шошинов  |      |       | 25.02.23 | Статья                                                                                                     | Лист | Листов |              |  |  |
|                                                        |        |          |      |       |          | Р                                                                                                          | 1    | 19     |              |  |  |
| Гл. инженер                                            |        | Афанов   |      |       | 25.02.23 | <br>ООО "ИС"<br>Инженерно-Строительная Компания "ИСК"                                                      |      |        |              |  |  |
| Акк. Контроль                                          |        | Ахилдова |      |       | 25.02.23 |                                                                                                            |      |        | Общие данные |  |  |
| ГИП                                                    |        | Нефодова |      |       | 25.02.23 |                                                                                                            |      |        |              |  |  |
| E230-0001-8000571851-РД-01-10.20.010-08 1 0 RU IFC.dwg |        |          |      |       |          | Формат А 1                                                                                                 |      |        |              |  |  |



| № пик. | Наименование                                 | Пл. |
|--------|----------------------------------------------|-----|
| 1      | Азотная установка                            | 68  |
| 2      | Установка и насосная деминерализованной воды | 12  |
| 3      | Склад баллонов                               | 2   |

\* - категория помещения по взрывопожарной и пожарной опасности

| № п/п | Наименование                                 | Площадь | Всего кв.м. |
|-------|----------------------------------------------|---------|-------------|
| 1     | Азотная установка                            | 684,70  | ВЗ          |
| 2     | Установка и насосная деминерализованной воды | 1218,78 | Д           |
| 3     | Склад баллонов                               | 2,89    | -           |

|                                                           |                          |                          |                          |                           |
|-----------------------------------------------------------|--------------------------|--------------------------|--------------------------|---------------------------|
| Наружный диаметр трубопровода, мм                         | более или<br>равно<br>25 | более или<br>равно<br>45 | более или<br>равно<br>89 | более или<br>равно<br>108 |
| Наименьшая допускаемая толщина<br>стенки трубопровода, мм | 1,0                      | 1,5                      | 2,0                      | 2,5                       |

|                                        |       |           |       |           |                                                    |                                                                                          |                                                                                                 |                    |
|----------------------------------------|-------|-----------|-------|-----------|----------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------|
|                                        |       |           |       |           | E230-0001-8000571851-РД-01-10.20.01-ОВ             |                                                                                          |                                                                                                 |                    |
|                                        |       |           |       |           | Производство аммиака и карбамида, Кингисепп        |                                                                                          |                                                                                                 |                    |
|                                        |       |           |       |           | Россия, Ленинградская область, Кингисеппский район |                                                                                          |                                                                                                 |                    |
| Изм.                                   | Колч. | Лист      | Вход. | Подп.     | Дата                                               |                                                                                          |                                                                                                 |                    |
| Разработал                             |       | Савватеев |       | <i>AS</i> | 30.10.23                                           | Объект А17.70.2                                                                          | Стадия                                                                                          |                    |
| Проверил                               |       | Шишинов   |       | <i>AS</i> | 30.10.23                                           | (задание эскизной конструкции и узла децентрализованной добычи)<br>Отопление, вентиляция | Лист                                                                                            |                    |
|                                        |       |           |       |           |                                                    |                                                                                          | 2                                                                                               |                    |
| Гл. инженер                            |       | Аграмов   |       | <i>AS</i> | 30.10.23                                           | Общие данные (продолжение)                                                               |  ООО "ИСМ" |                    |
| Н.Контроль                             |       | Акулова   |       | <i>AS</i> | 30.10.23                                           |                                                                                          |                                                                                                 | г. Санкт-Петербург |
| ГИП                                    |       | Неседов   |       | <i>AS</i> | 30.10.23                                           |                                                                                          |                                                                                                 |                    |
| E230-0001-8000571851-РД-01-10.20.01-ОВ |       |           |       |           | 20.010-ОВ 1.0 РД. ИСС. dwg                         |                                                                                          |                                                                                                 |                    |

Инв. № подл.

Подп. и дата

Взам. инв. №

Согласовано

Характеристика отопительно-вентиляционных систем

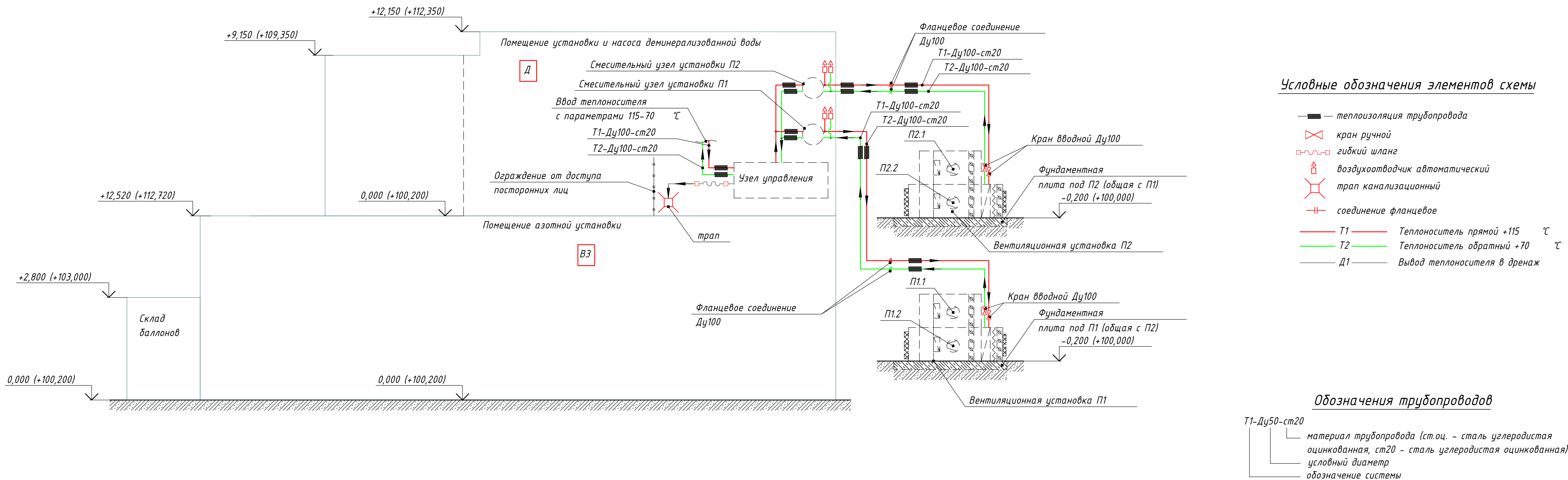
| Обозна-<br>чение<br>системы                                                   | Кол.<br>сис-<br>тем | Наименование<br>обслуживаемого помещения<br>(технологического<br>оборудования) | Тип<br>(наименование) | Вентилятор                              |              |          |              |                       |           |              | Воздухонагреватель    |      |                       |     |                       |               |            | Фильтр                |      |                        | Примечания                                           |
|-------------------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------|-----------------------|-----------------------------------------|--------------|----------|--------------|-----------------------|-----------|--------------|-----------------------|------|-----------------------|-----|-----------------------|---------------|------------|-----------------------|------|------------------------|------------------------------------------------------|
|                                                                               |                     |                                                                                |                       | Исполне-<br>ние по<br>взрыво-<br>защите | L,<br>м3/час | P,<br>Па | n,<br>об/мин | Электродвигатель      |           |              | Тип<br>(наименование) | Кол. | Т-ра наг-<br>рева, °C |     | Расход<br>теплоты, Вт | ΔP, Па        |            | Тип<br>(наименование) | Кол. | ΔP,<br>(чистого)<br>Па |                                                      |
|                                                                               |                     |                                                                                |                       |                                         |              |          |              | Тип<br>(наименование) | N,<br>кВт | n,<br>об/мин |                       |      | от                    | до  |                       | по<br>воздуху | по<br>воде |                       |      |                        |                                                      |
| Здание А 17.710.2 (Здание азотной установки и узла деминерализированной воды) |                     |                                                                                |                       |                                         |              |          |              |                       |           |              |                       |      |                       |     |                       |               |            |                       |      |                        |                                                      |
| П1                                                                            | 1                   | Помещение азотной<br>установки                                                 | блочная               | общепром.                               | 46340        | 450*     | -            | -                     | 15*       | -            | водяной<br>стальной   | 1    | -24                   | +10 | 380200                | -             | -          | G3                    | 1    | -                      | 2 вентилятора<br>(1 раб., 1 рез.)<br>2 режима работы |
| П2                                                                            | 1                   | Помещение установки и насоса<br>деминерализованной воды                        | блочная               | общепром.                               | 36500        | 450*     | -            | -                     | 11*       | -            | водяной<br>стальной   | 1    | -24                   | +10 | 427900                | -             | -          | G3                    | 1    | -                      | 2 вентилятора<br>(1 раб., 1 рез.)                    |
| ПА1, ПА2                                                                      | 2                   | Помещение азотной<br>установки                                                 | осевой                | общепром.                               | 14470        | 300      | -            | -                     | 2,2       | -            | -                     | -    | -                     | -   | -                     | -             | -          | -                     | -    | -                      |                                                      |
| В1,В2,<br>В3                                                                  | 3                   | Помещение азотной<br>установки                                                 | крышный               | общепром.                               | 22560        | 250      | -            | -                     | 5,5       | -            | -                     | -    | -                     | -   | -                     | -             | -          | -                     | -    | -                      | 3 вентилятора<br>(2 раб., 1 рез.)<br>2 режима работы |
| В4-В7                                                                         | 4                   | Помещение установки и насоса<br>деминерализованной воды                        | крышный               | общепром.                               | 8755         | 250      | -            | -                     | 0,75      | -            | -                     | -    | -                     | -   | -                     | -             | -          | -                     | -    | -                      |                                                      |
| ВА1,ВА2                                                                       | 2                   | Помещение азотной<br>установки                                                 | радиальный            | общепром                                | 15080        | 400      | -            | -                     | 3,0       | -            | -                     | -    | -                     | -   | -                     | -             | -          | -                     | -    | -                      |                                                      |
|                                                                               |                     |                                                                                |                       |                                         |              |          |              |                       |           |              |                       |      |                       |     |                       |               |            |                       |      |                        |                                                      |

\*Уточняется при закупке установки по опросному листу от предприятия-изготовителя.

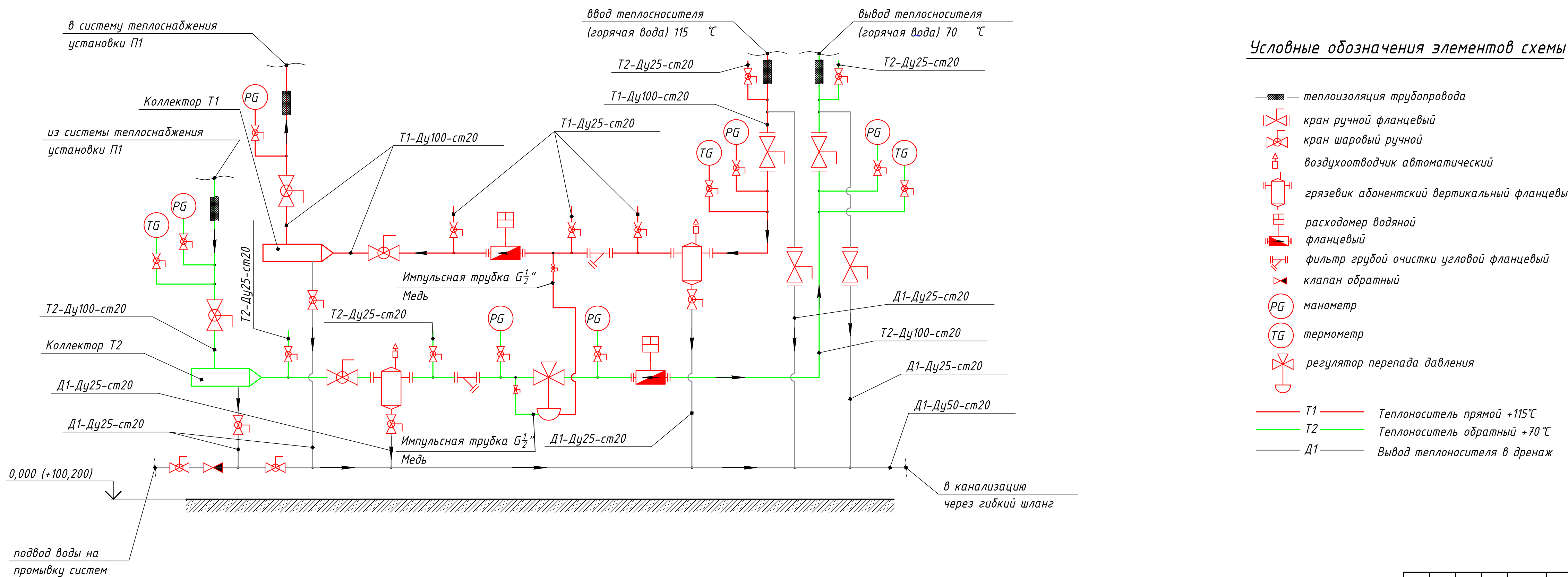
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|-------------|-----------|------|--------|-------|----------|--------------------------------------------------------------------------------------------------------|--|--|-----------------------------------------------------------------------------------------------------------------------|------|--------|
|             |           |      |        |       |          | E230-0001-8000571851-РД-01-10.20.010-ОВ                                                                |  |  |                                                                                                                       |      |        |
|             |           |      |        |       |          | Производство аммиака и карбамида, Кингисепп                                                            |  |  |                                                                                                                       |      |        |
|             |           |      |        |       |          | Россия, Ленинградская область, Кингисеппский район                                                     |  |  |                                                                                                                       |      |        |
| Изм.        | Кол.уч.   | Лист | № док. | Подп. | Дата     | Объект А17.710.2<br>(здание азотной установки и узла деминерализованной воды)<br>Отопление, вентиляция |  |  | Стадия                                                                                                                | Лист | Листов |
| Разработал  | Савватеев |      |        |       | 25.10.23 |                                                                                                        |  |  | Р                                                                                                                     | 3    |        |
| Проверил    | Шишинов   |      |        |       | 25.10.23 | Общие данные (продолжение)                                                                             |  |  |  ООО "ИСМ"<br>г. Санкт-Петербург |      |        |
| Гл. инженер | Афрамов   |      |        |       | 25.10.23 |                                                                                                        |  |  |                                                                                                                       |      |        |
| Н.Контроль  | Акцолова  |      |        |       | 25.10.23 |                                                                                                        |  |  |                                                                                                                       |      |        |
| ГИП         | Неофидова |      |        |       | 25.10.23 |                                                                                                        |  |  |                                                                                                                       |      |        |



Принципиальная схема систем теплоснабжения

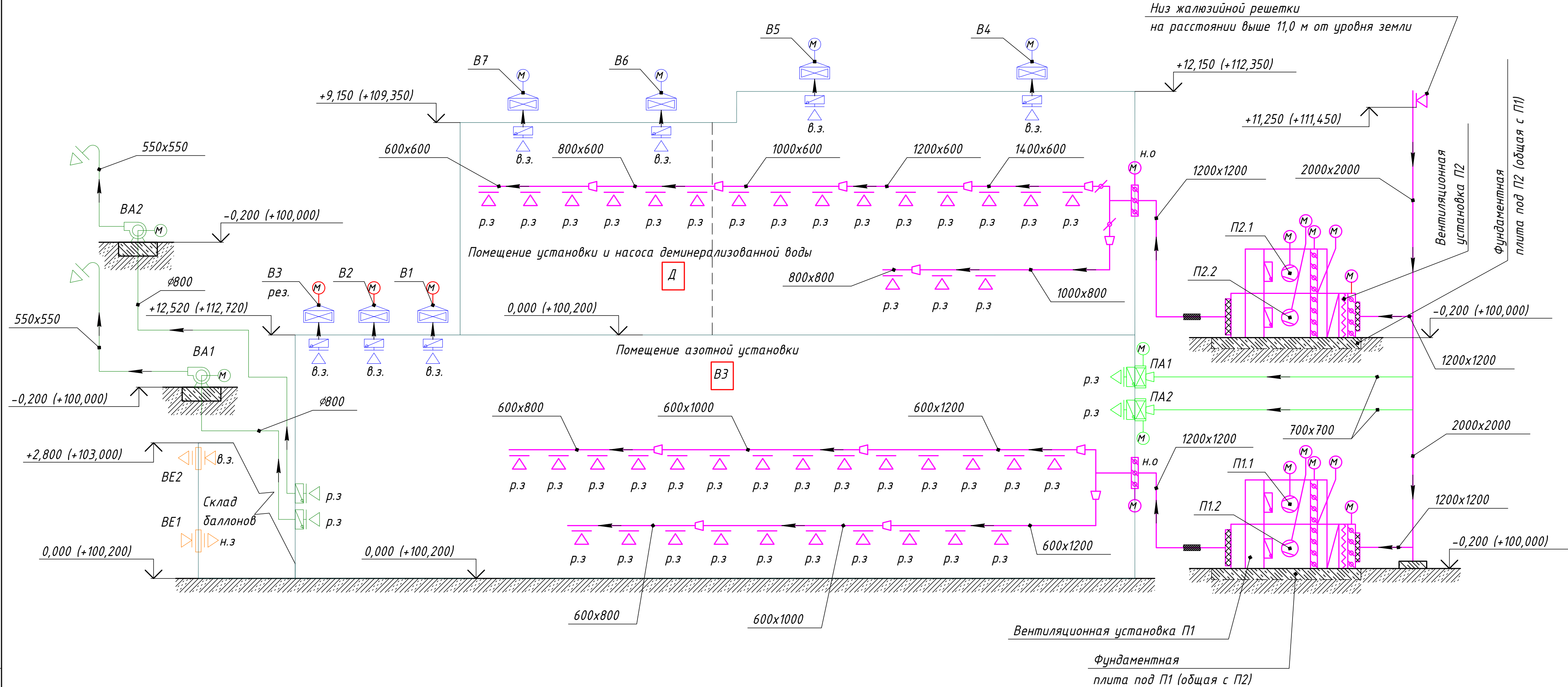


Принципиальная схема узла управления



|             |           |          |          |          |          |                                                            |        |                    |
|-------------|-----------|----------|----------|----------|----------|------------------------------------------------------------|--------|--------------------|
|             |           |          |          |          |          | Е230-0001-8000571851-РД-01-10.20.010-ОВ                    |        |                    |
|             |           |          |          |          |          | Производство аммиака и карбамида, Кингисепп                |        |                    |
|             |           |          |          |          |          | Россия, Ленинградская область, Кингисеппский район         |        |                    |
| Изм.        | Копия     | Лист     | Изд.     | Подп.    | Дата     | Объект А17.710.2                                           | Стация | Лист               |
| Разработал  | Савватеев | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 | (задание азотной установки и узла деминерализованной воды) | Р      | 4                  |
| Проверил    | Шилинов   | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 | Отопление, вентиляция                                      |        |                    |
| Гл. инженер | Афромов   | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 | Схемы систем теплоснабжения                                | ИСМ    | ООО "ИСМ"          |
| Н.Контроль  | Акилова   | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 |                                                            |        | г. Санкт-Петербург |
| ГИП         | Неофидова | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 |                                                            |        |                    |

Принципиальная схема систем вентиляции



Условные обозначения элементов схемы

- теплоизоляция воздуховода
- н.о нормально открытый
- н.з нормально закрытый
- гибкий шланг
- привод элемента вентиляции
- вентилятор радиальный
- клапан воздушный приводной
- отверстие (решетка) для выпуска воздуха
- отверстие (решетка) для забора воздуха
- н.з нижняя зона помещения
- р.з рабочая зона помещения
- в.з верхняя зона помещения
- вентилятор крышный (кровельный)
- клапан обратный воздушный
- вентилятор осевой
- заслонка вентиляционная
- переход

- П1 Система приточная П1/П2
- В1 Система вытяжная В1-В7
- ПА1 Система приточная аварийная ПА1-ПА2
- БА1 Система вытяжная аварийная БА1-БА2
- ВЕ1 Система общеобменная естественная ВЕ1-ВЕ2

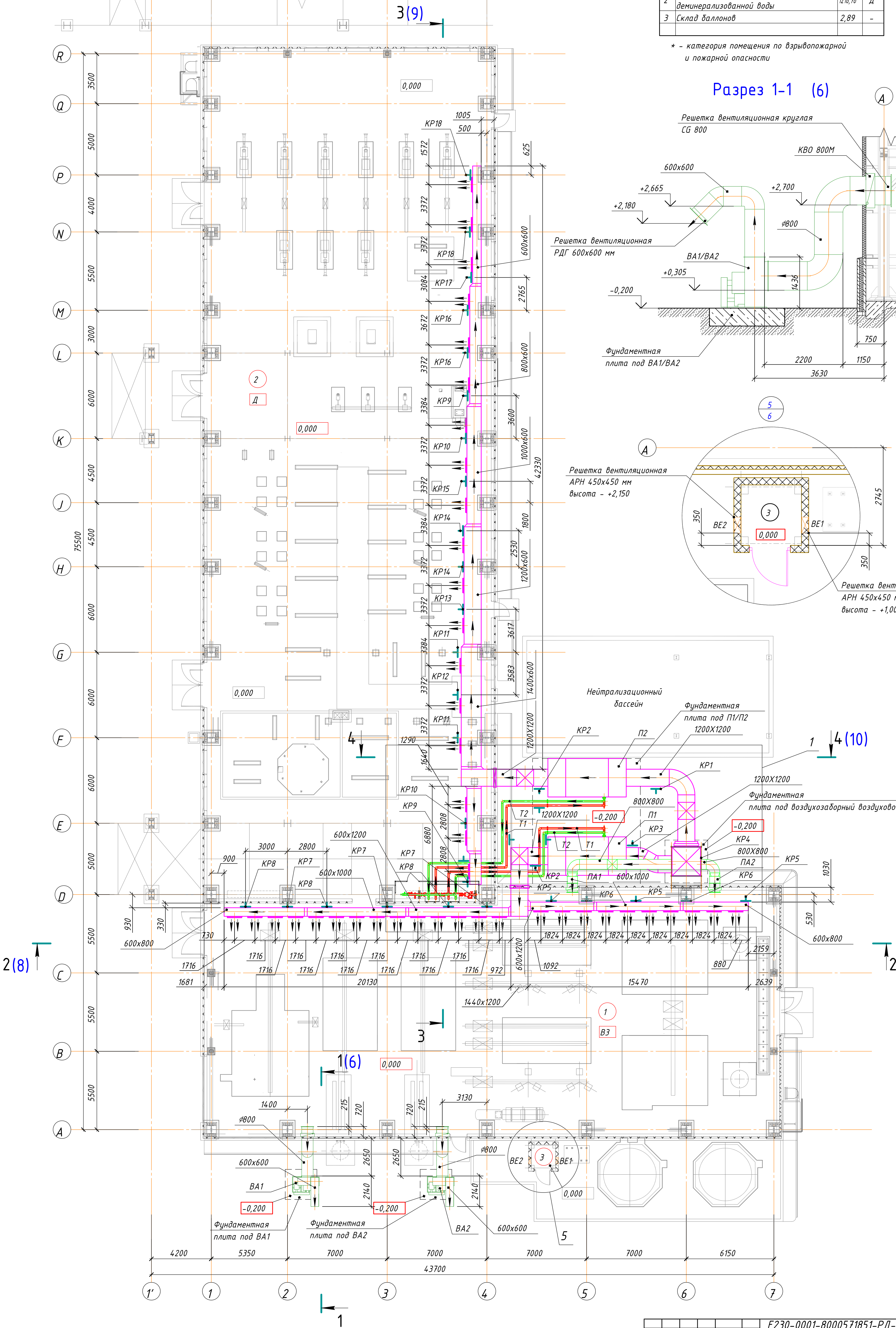
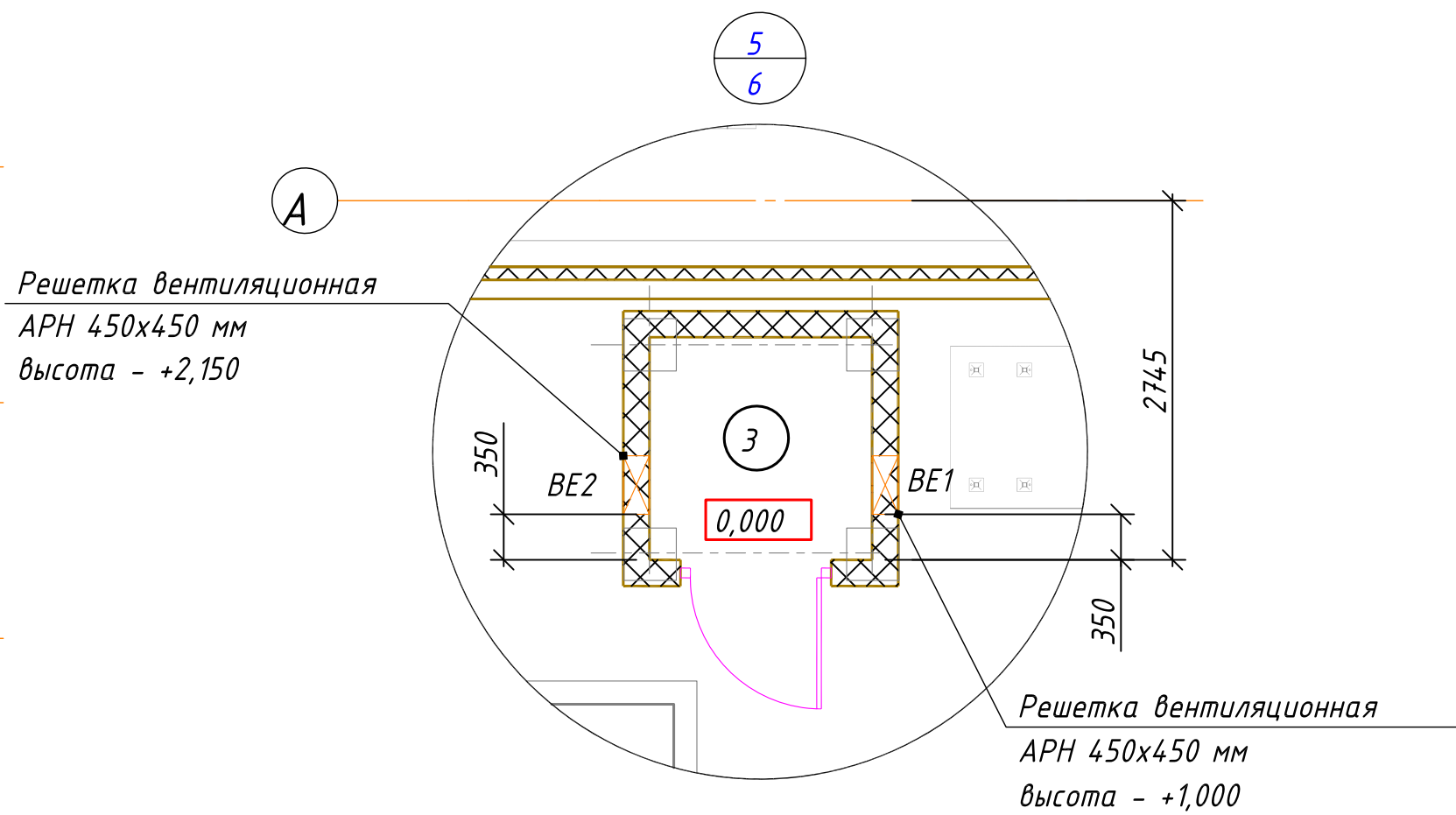
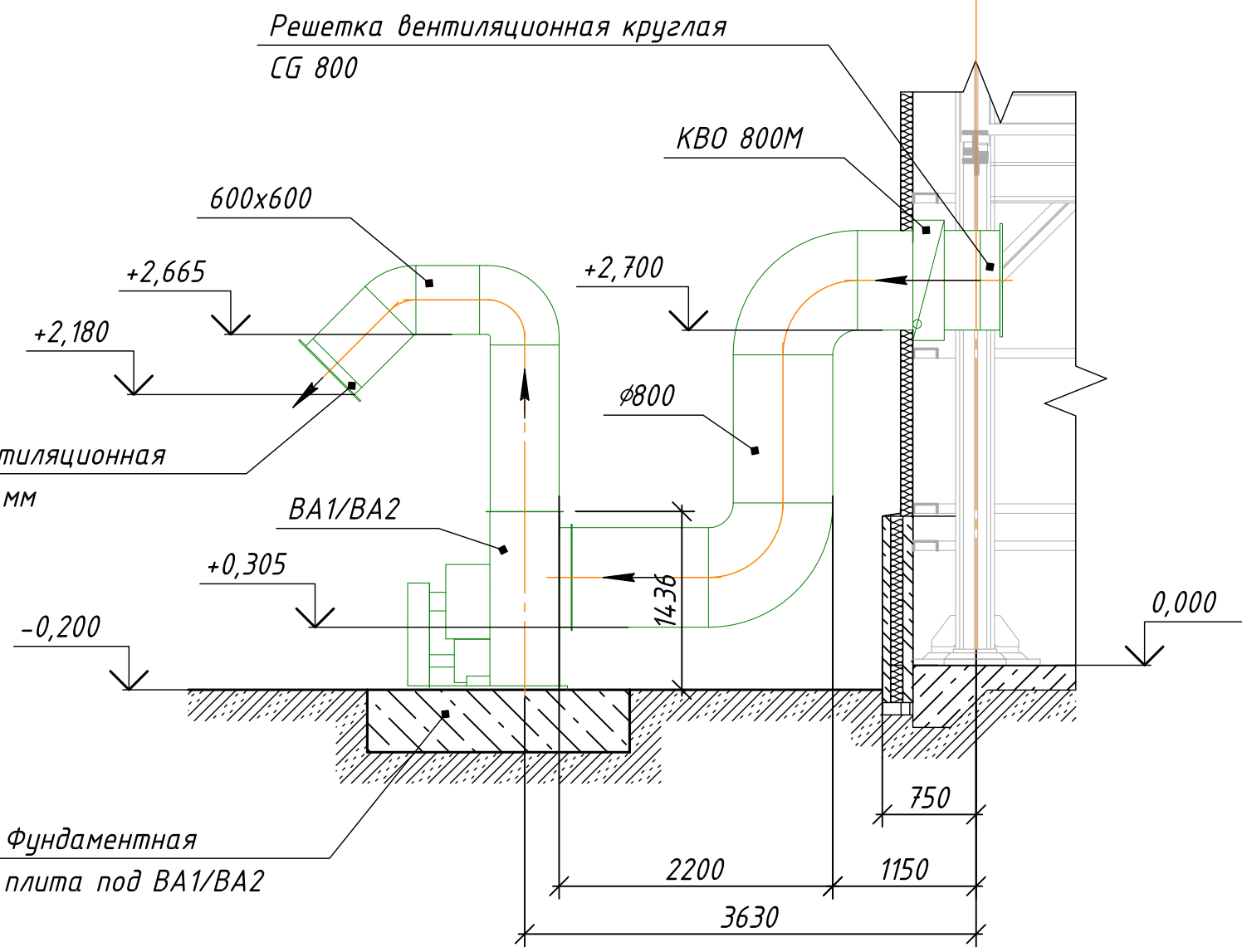
|                                             |           |          |                         |         |          |                                                                                                           |      |        |
|---------------------------------------------|-----------|----------|-------------------------|---------|----------|-----------------------------------------------------------------------------------------------------------|------|--------|
| Производство аммиака и карбамида, Кингисепп |           |          |                         |         |          | Россия, Ленинградская область, Кингисеппский район                                                        |      |        |
| Изм.                                        | Колуч.    | Лист     | № док.                  | Подп.   | Дата     | Объект А17.710.2<br>(здание азотной установки и<br>узла деминерализованной воды)<br>Отопление, вентиляция |      |        |
| Разработал                                  | Савватеев | 25.10.23 | Проверил                | Шушинов | 25.10.23 | Стадия                                                                                                    | Лист | Листов |
|                                             |           |          |                         |         |          | Р                                                                                                         | 5    |        |
| Гл. инженер                                 | Афранов   | 25.10.23 | Н.Контроль              | Акулова | 25.10.23 | ООО "ИСМ"                                                                                                 |      |        |
| ГИП                                         | Неофидова | 25.10.23 | Схемы систем вентиляции |         |          | г. Санкт-Петербург                                                                                        |      |        |



| № п/п | Наименование                                    | Площадь | Кл. ок. |
|-------|-------------------------------------------------|---------|---------|
| 1     | Азотная установка                               | 684,70  | ВЗ      |
| 2     | Установка и насосная<br>деминерализованной воды | 1218,78 | Д       |
| 3     | Склад баллонов                                  | 2,89    | -       |

\* - категория помещения по взрывопожарной  
и пожарной опасности

Разрез 1-1 (6)

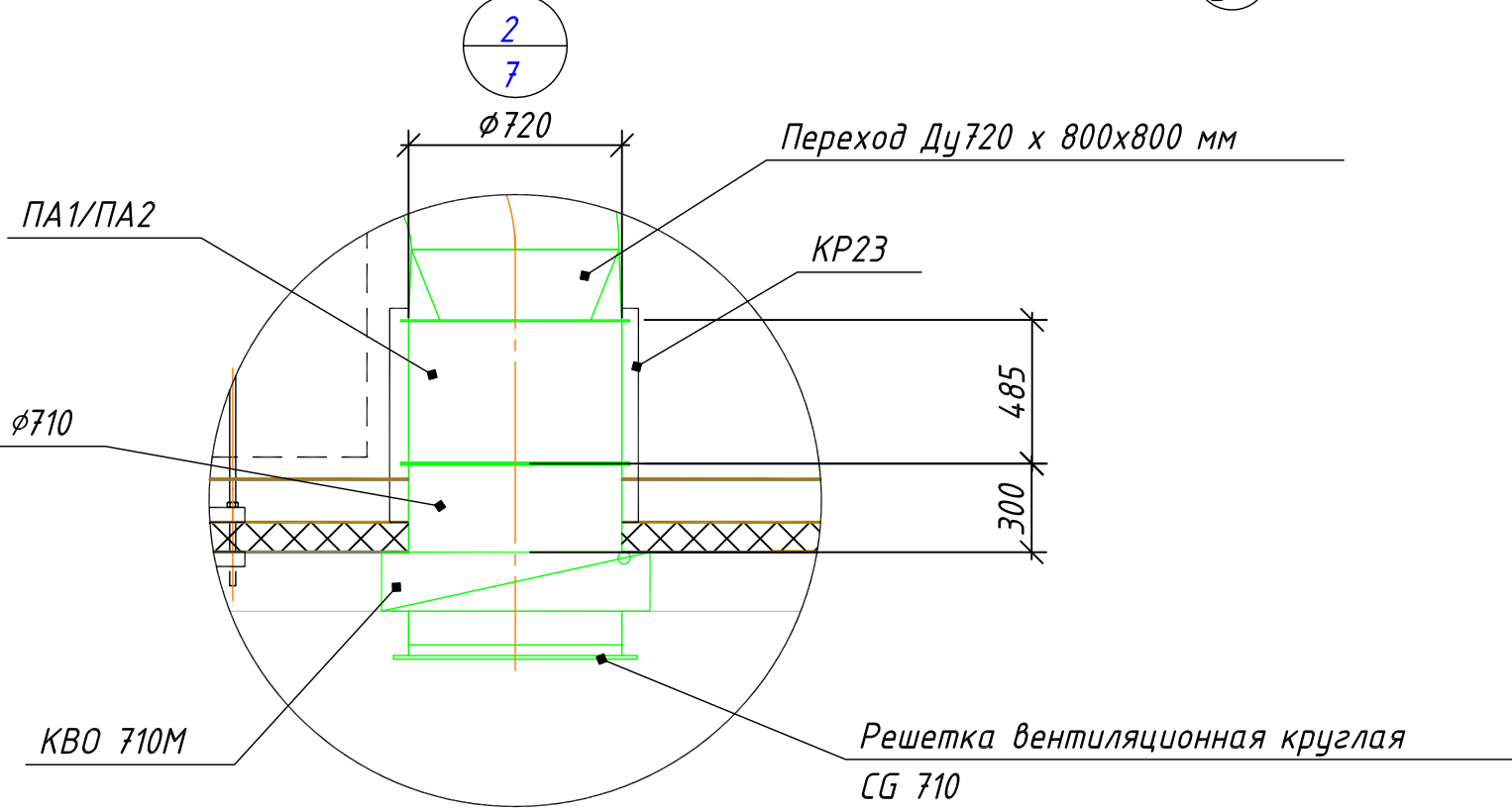
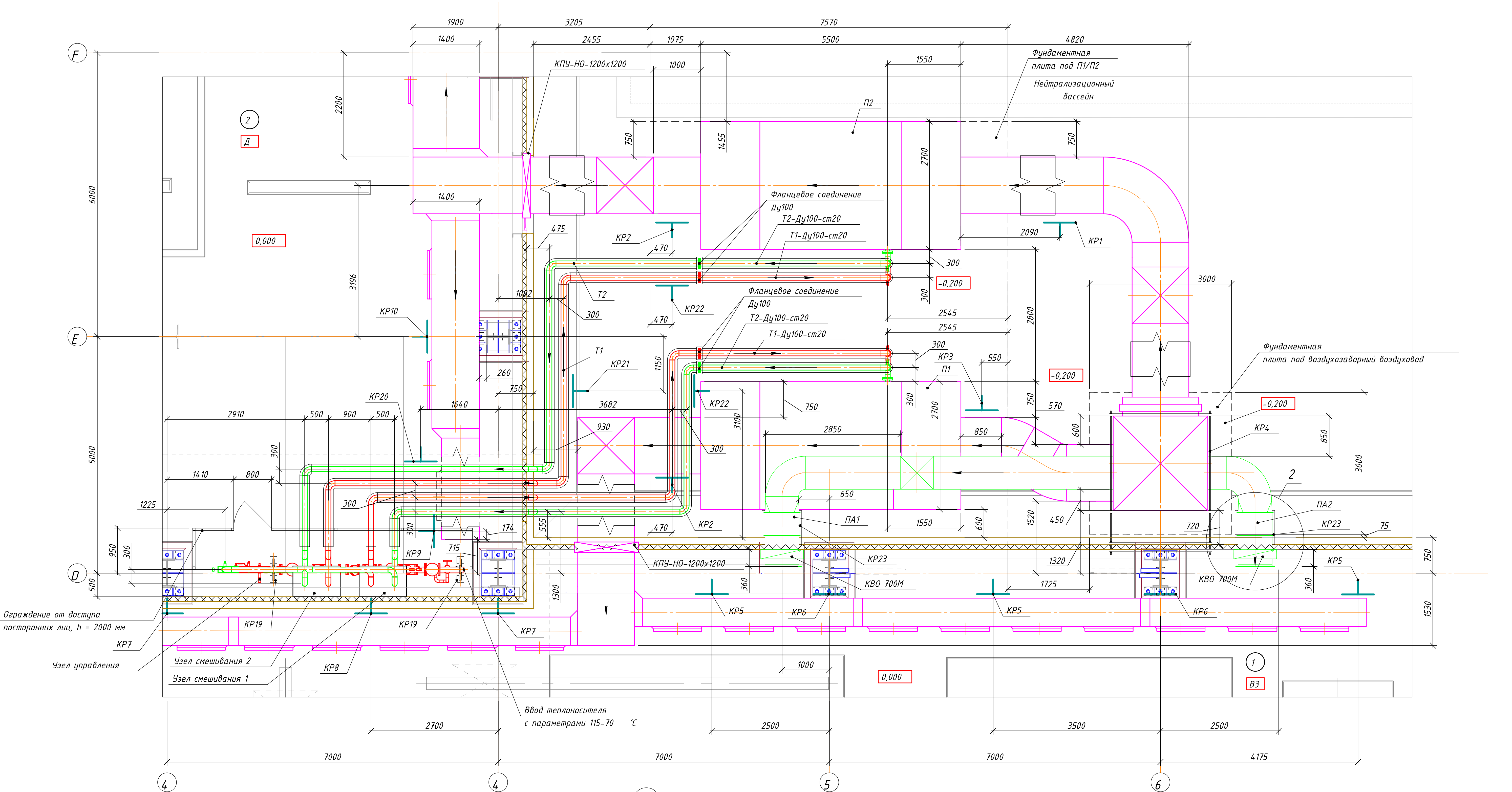


|                                                                                                   |           |          |        |                                                                                       |          |                                                                                  |  |                                                                                       |           |
|---------------------------------------------------------------------------------------------------|-----------|----------|--------|---------------------------------------------------------------------------------------|----------|----------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------|-----------|
| Е230-0001-8000571851-РД-01-10.20.010-ОВ                                                           |           |          |        |                                                                                       |          |                                                                                  |  |                                                                                       |           |
| Производство аммиака и карбамида, Кингисепп<br>Россия, Ленинградская область, Кингисеппский район |           |          |        |                                                                                       |          |                                                                                  |  |                                                                                       |           |
| Изм.                                                                                              | Коллч.    | Лист     | № док. | Подп.                                                                                 | Дата     | Объект А17.710.2<br>(здание азотной установки и<br>узла деминерализованной воды) |  | Стадия                                                                                | Лист      |
| Разработал                                                                                        | Савватеев | 25.02.23 |        |  | 25.02.23 | Отопление, вентиляция                                                            |  | Р                                                                                     | 6         |
| Проверил                                                                                          | Шашин     | 25.02.23 |        |                                                                                       |          |                                                                                  |  |                                                                                       |           |
| Гл. инженер                                                                                       | Аврамов   | 25.02.23 |        |  | 25.02.23 |                                                                                  |  |                                                                                       |           |
| Н.Контроль                                                                                        | Акулова   | 25.02.23 |        |                                                                                       | 25.02.23 |                                                                                  |  |                                                                                       |           |
| ГИП                                                                                               | Неофудова | 25.02.23 |        |  | 25.02.23 | План на отм. 0,000 (+100.200)                                                    |  |  | ООО "ИСМ" |
|                                                                                                   |           |          |        |                                                                                       |          |                                                                                  |  | г. Санкт-Петербург                                                                    |           |



1  
6

Фрагмент плана на отм. 0,000 (+100.200)  
М 1: 40

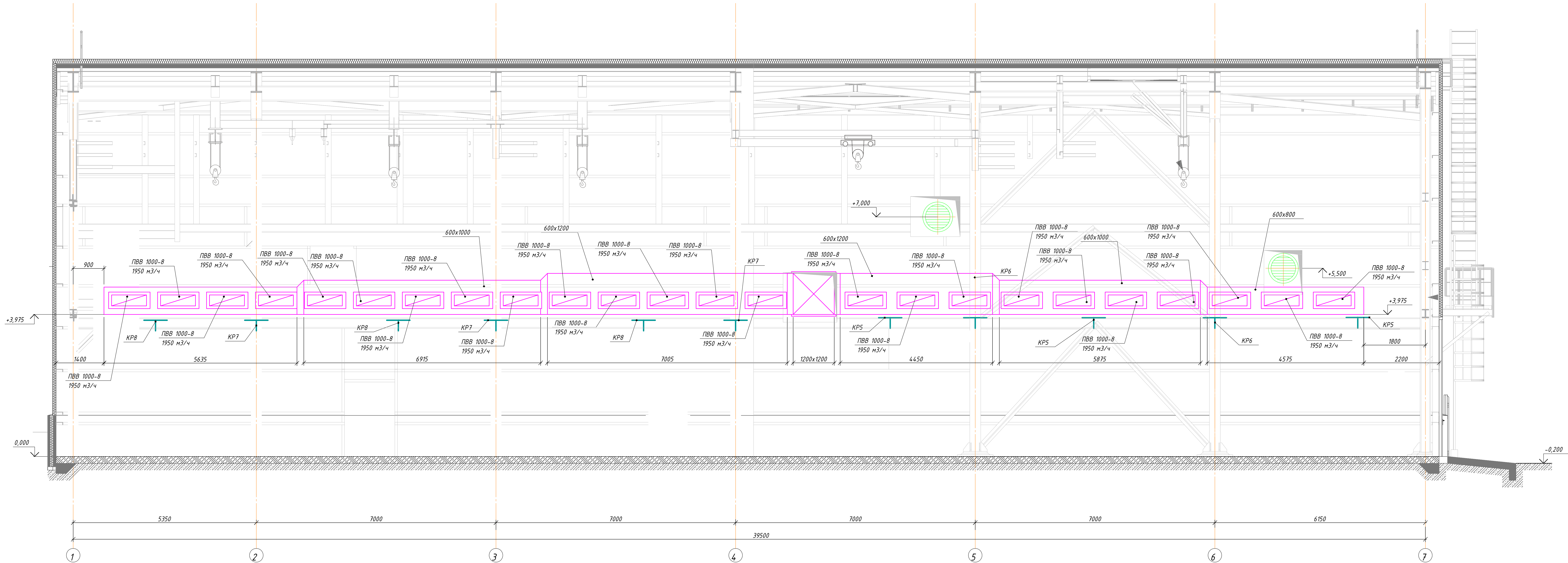


|              |              |              |             |
|--------------|--------------|--------------|-------------|
| Инв. № подл. | Подп. и дата | Взам. инв. № | Согласовано |
|              |              |              |             |

|                                                                  |           |          |          |          |          |                                             |      |        |
|------------------------------------------------------------------|-----------|----------|----------|----------|----------|---------------------------------------------|------|--------|
| E230-0001-8000571851-РД-01-10.20.010-ОВ                          |           |          |          |          |          | Производство аммиака и карбамида, Кингисепп |      |        |
| Россия, Ленинградская область, Кингисеппский район               |           |          |          |          |          | Объект А17.710.2                            |      |        |
| (задание азотной установки и узла деаэрации/деаэрированной воды) |           |          |          |          |          | Отопление, вентиляция                       |      |        |
| Изм.                                                             | Колуч.    | Лист     | Изд.     | Подп.    | Дата     | Статус                                      | Лист | Листов |
| Разработал                                                       | Савватеев | Шилинов  | 25.02.23 | 25.02.23 | 25.02.23 | Р                                           | 7    |        |
| Гл. инженер                                                      | Афромов   | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 | ООО "ИСМ"                                   |      |        |
| Н.Контроль                                                       | Акилова   | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 | г. Санкт-Петербург                          |      |        |
| ГИП                                                              | Неофидова | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 | Фрагмент плана на отм. 0,000 (+100.200)     |      |        |
| E230-0001-8000571851-РД-01-10.20.010-ОВ_1_0_RU_IFC.dwg           |           |          |          |          |          | Формат А1                                   |      |        |



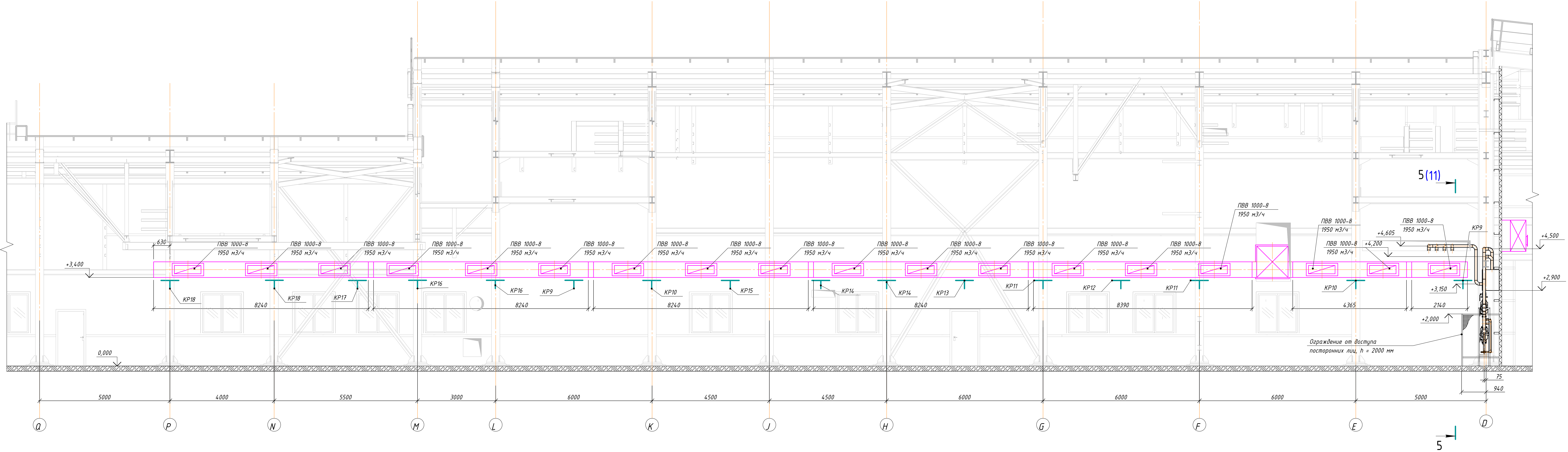
Разрез 2-2 (6)



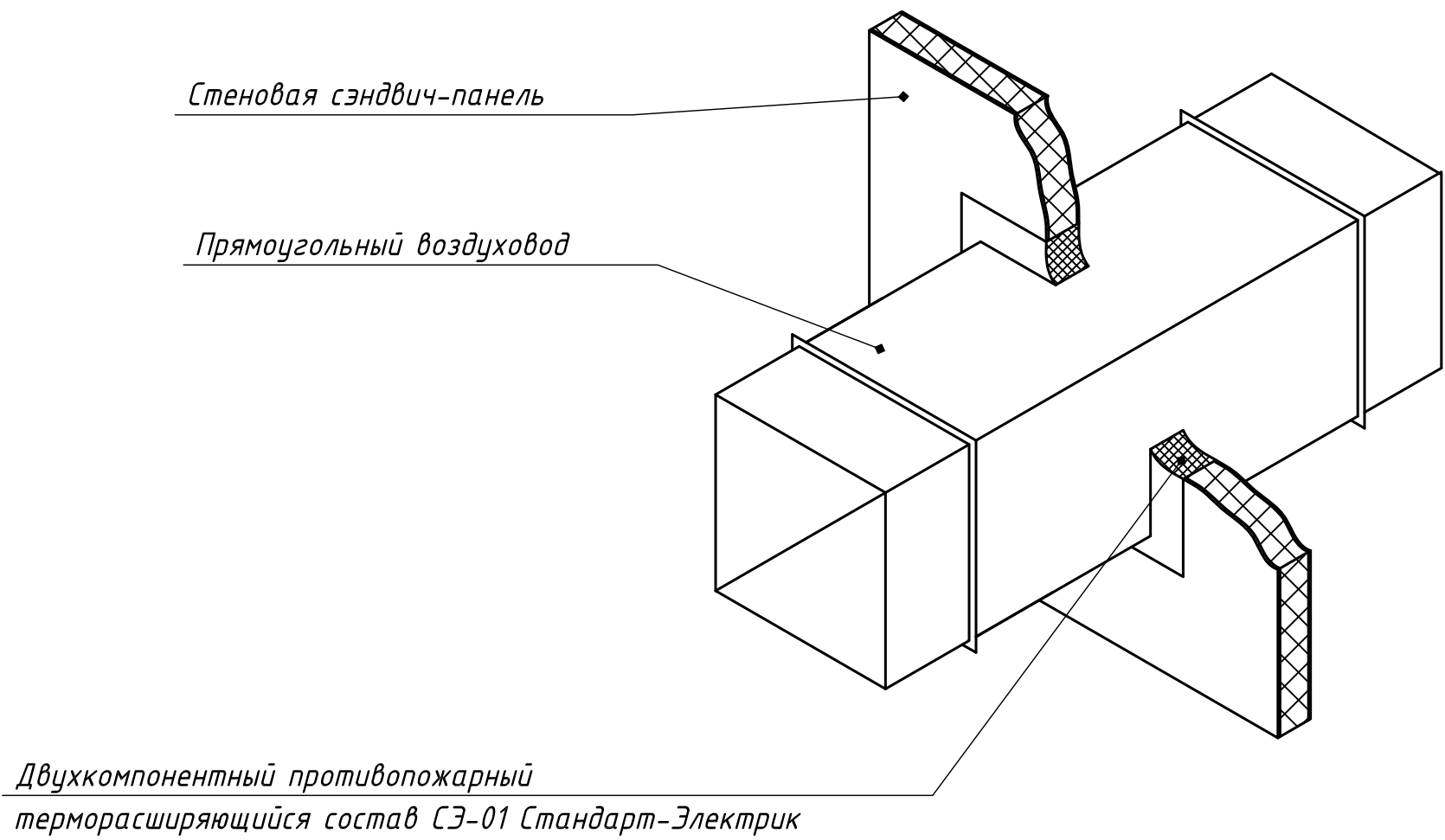
|                                                    |           |        |                       |       |      |                  |                    |      |        |
|----------------------------------------------------|-----------|--------|-----------------------|-------|------|------------------|--------------------|------|--------|
| E230-0001-8000571851-РД-01-10.20.010-0В            |           |        |                       |       |      |                  |                    |      |        |
| Производство аммиака и карбамида, Кингисепп        |           |        |                       |       |      |                  |                    |      |        |
| Россия, Ленинградская область, Кингисеппский район |           |        |                       |       |      |                  |                    |      |        |
| Изм.                                               | Колуч.    | Лист   | Вход                  | Подп. | Дата | Объект А17 710.2 |                    |      |        |
| Разработал                                         | Савватеев | 5.9.22 | Издание: 01.01.2022   |       |      |                  | Стр.               | Лист | Листов |
| Проверил                                           | Шиманов   | 5.9.22 | (издание: 01.01.2022) |       |      |                  | Р                  | 8    |        |
| Гл. инженер                                        | Абрамов   | 5.9.22 | Издание: 01.01.2022   |       |      |                  | ООО "ИСМ"          |      |        |
| Инженер                                            | Акулиба   | 5.9.22 | Издание: 01.01.2022   |       |      |                  | г. Санкт-Петербург |      |        |
| ГИП                                                | Неофидова | 5.9.22 | Издание: 01.01.2022   |       |      |                  | Формат А2х3        |      |        |



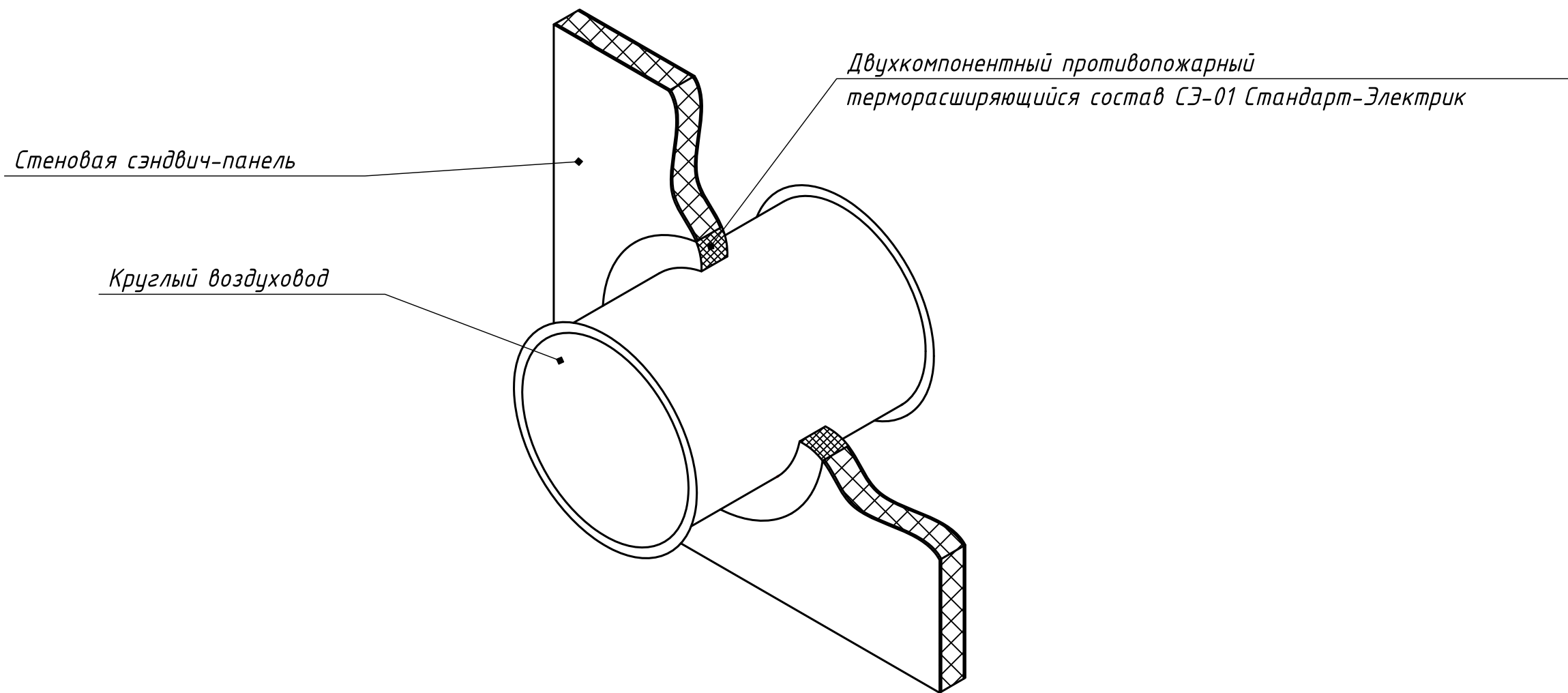
Разрез 3-3 (6)



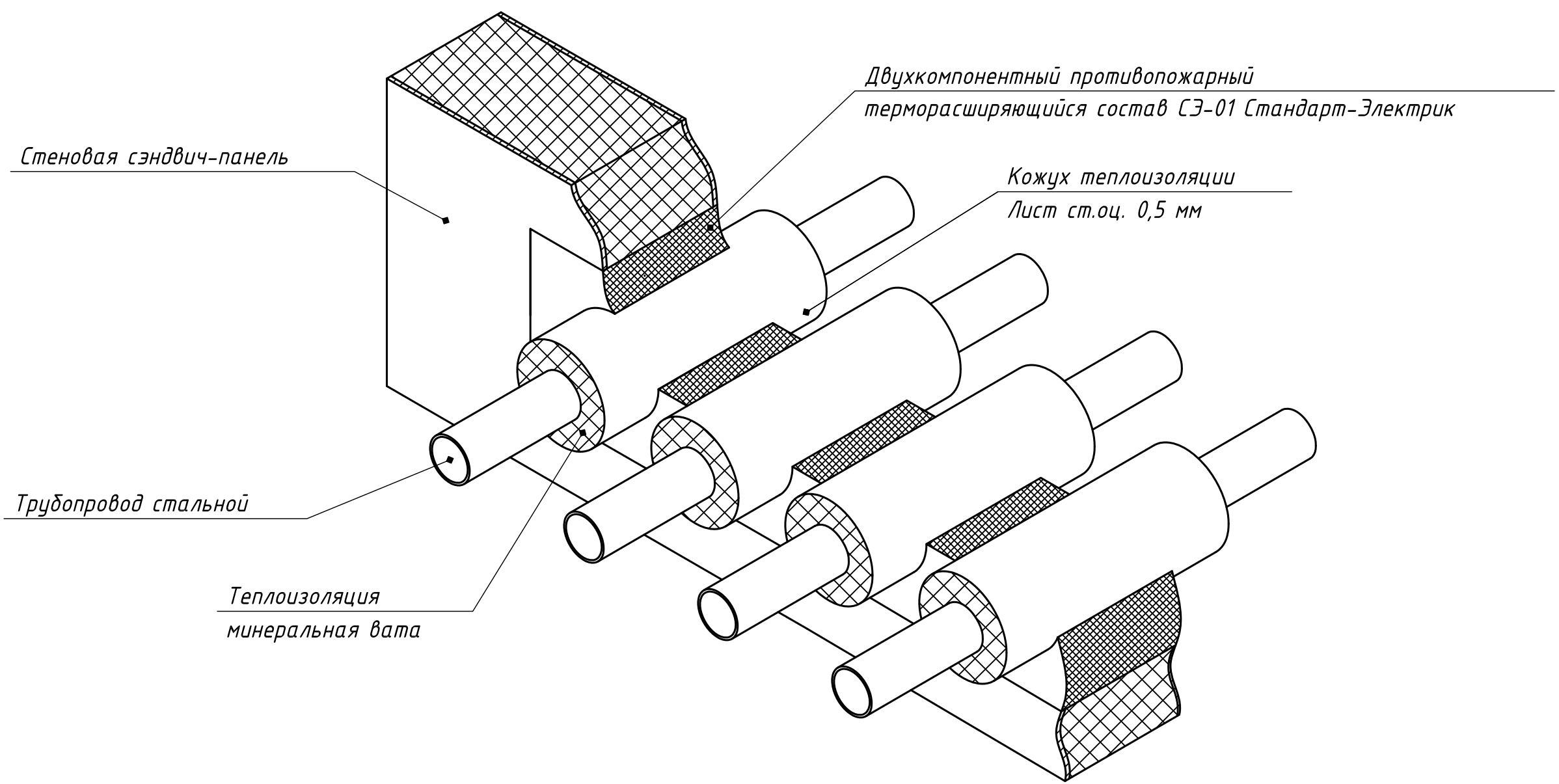
Типовой узел прохода воздуховода прямоугольного



Типовой узел прохода воздуховода круглого



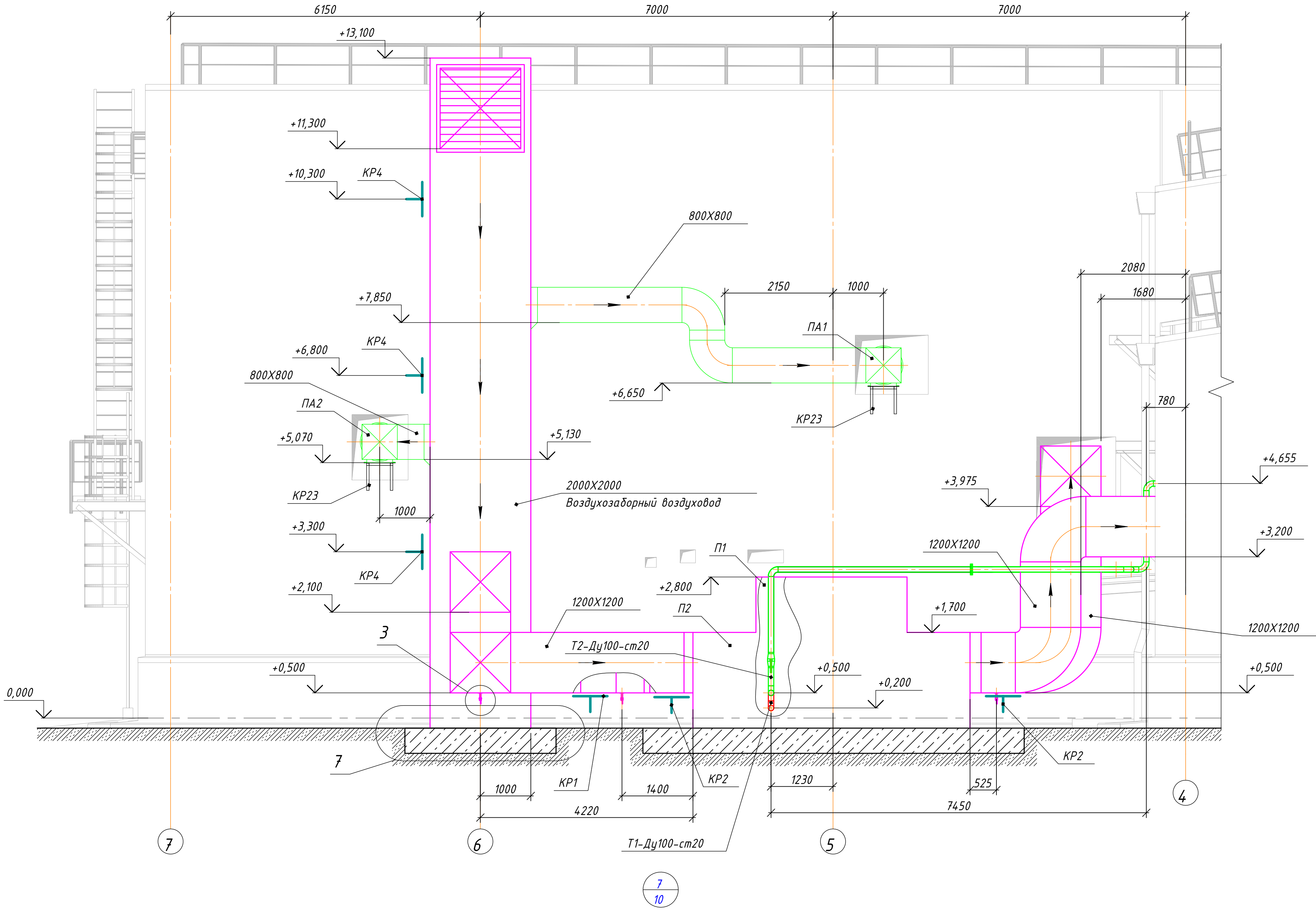
Типовой узел прохода трубопровода



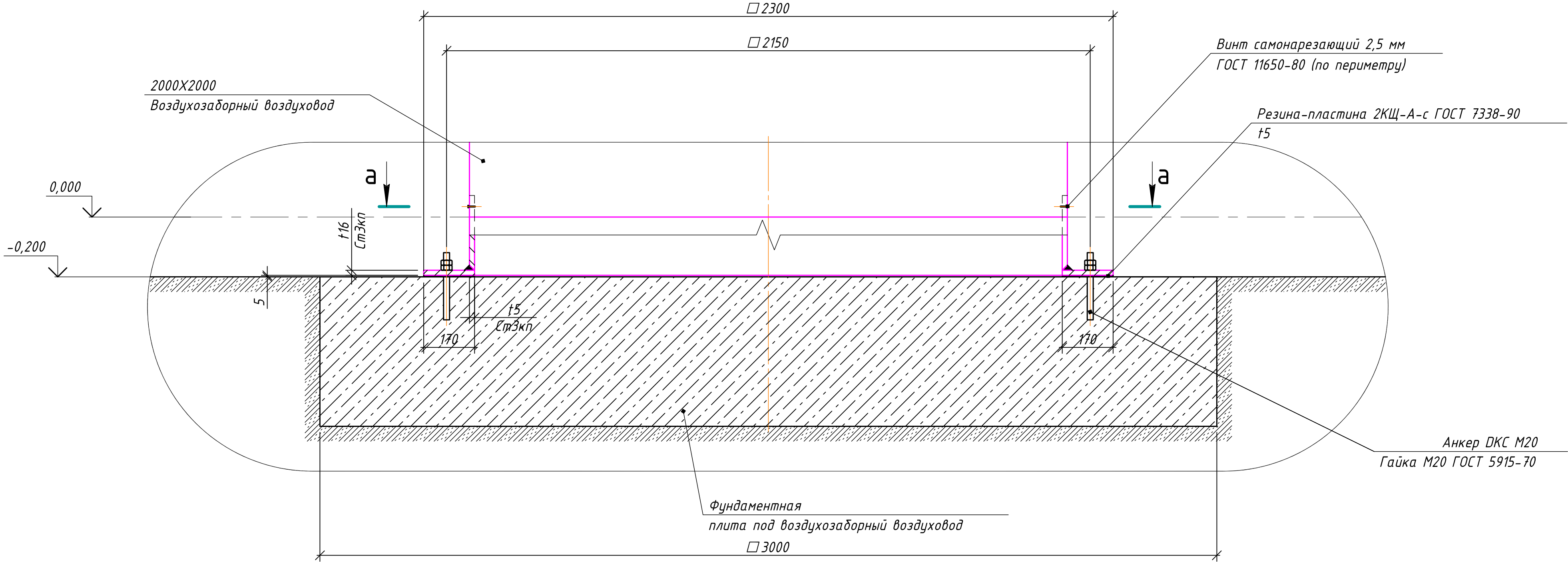
|                                         |           |        |      |       |      |                                             |  |  |                                                    |  |  |
|-----------------------------------------|-----------|--------|------|-------|------|---------------------------------------------|--|--|----------------------------------------------------|--|--|
| E230-0001-8000571851-РД-01-10.20.010-ОВ |           |        |      |       |      | Производство аммиака и карбамида, Кингисепп |  |  | Россия, Ленинградская область, Кингисеппский район |  |  |
| Изм.                                    | Колуч.    | Лист   | Вход | Подп. | Дата | Объект А17 710.2                            |  |  | Издание эскизной установки и                       |  |  |
| Разработка                              | Савватеев | 5.8.12 |      |       |      | узла (вентиляционная вода)                  |  |  | Отопление, вентиляция                              |  |  |
| Проверка                                | Ильиников | 5.8.12 |      |       |      |                                             |  |  |                                                    |  |  |
| Гл. инженер                             | Абрамов   | 5.8.12 |      |       |      |                                             |  |  |                                                    |  |  |
| Н.Контроль                              | Ахулова   | 5.8.12 |      |       |      |                                             |  |  |                                                    |  |  |
| ГИП                                     | Неофидова | 5.8.12 |      |       |      |                                             |  |  |                                                    |  |  |
| Разрез 3-3                              |           |        |      |       |      | 000 "ИСМ"                                   |  |  | г. Санкт-Петербург                                 |  |  |
|                                         |           |        |      |       |      | Формат А2х3                                 |  |  |                                                    |  |  |



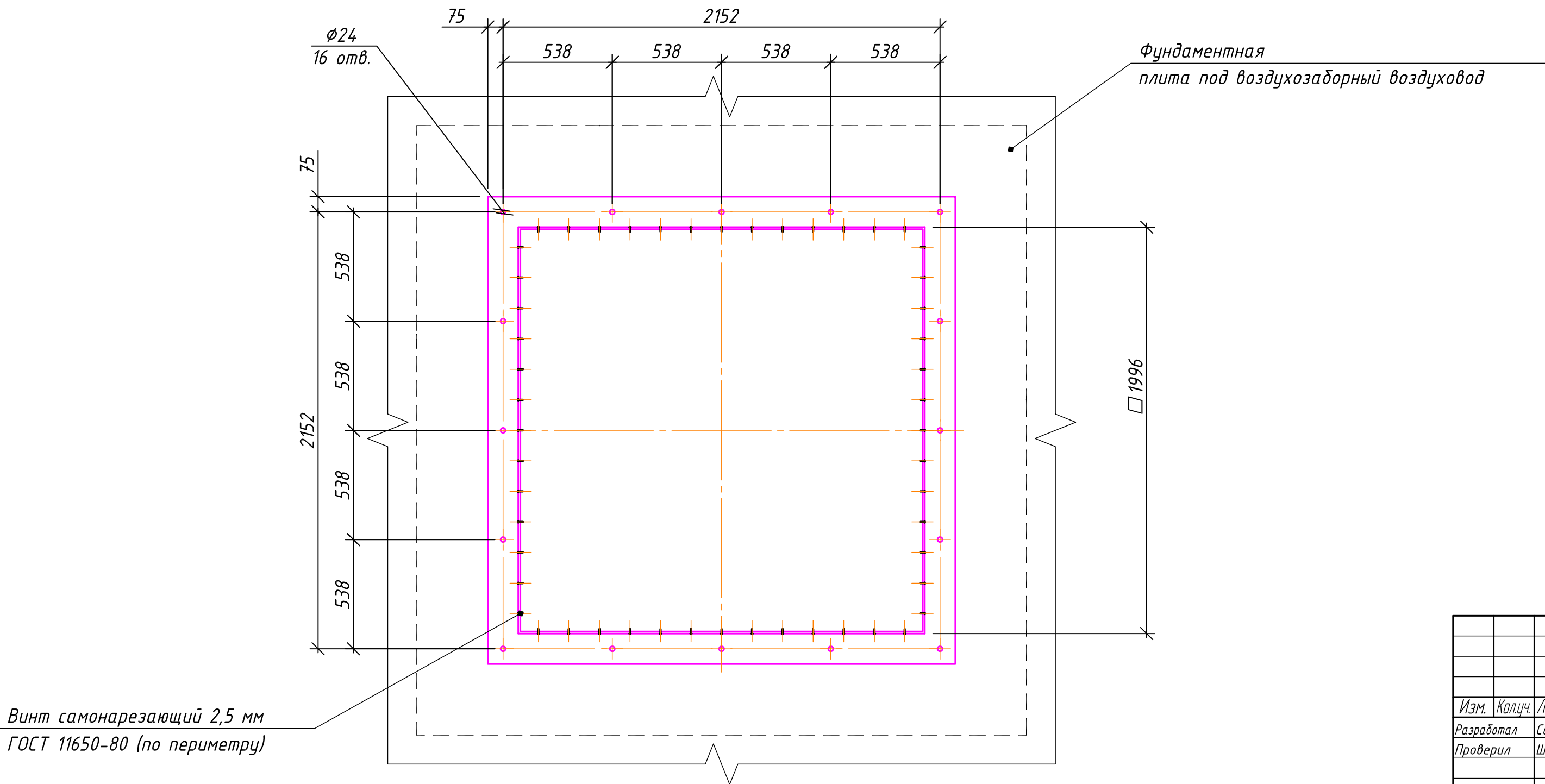
Разрез 4-4 (6)



Узел крепления воздухозаборного воздуховода



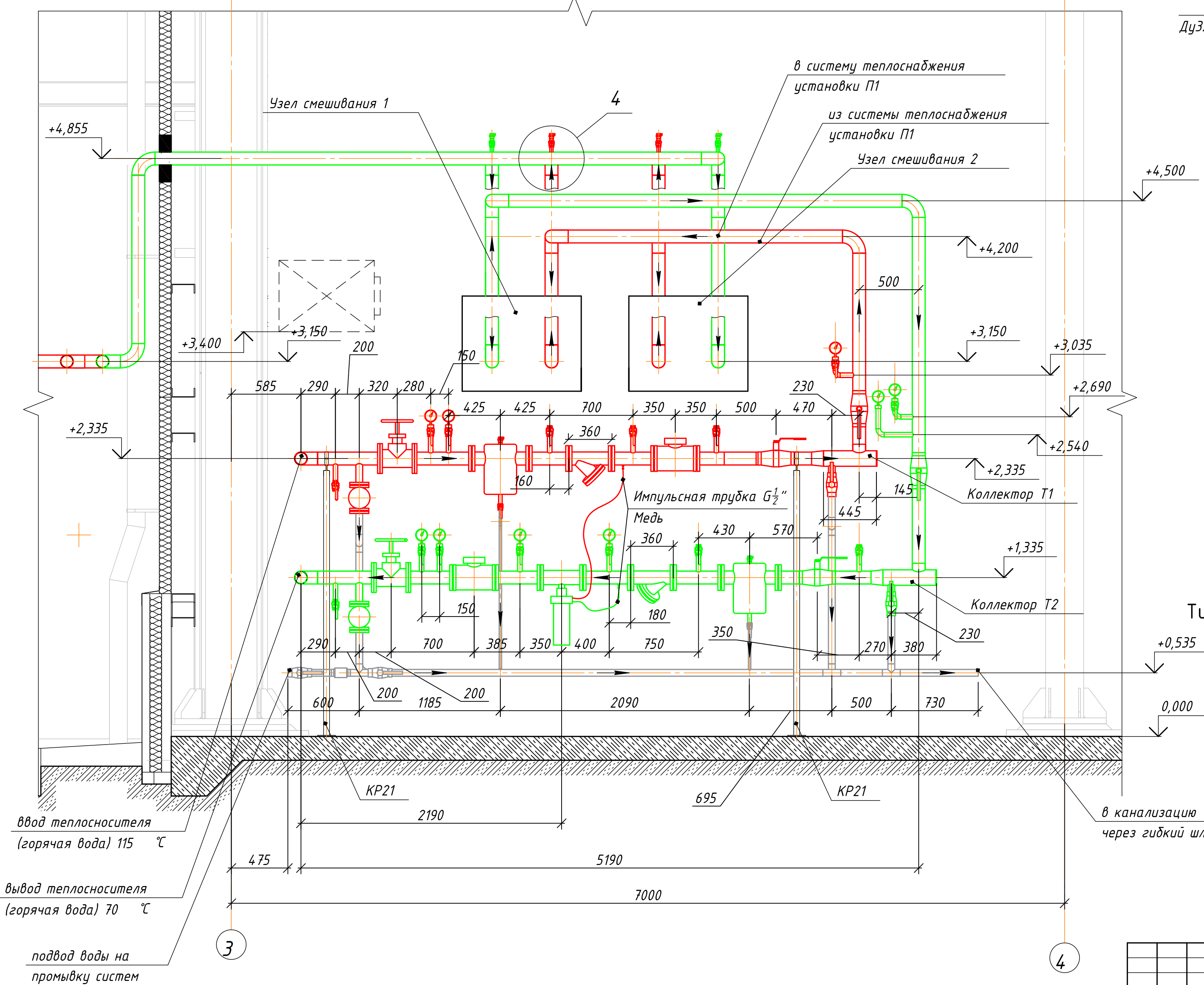
Разрез а-а



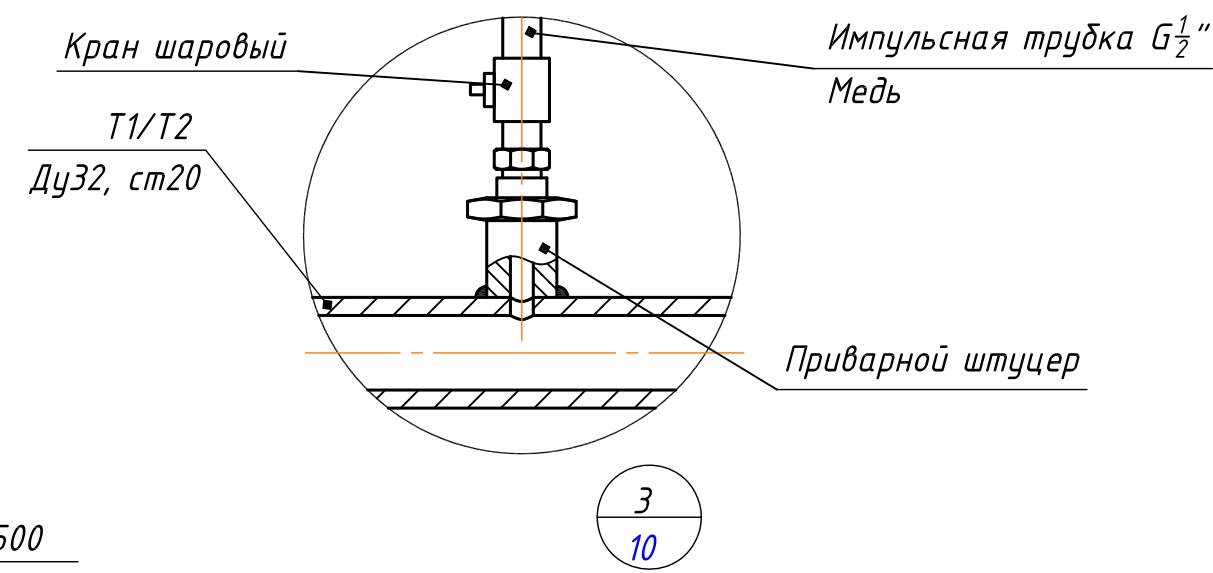
|                                                    |           |          |          |       |      |                                                           |
|----------------------------------------------------|-----------|----------|----------|-------|------|-----------------------------------------------------------|
| E230-0001-8000571851-РД-01-10.20.010-0В            |           |          |          |       |      |                                                           |
| Производство аммиака и карбамида, Кингисепп        |           |          |          |       |      |                                                           |
| Россия, Ленинградская область, Кингисеппский район |           |          |          |       |      |                                                           |
| Изм.                                               | Кол.      | Лист     | № док.   | Подп. | Дата | Статус                                                    |
| Разработал                                         | Савватеев | 25.02.23 | 25.02.23 |       |      | Объект А17 710.2                                          |
| Проверил                                           | Шашин     | 25.02.23 | 25.02.23 |       |      | (здание азотной установки и узла деминерализованной воды) |
|                                                    |           |          |          |       |      | Отопление, вентиляция                                     |
| Гл. инженер                                        | Афрямов   | 25.02.23 | 25.02.23 |       |      | Р                                                         |
| Н.Контроль                                         | Акулова   | 25.02.23 | 25.02.23 |       |      | Л                                                         |
| ГИП                                                | Неофидова | 25.02.23 | 25.02.23 |       |      | Л                                                         |
| Разрез 4-4                                         |           |          |          |       |      | ООО "ИСМ"                                                 |
|                                                    |           |          |          |       |      | г. Санкт-Петербург                                        |
|                                                    |           |          |          |       |      | Формат А1                                                 |

Разрез 5-5 (9)

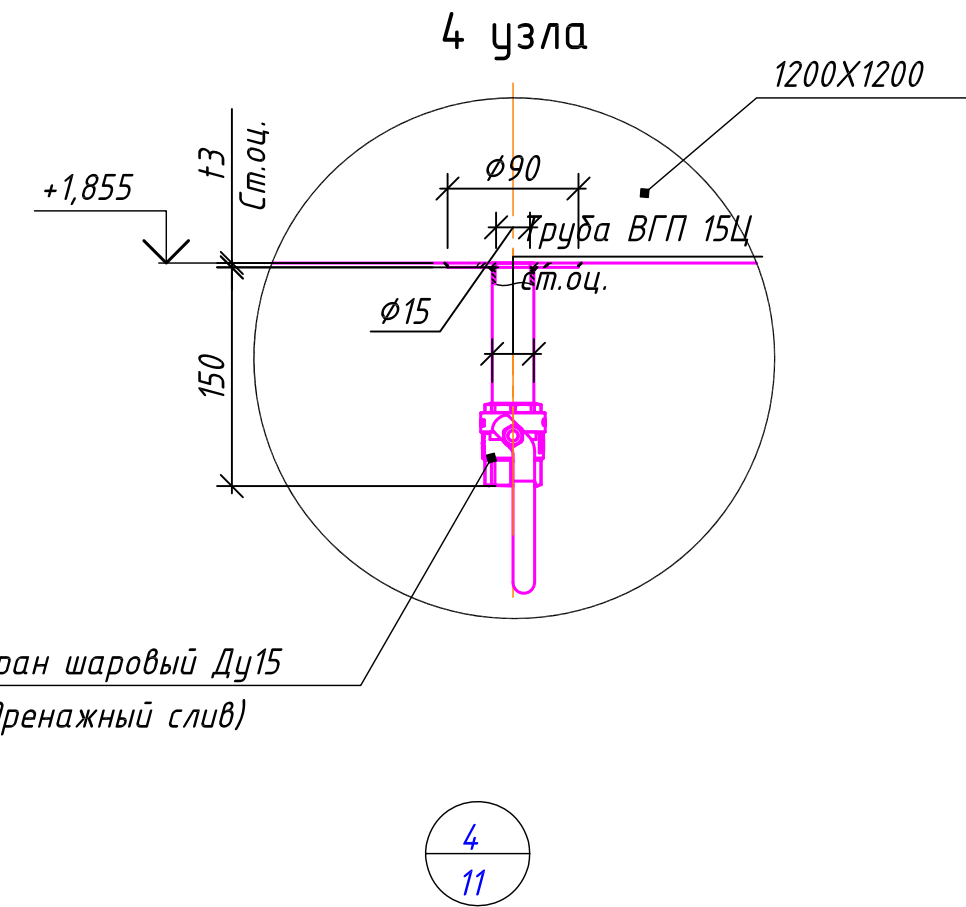
Узел управления теплоснабжения установок П1/П2



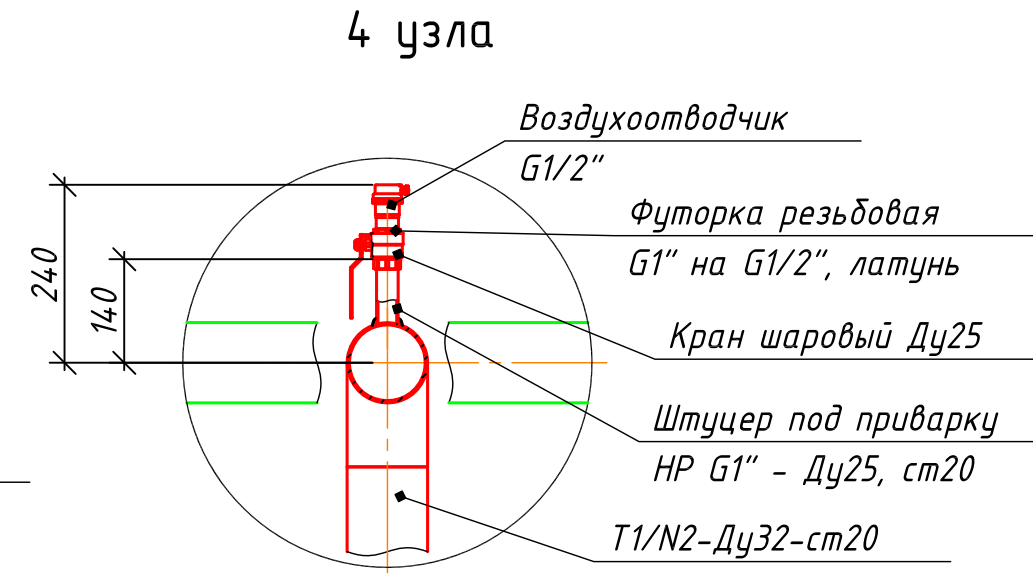
Подключение импульсных трубок к Т1/Т2



Типовой дренажный узел



Типовой узел подключения воздухоотводчика



1. Узлы смешивания предоставляются поставщиком оборудования теплоснабжения.

|                                                           |           |          |        |       |      |                                             |      |        |
|-----------------------------------------------------------|-----------|----------|--------|-------|------|---------------------------------------------|------|--------|
| E230-0001-8000571851-РД-01-10.20.010-ОВ                   |           |          |        |       |      | Производство аммиака и карбамида, Кингисепп |      |        |
| Россия, Ленинградская область, Кингисеппский район        |           |          |        |       |      | Объект А17.710.2                            |      |        |
| (зданье азотной установки и узла деминерализованной воды) |           |          |        |       |      | Отопление, вентиляция                       |      |        |
| Изм.                                                      | Коллч.    | Лист     | № док. | Подп. | Дата | Стадия                                      | Лист | Листов |
| Разработал                                                | Савватеев | 25.10.23 |        |       |      | Р                                           | 11   |        |
| Проверил                                                  | Шишинов   | 25.10.23 |        |       |      |                                             |      |        |
| Гл. инженер                                               | Афромов   | 25.10.23 |        |       |      |                                             |      |        |
| Н.Контроль                                                | Акулова   | 25.10.23 |        |       |      |                                             |      |        |
| ГИП                                                       | Неофидова | 25.10.23 |        |       |      |                                             |      |        |

Разрез 5-5

ООО "ИСМ"

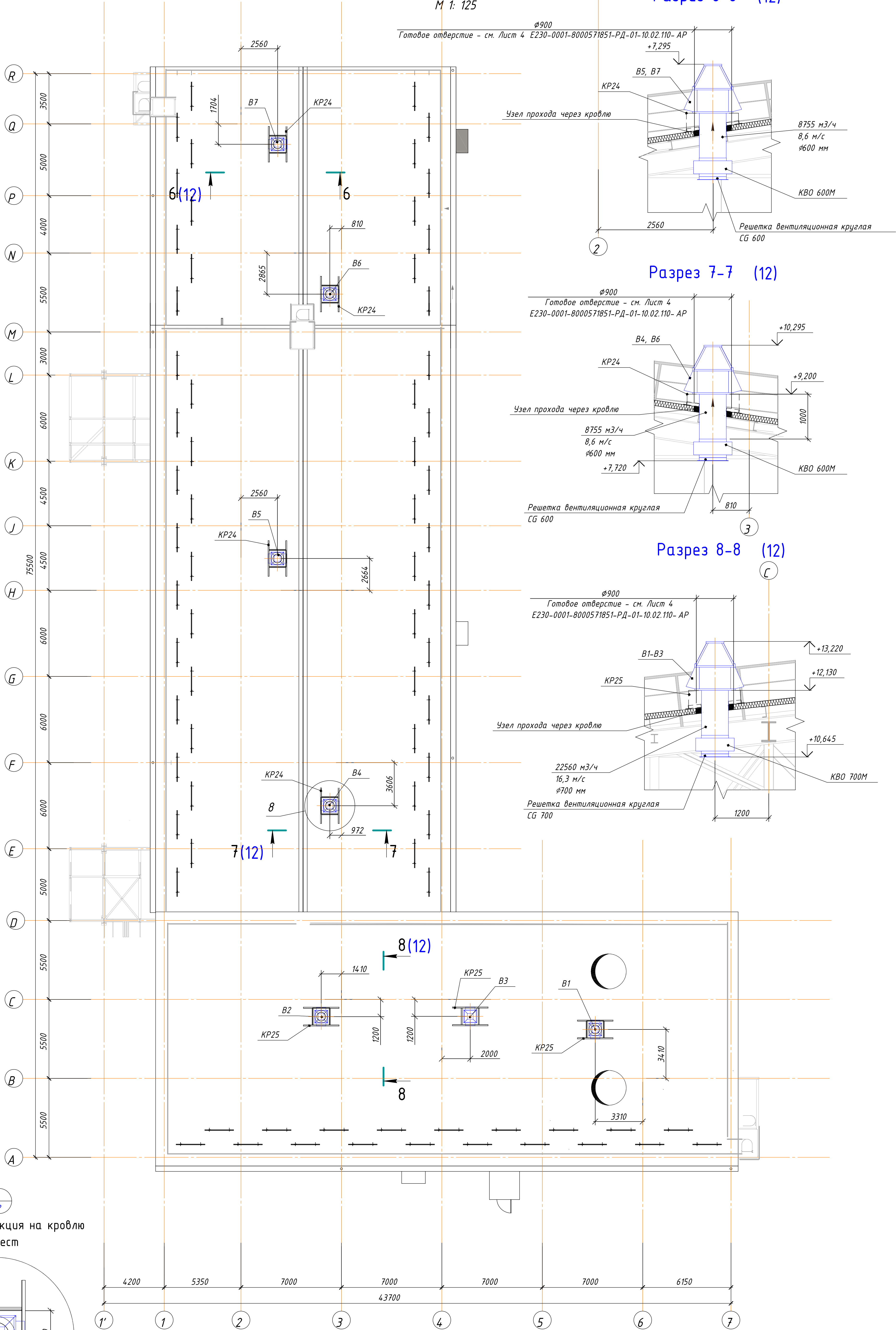
г. Санкт-Петербург

Формат А2

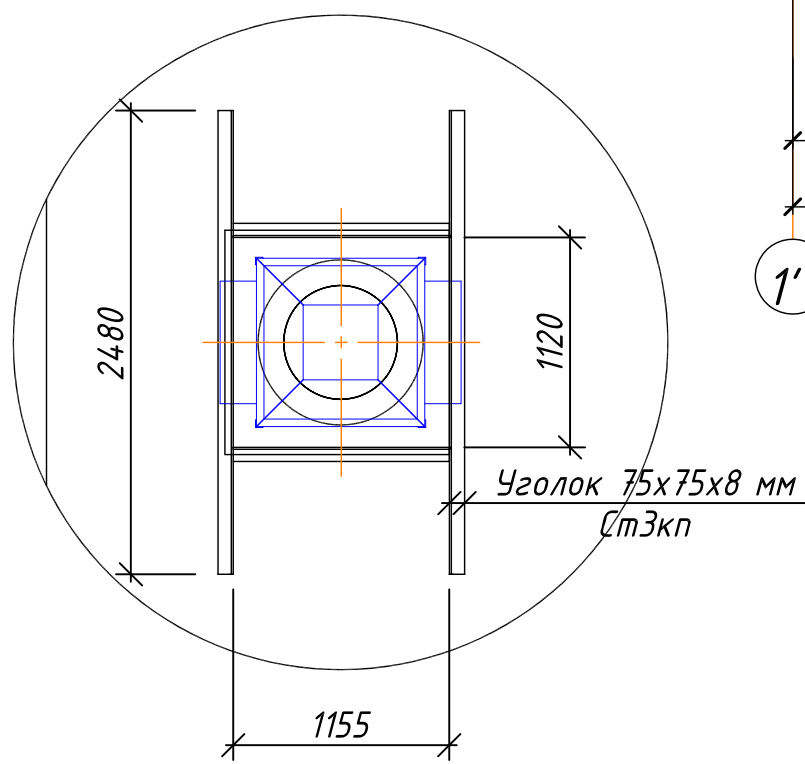


План кровли  
М 1: 125

Разрез 6-6 (12)



Опорная конструкция на кровлю  
7 мест



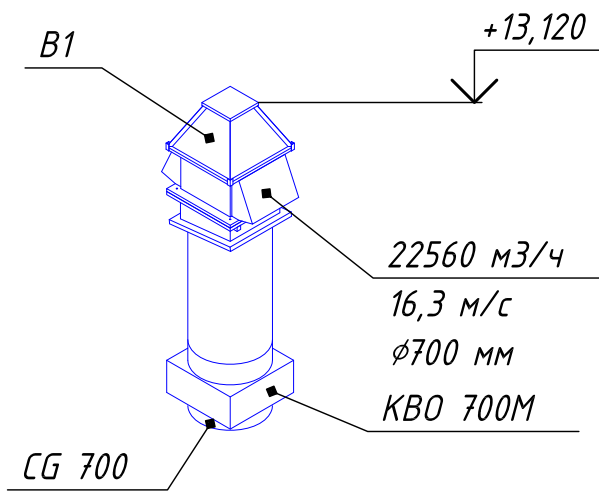
1. На разрезах указаны отметки только тех кровельных вентиляторов, с которыми разрезы связаны. Точные данные по высотным отметкам кровельных вентиляторов - см. Лист 13.
2. Крепление систем В1-В3 - идентично друг другу.
3. Крепление систем В4-В7 - идентично друг другу.

|                                                            |           |          |          |          |          |                                                           |
|------------------------------------------------------------|-----------|----------|----------|----------|----------|-----------------------------------------------------------|
| E230-0001-8000571851-РД-01-10.20.010-ОВ                    |           |          |          |          |          |                                                           |
| Производство аммиака и карбамида, Кингисепп                |           |          |          |          |          |                                                           |
| Россия, Ленинградская область, Кингисеппский район         |           |          |          |          |          |                                                           |
| Изм.                                                       | Кол.      | Лист     | № док.   | Подп.    | Дата     | Объект А17.710.2                                          |
| Разработал                                                 | Савватеев | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 | (здание азотной установки и узла деминерализованной воды) |
| Проверил                                                   | Шашин     | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 | Отопление, вентиляция                                     |
| Гл. инженер                                                | Афратов   | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 |                                                           |
| Н.Контроль                                                 | Акулова   | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 |                                                           |
| ГИП                                                        | Неофидова | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 |                                                           |
| План кровли                                                |           |          |          |          |          | ООО "ИСМ"                                                 |
| E230-0001-8000571851-РД-01-10.20.010-ОВ. 0. 0. RU. IFC.dwg |           |          |          |          |          | 2 Санкт-Петербург                                         |
| Формат А1                                                  |           |          |          |          |          |                                                           |

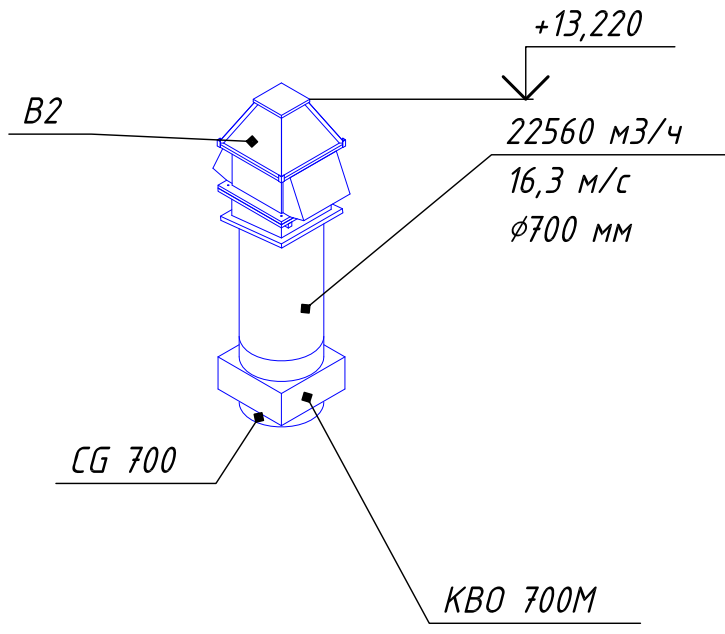


|              |  |
|--------------|--|
| Согласовано  |  |
| Взам. инв. № |  |
| Подп. и дата |  |
| Инв. № подл. |  |

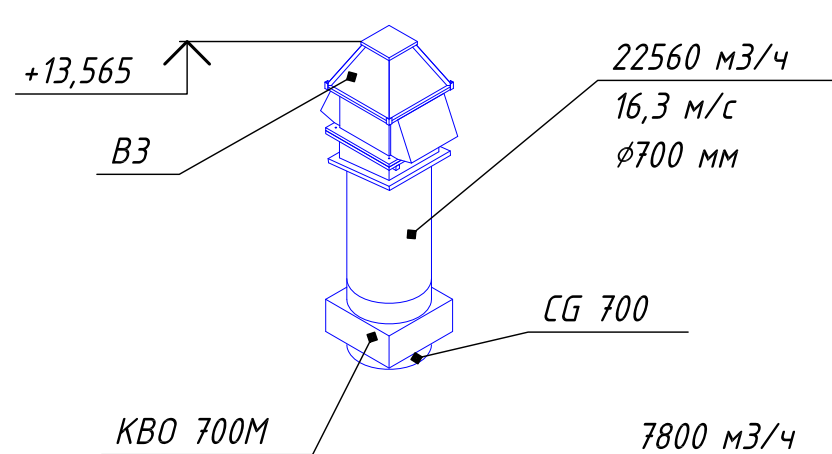
Изометрическая схема системы В1



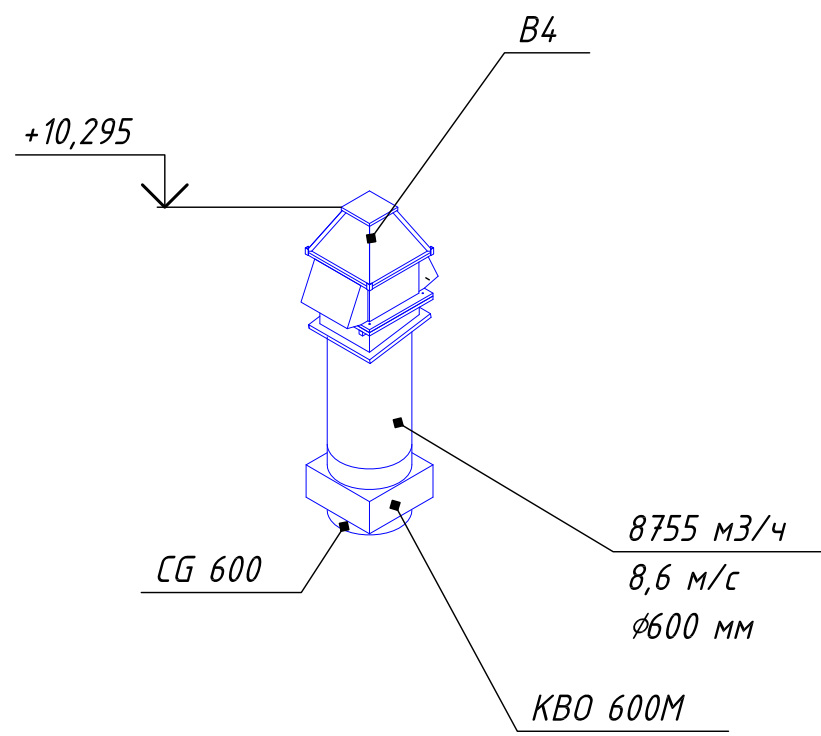
Изометрическая схема системы В2



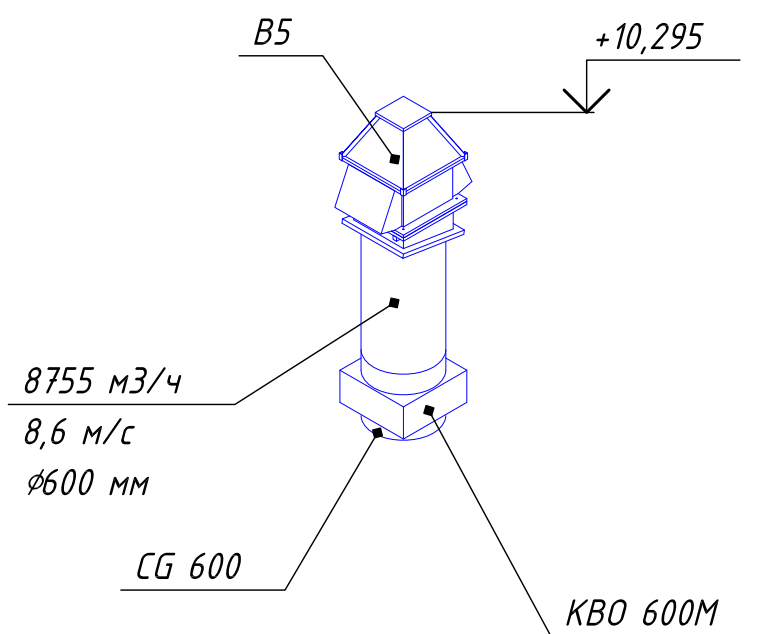
Изометрическая схема системы В3



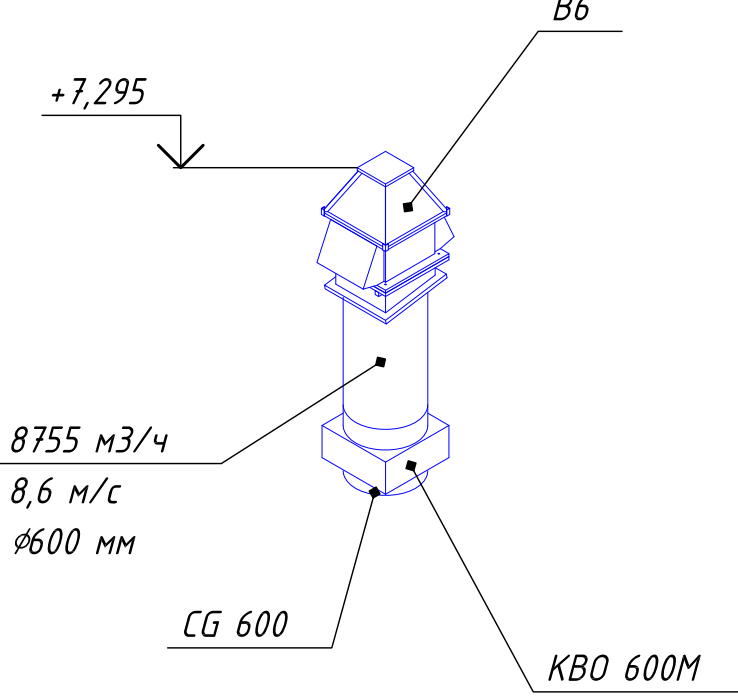
Изометрическая схема системы В4



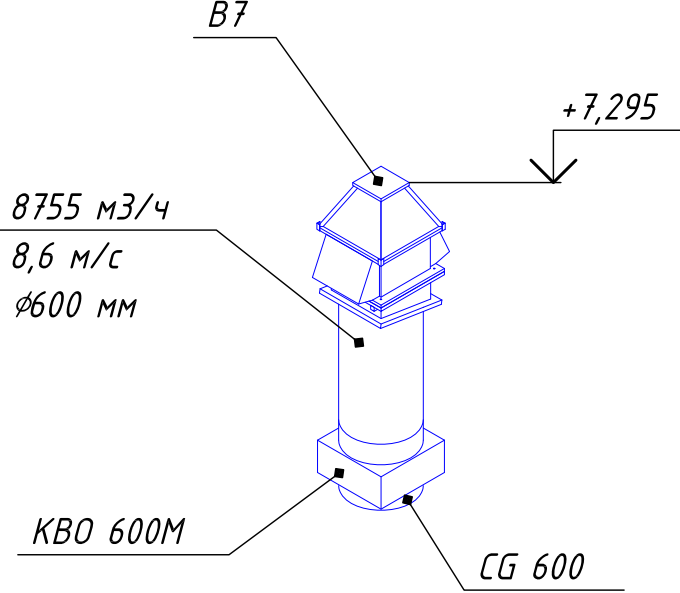
Изометрическая схема системы В5



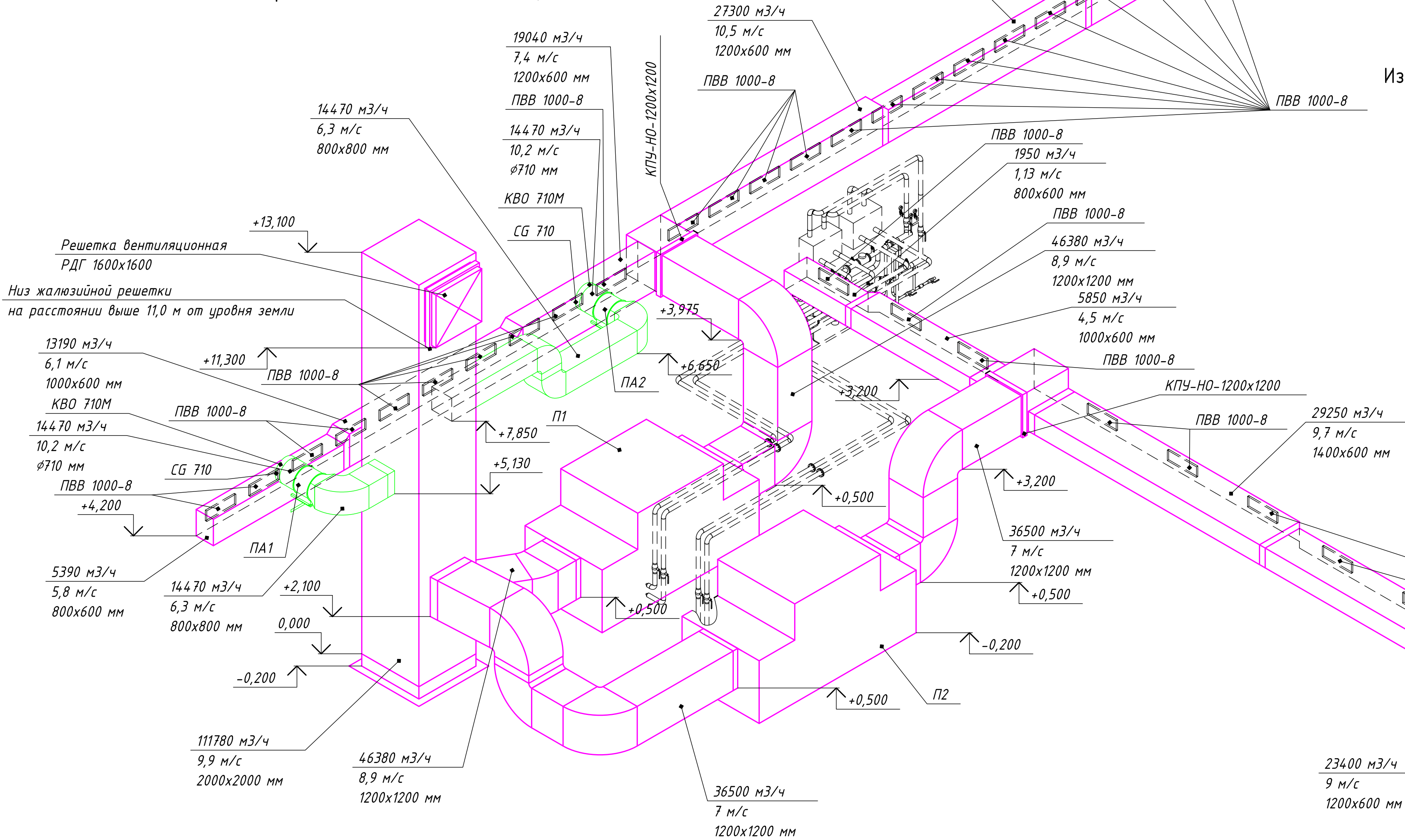
Изометрическая схема системы В6



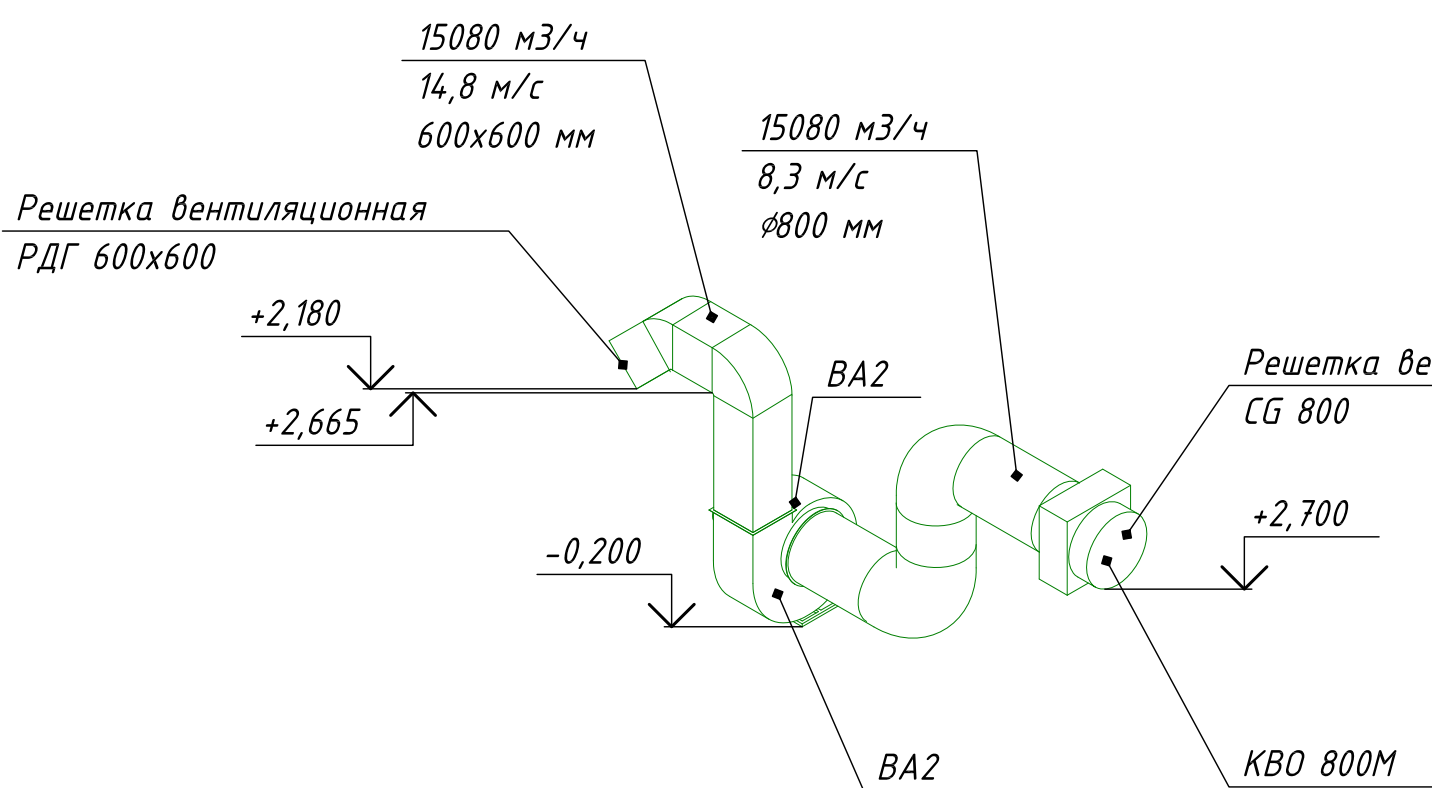
Изометрическая схема системы В7



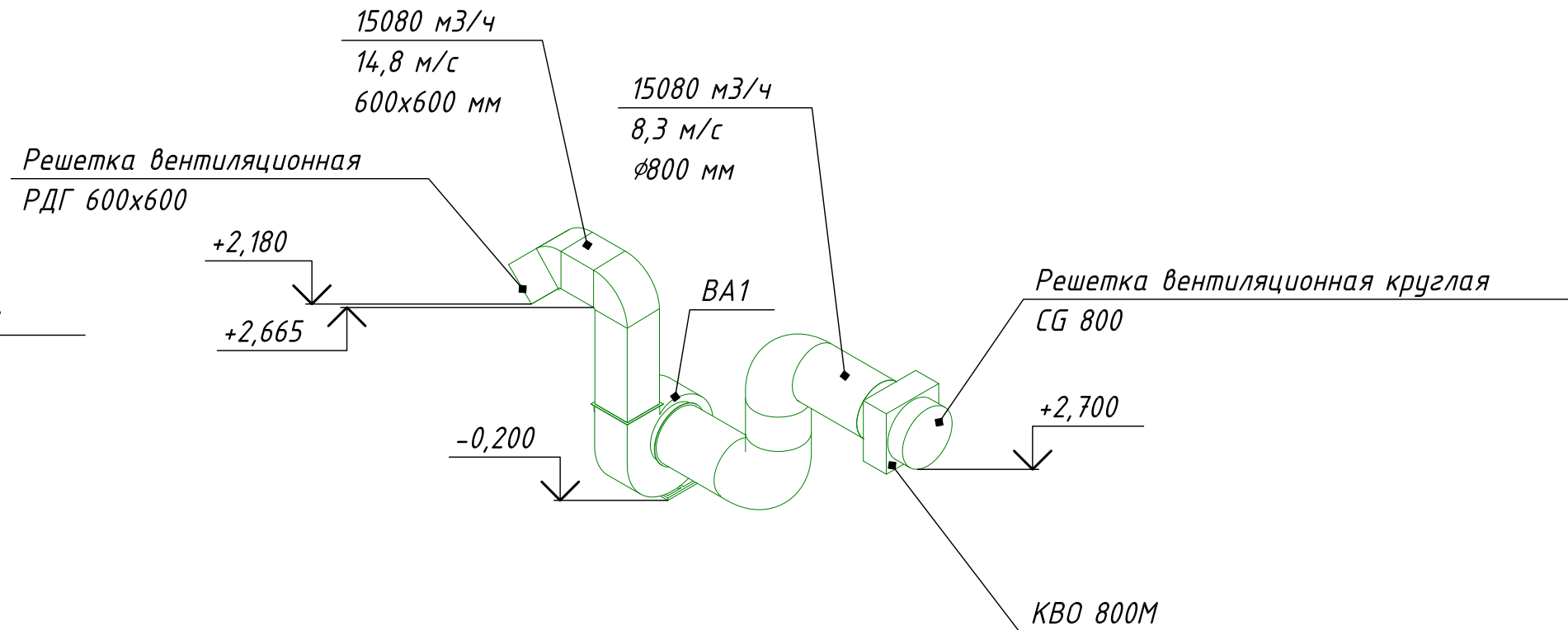
Изометрическая схема систем П1-2, ПА1-2



Изометрическая схема системы ВА2



Изометрическая схема системы ВА1

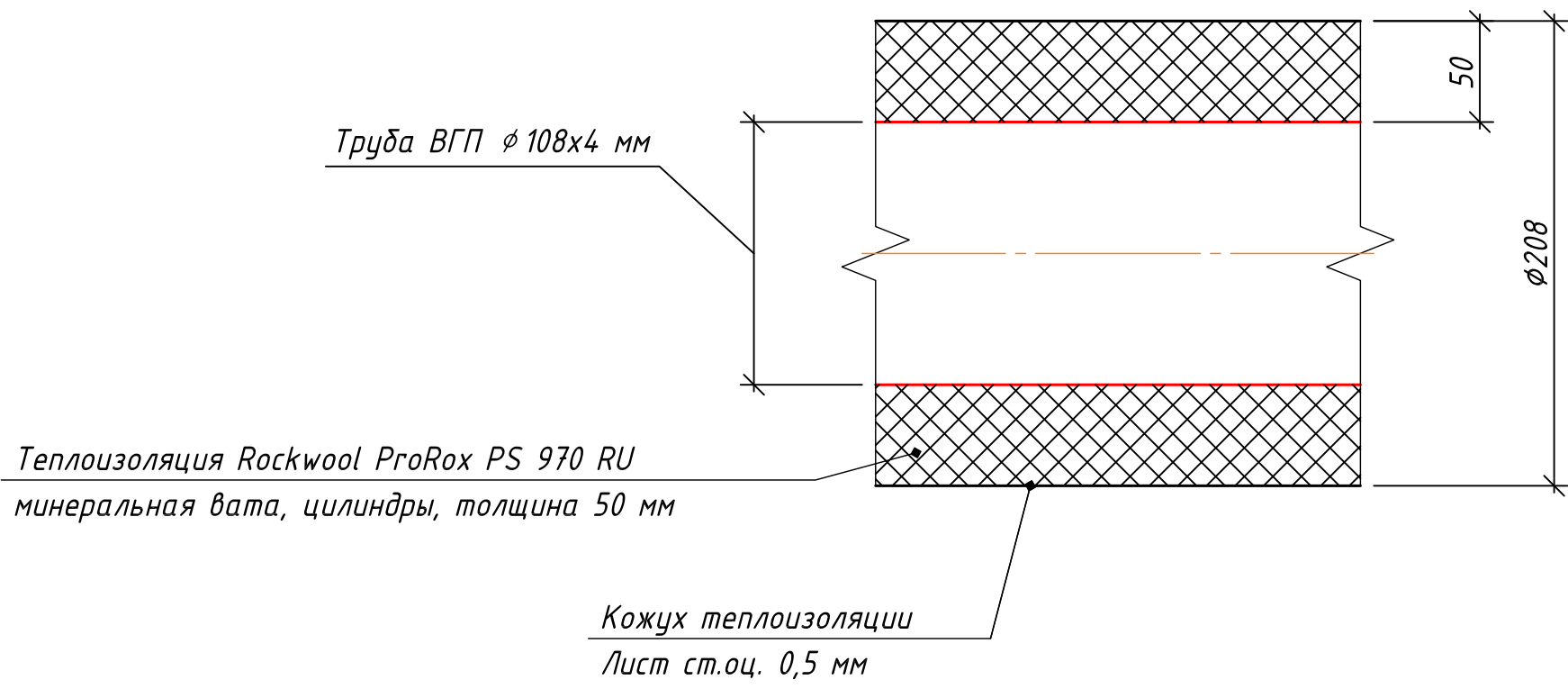


- Изометрические схемы систем отопления представлены на листе 14 - на данном листе показаны условно.
- Рассматривать совместно с листами 6-10, 12.

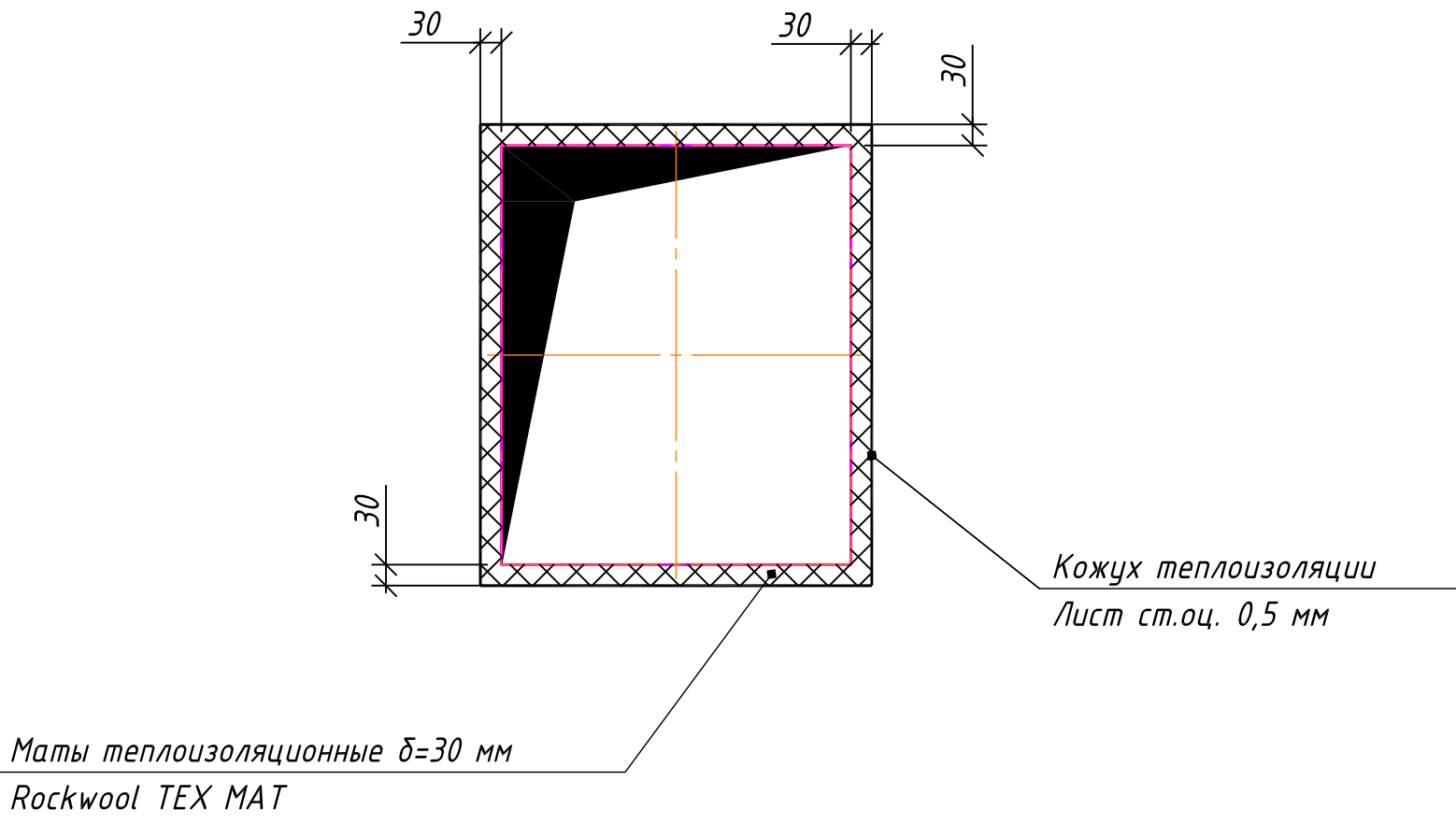
|                                                           |           |          |            |         |          |                                             |    |        |
|-----------------------------------------------------------|-----------|----------|------------|---------|----------|---------------------------------------------|----|--------|
| E230-0001-8000571851-РД-01-10.20.010-ОВ                   |           |          |            |         |          | Производство аммиака и карбамида, Кингисепп |    |        |
| Россия, Ленинградская область, Кингисеппский район        |           |          |            |         |          | Объект А17.710.2                            |    |        |
| (здание азотной установки и узла деминерализованной воды) |           |          |            |         |          | Отопление, вентиляция                       |    |        |
| Изм.                                                      | Колуч.    | Лист     | Изд.       | Подп.   | Дата     | Р                                           | 13 | Листов |
| Разработал                                                | Савватеев | 25.02.23 | Проверил   | Шилинов | 25.02.23 | ИЗМ                                         |    |        |
| Гл. инженер                                               | Афонов    | 25.02.23 | Н.Контроль | Акилова | 25.02.23 | ИЗМ                                         |    |        |
| ГИП                                                       | Неофидова | 25.02.23 | ООО "ИЗМ"  |         |          | г. Санкт-Петербург                          |    |        |



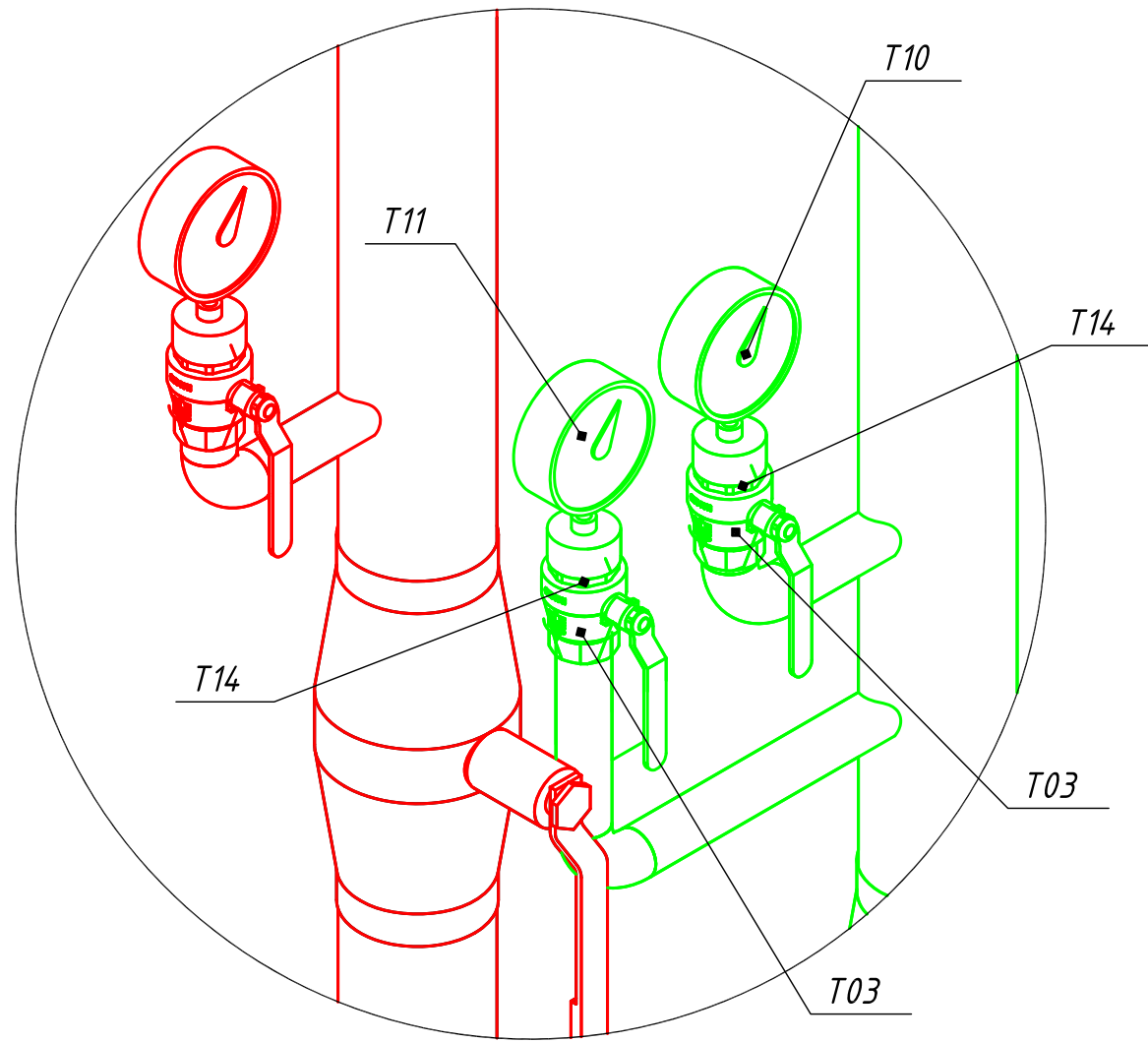
Теплоизоляция трубопроводов Ду100 Т1/Т2



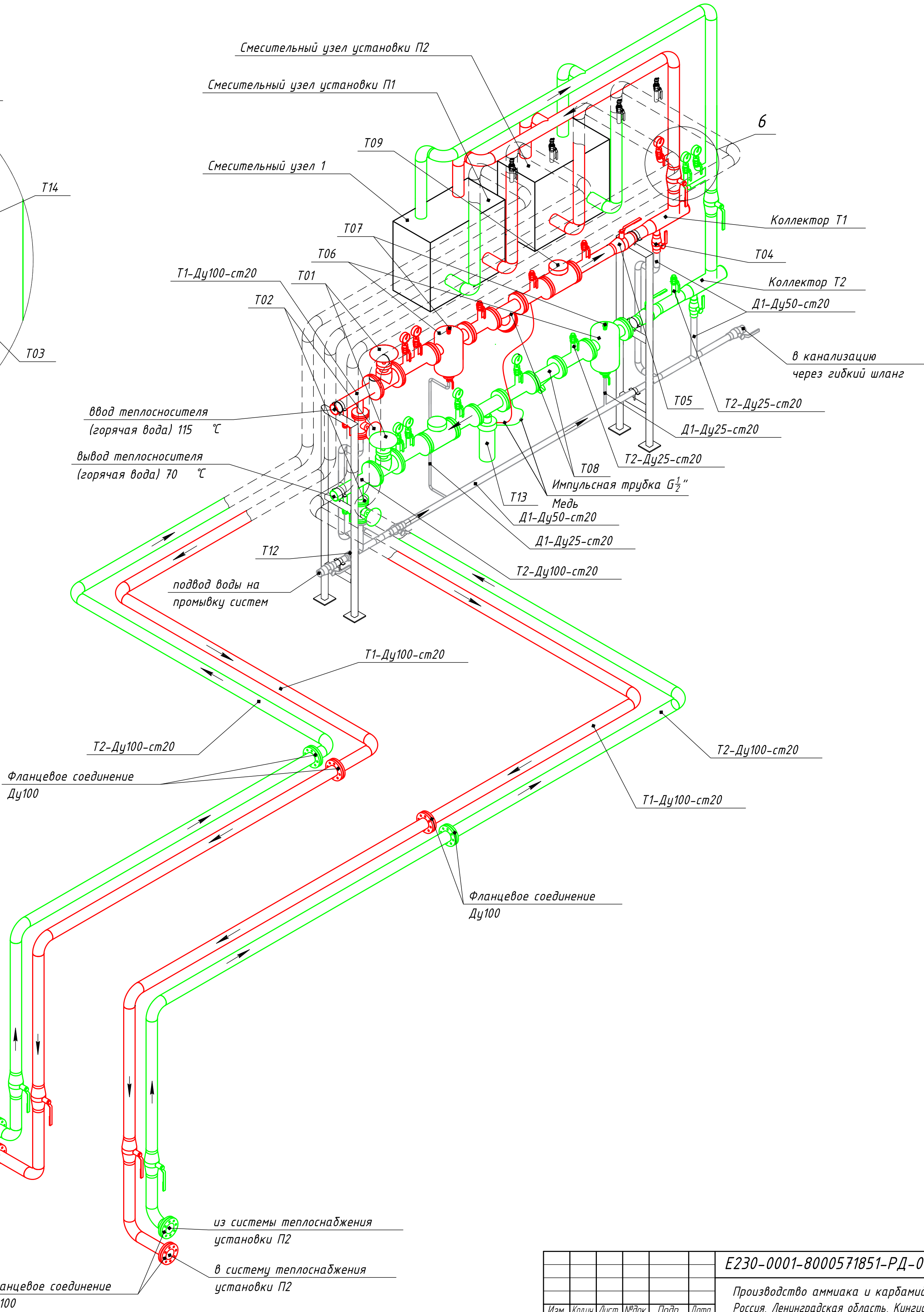
Теплоизоляция прямоугольных воздуховодов



6



Изометрическая схема системы Т1/Т2  
Узел управления и теплоснабжение приточных установок



Спецификация ЗРА и КИП узла управления

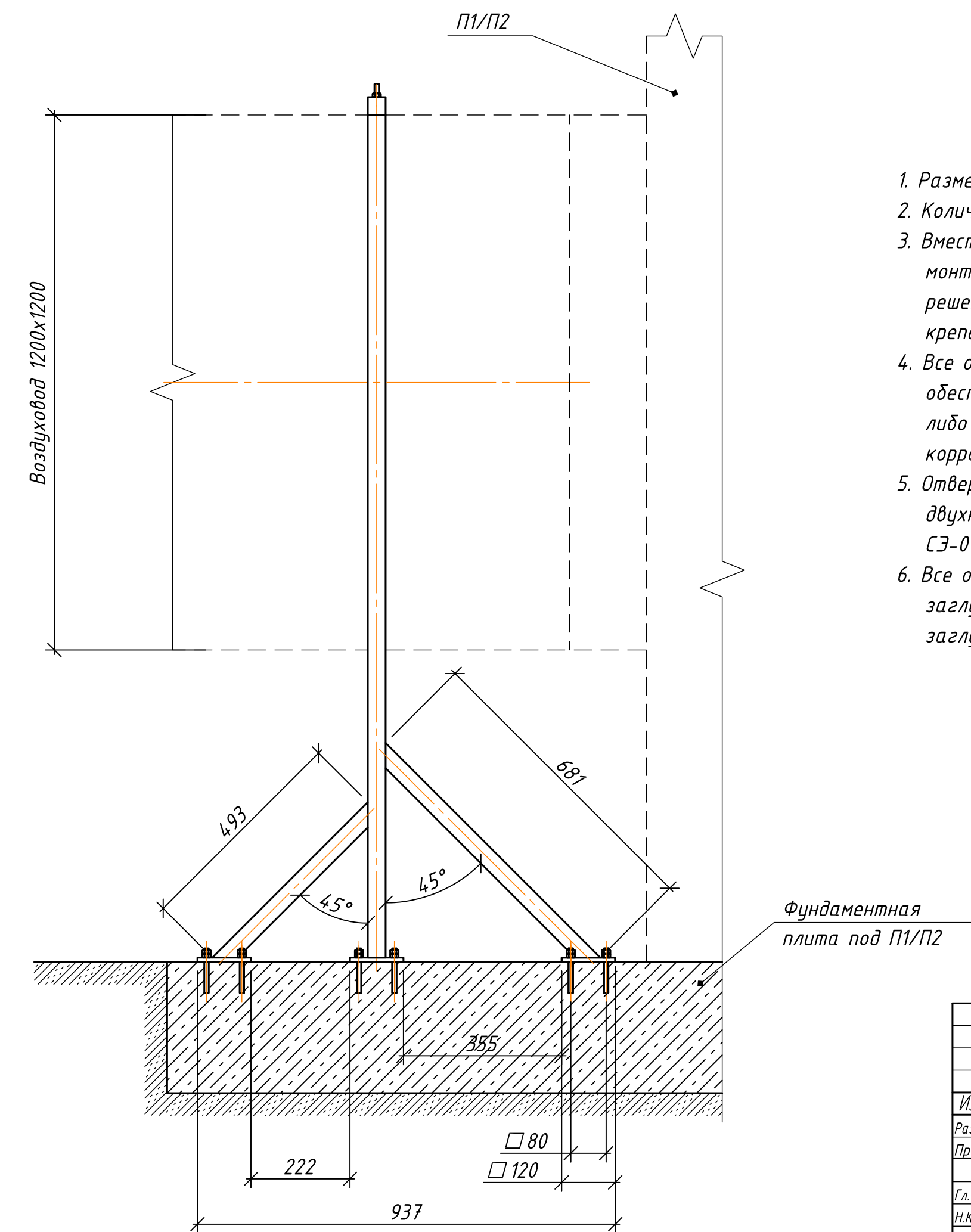
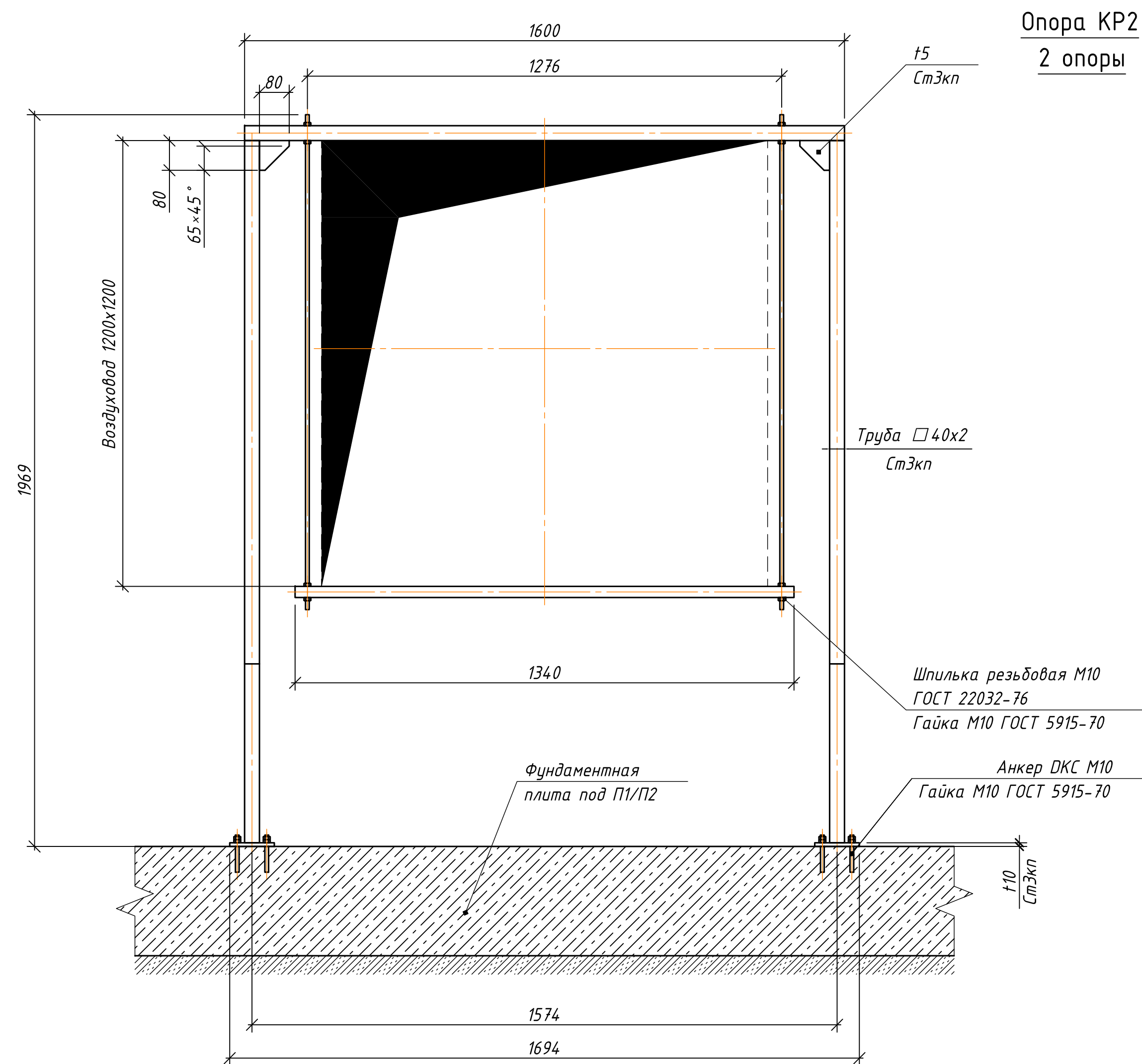
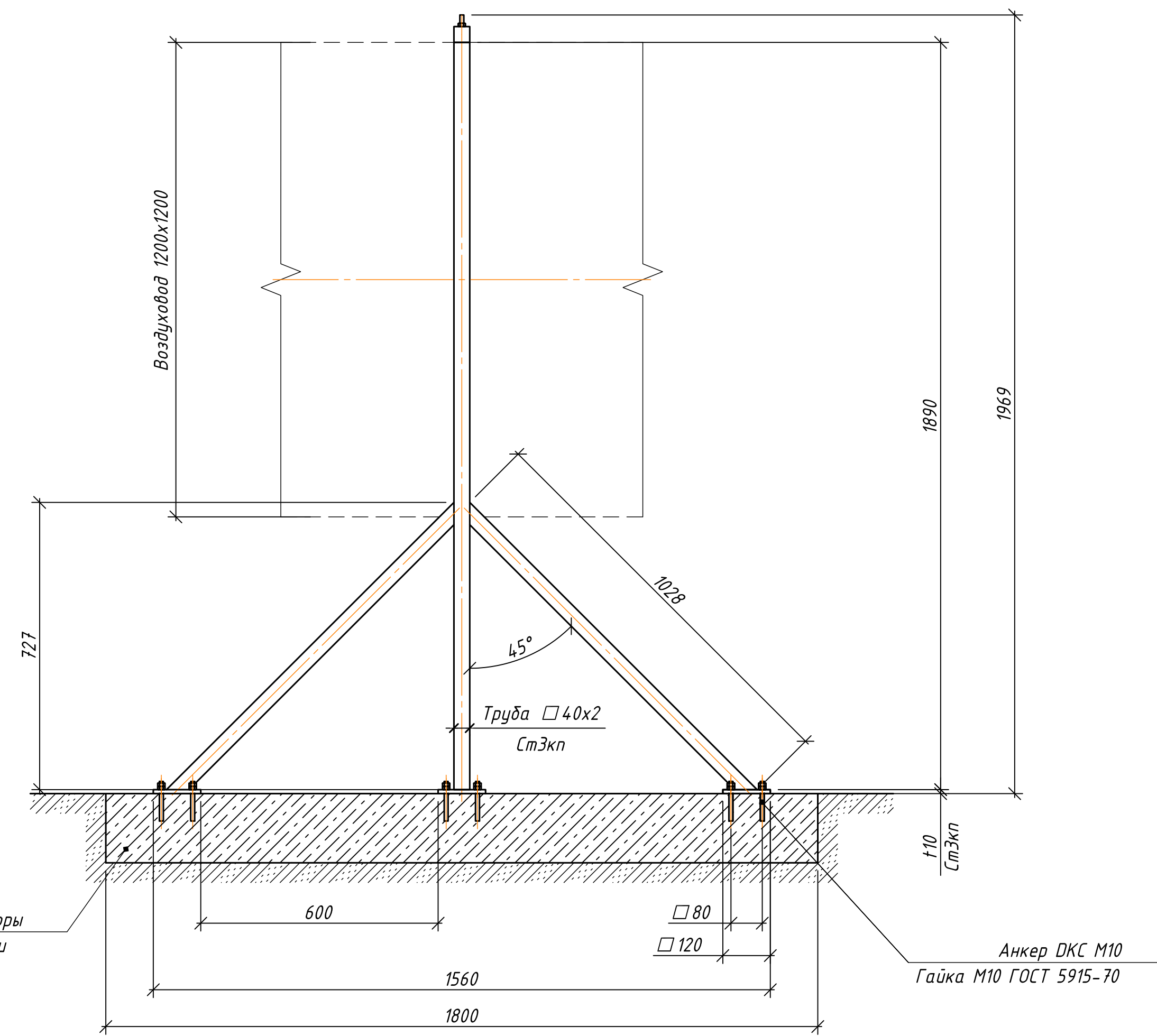
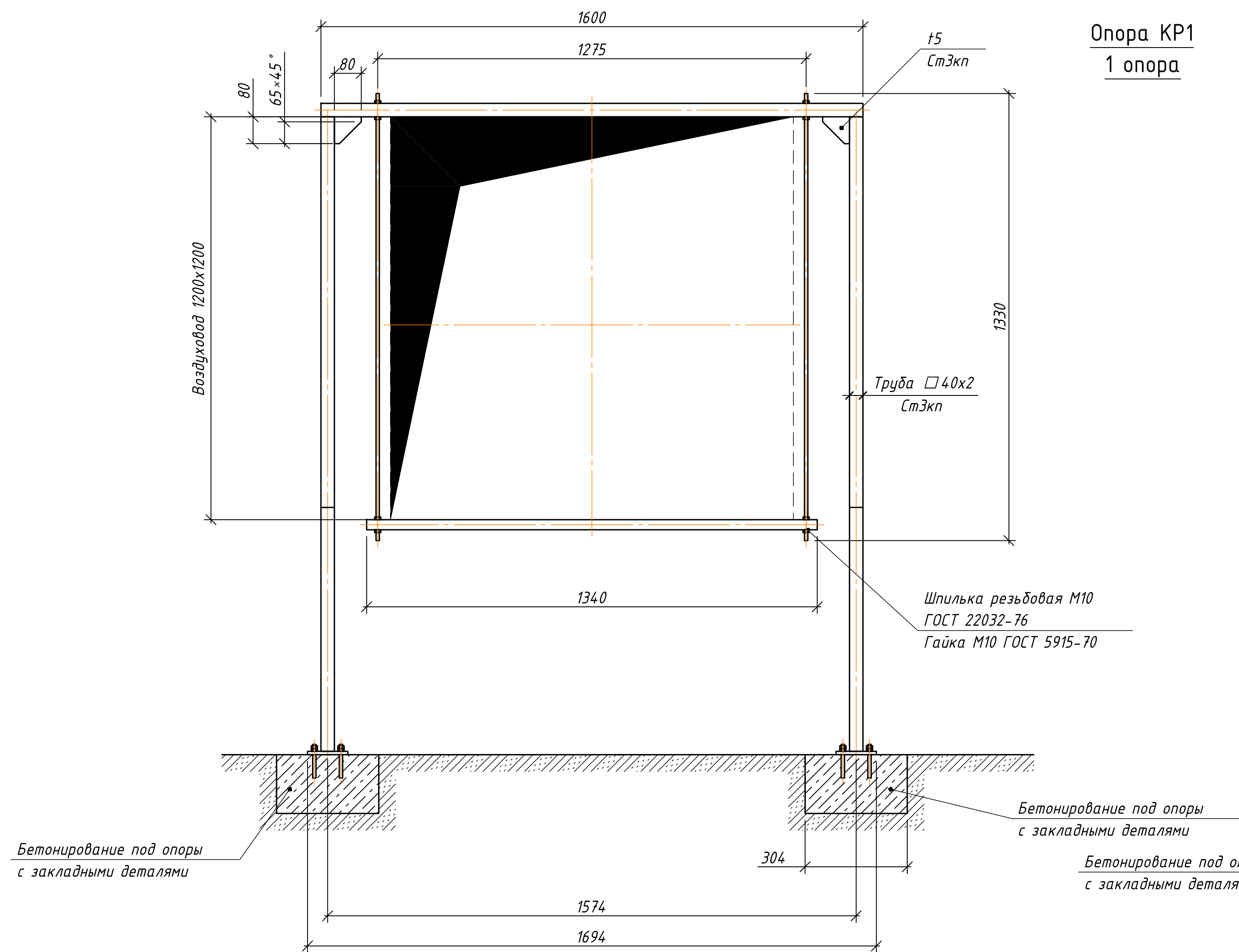
| Поз. | Обозначение               | Наименование                          | Кол. | Масса, кг | Примечание |
|------|---------------------------|---------------------------------------|------|-----------|------------|
| T01  | СИБЗТА 15с65нж            | Вентиль фланцевый стальной Ду100 Ру16 | 2    |           | или аналог |
|      |                           | в комплекте с фланцами и прокладками  |      |           |            |
| T02  | СИБЗТА 15с65нж            | Вентиль фланцевый стальной Ду50 Ру16  | 2    |           | или аналог |
|      |                           | в комплекте с фланцами и прокладками  |      |           |            |
| T03  | Valtec VT.314.N.06        | Кран шаровый Ду25, ВР/ВР, стальной    | 22   |           | или аналог |
| T04  | Temper 292 D160-13012     | Кран шаровый Ду50 Ру25 под приварку   | 4    |           | или аналог |
| T05  | Temper 292 D160-13015     | Кран шаровый Ду100 Ру25 под приварку  | 8    |           |            |
| T06  | Грязевик ЦЗЗВТ ДУ100      | Грязевик абонентский вертикальный     | 2    |           | или аналог |
|      |                           | фланцевый стальной Ду100              |      |           |            |
|      |                           | в комплекте с фланцами и прокладками  |      |           |            |
| T07  | Valtec VT.502.NH.04       | Воздухоотводчик НР G1/2"              | 6    |           | или аналог |
| T08  | Danfoss Y333P Ду100 Ру16  | Фильтр сетчатый чугунный              | 2    |           | или аналог |
|      | 149В3284                  | с дренажным краном фланцевый          |      |           |            |
| T09  | Тепловономер водосчетчик  | Водосчетчик промышленный в комплекте  | 2    |           | или аналог |
|      | СТ20 Ду100 Ру16           | с датчиками и соединениями, фланцевый |      |           |            |
|      |                           | в комплекте с фланцами и прокладками  |      |           |            |
| T10  | РОСМА ТМ-510              | Манометр рад. ТМ серии 10, G1/2"      | 6    |           | или аналог |
| T11  | РОСМА БТ-32.211 120С Дк63 | Термометр радиальный, G1/2"           | 3    |           | или аналог |
| T12  | DN.ru LSCV 2" D100-00492  | Клапан обратный ВР/ВР Ду50 - G2"      | 1    |           | или аналог |
| T13  | RDT Ду100 Ру16            | Регулятор перепада давления           | 1    |           | или аналог |
|      |                           | фланцевый стальной Ду32               |      |           |            |
|      |                           | в комплекте с фланцами и прокладками, |      |           |            |
|      |                           | импульсными трубками и фитингами      |      |           |            |
| T14  | Aquasfera 9024-03         | Футорка латунь, НР/ВР G1" x G1/2"     | 11   |           | или аналог |

- Сортамент труб и фитинги трубных соединений – см. Е230-0001-8000571851-РД-01-10.20.010-ОВ.СО.
- Сборку трубопроводов выполнить на резьбе с применением соединительных деталей, на накидных гайках, на фланцах (к арматуре и оборудованию), муфтах или греблоках.
- При использовании резьбовых соединений, нарезку резьбы на трубы выполнять по месту, с использованием специального инструмента.
- Сварку трубопроводов производить по ГОСТ 16037-80 с зачисткой сварных швов.
- Для покраски труб использовать грунтование грунтовкой АС-7 ГОСТ 51693-2000 (1 слой), краску акриловую (2 слоя).

|                                                                                                |           |          |          |          |          |
|------------------------------------------------------------------------------------------------|-----------|----------|----------|----------|----------|
| Е230-0001-8000571851-РД-01-10.20.010-ОВ                                                        |           |          |          |          |          |
| Производство аммиака и карбамида, Кингисепп Россия, Ленинградская область, Кингисеппский район |           |          |          |          |          |
| Изм.                                                                                           | Копия     | Лист     | Изд.     | Подп.    | Дата     |
| Разработал                                                                                     | Савватеев | Шилинов  | 25.02.23 | 25.02.23 | 25.02.23 |
| Проверил                                                                                       | Шилинов   | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 |
| Гл. инженер                                                                                    | Афонов    | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 |
| Н.Контроль                                                                                     | Акилова   | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 |
| ГИП                                                                                            | Неофидова | 25.02.23 | 25.02.23 | 25.02.23 | 25.02.23 |
| Изометрические схемы систем отопления                                                          |           |          |          |          |          |
| ООО "ИСМ" г. Санкт-Петербург                                                                   |           |          |          |          |          |



|              |  |
|--------------|--|
| Согласовано  |  |
| Подп. и дата |  |
| Инв. № подл. |  |
| Взам. инв. № |  |



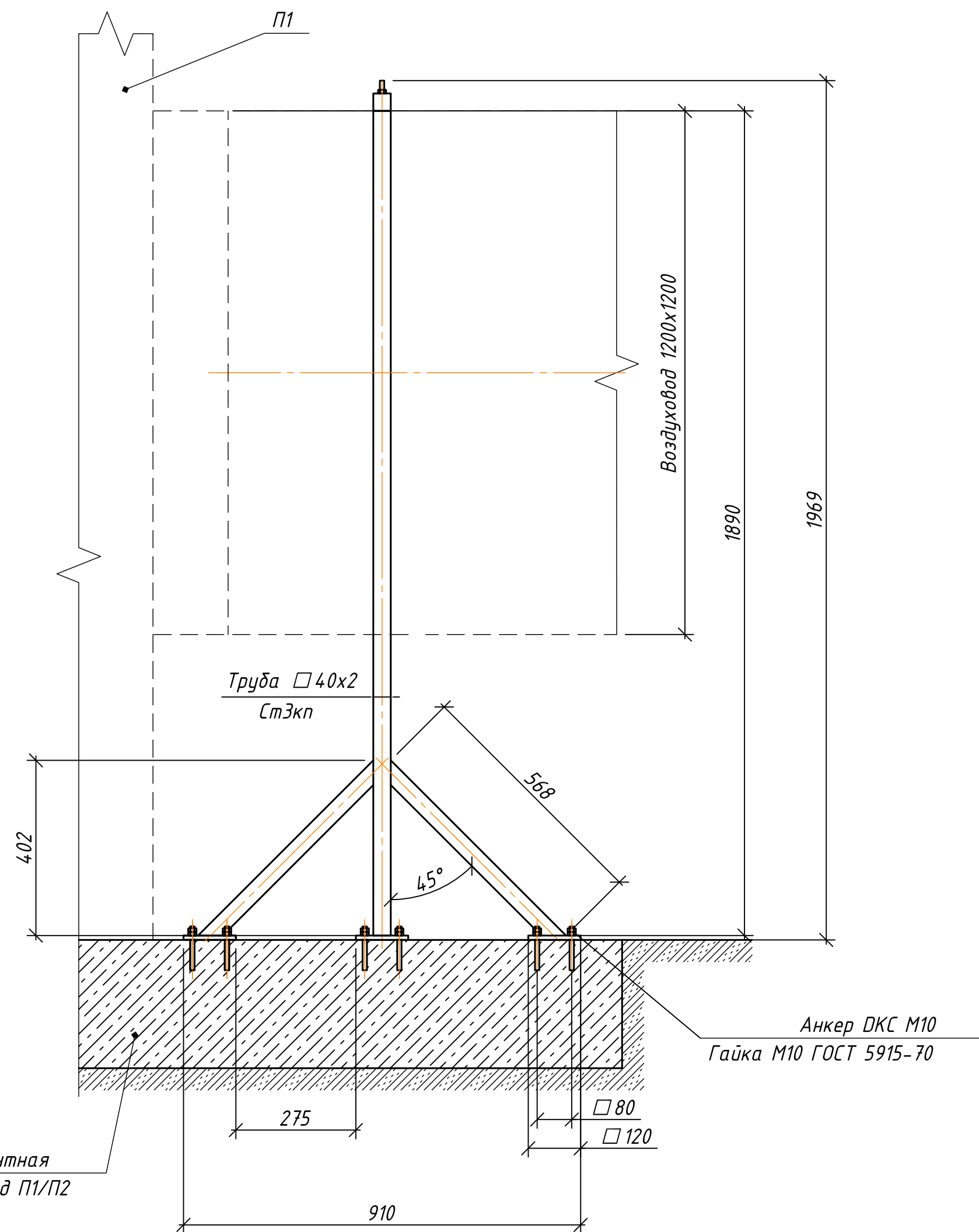
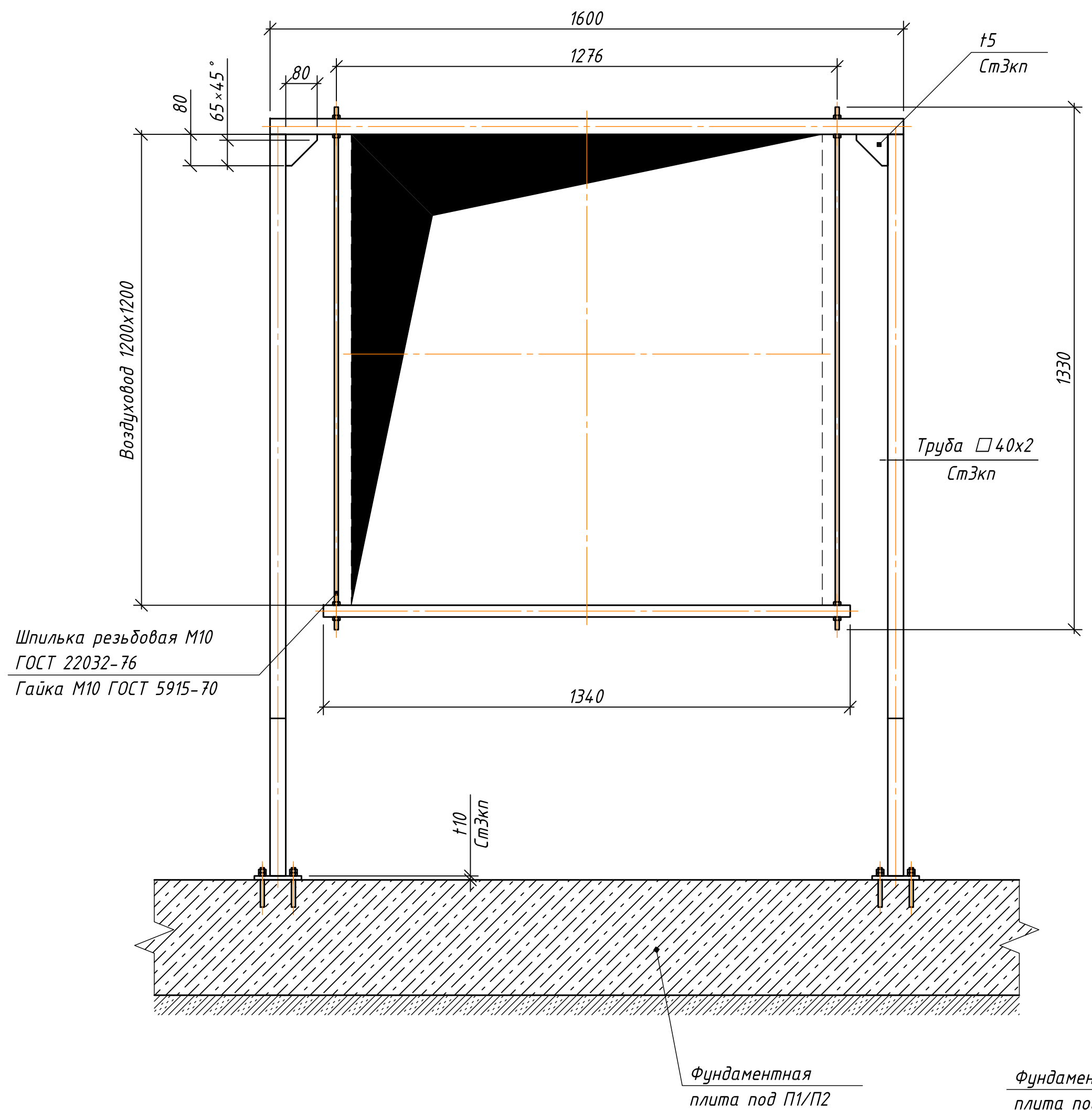
1. Размеры справочные - уточняются по месту.
2. Количество крепежа уточняется по Е230-0001-8000571851-РД-01-10.20.010-ОВ.СО.
3. Вместо профильных труб допускается использовать стандартные монтажные профили и аналогичные стандартные крепежные решения, используемые на рынке. В таком случае количество крепежа уточняется производителем работ.
4. Все опоры, крепления и подвесы и их крепеж необходимо обеспечить антикоррозионной защитой согласно СП 28.13330.2017, либо они должны быть, в случае стандартного решения, в коррозионностойком исполнении.
5. Отверстия для крепежа в стеновых сэндвич-панелях заделать двухкомпонентным противопожарным терморасширяющимся составом СЗ-01 Стандарт-Электрик.
6. Все открытые концы профильных труб, либо заварить приварными заглушками, либо закрыть подходящими по размеру пластиковыми заглушками.

|                                         |           |          |            |         |          |                                                                                                          |        |        |
|-----------------------------------------|-----------|----------|------------|---------|----------|----------------------------------------------------------------------------------------------------------|--------|--------|
| Е230-0001-8000571851-РД-01-10.20.010-ОВ |           |          |            |         |          | Производство аммиака и карбамида, Кингисепп<br>Россия, Ленинградская область, Кингисеппский район        |        |        |
| Изм.                                    | Кол.      | Лист     | Изд.       | Подп.   | Дата     | Объект А17.710.2<br>(здание азотной установки и<br>узла дегидратизованной воды)<br>Отопление, вентиляция | Стация | Лист   |
| Разработал                              | Савватеев | 25.02.23 | Проверил   | Шилинов | 25.02.23 | Р                                                                                                        | 15     | Листов |
| Гл. инженер                             | Афранов   | 25.02.23 | Н.Контроль | Акилова | 25.02.23 | Типовые опоры, подвесы<br>и крепления                                                                    |        |        |
| ГИП                                     | Неофидова | 25.02.23 | ООО "ИСМ"  |         |          | г. Санкт-Петербург                                                                                       |        |        |

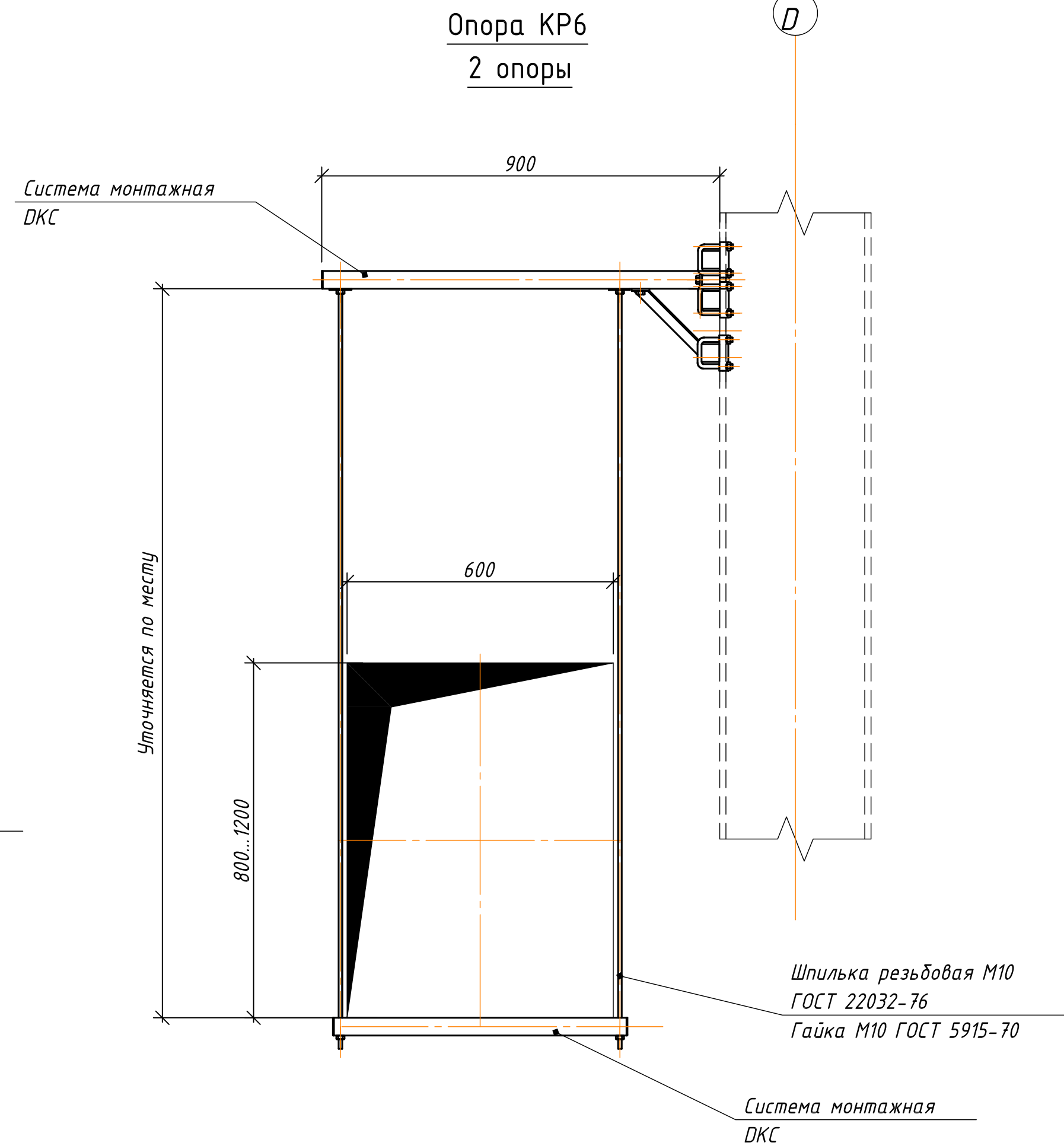


|              |              |
|--------------|--------------|
| Согласовано  |              |
| Подп. и дата | Взам. инв. № |
| Инв. № подл. |              |

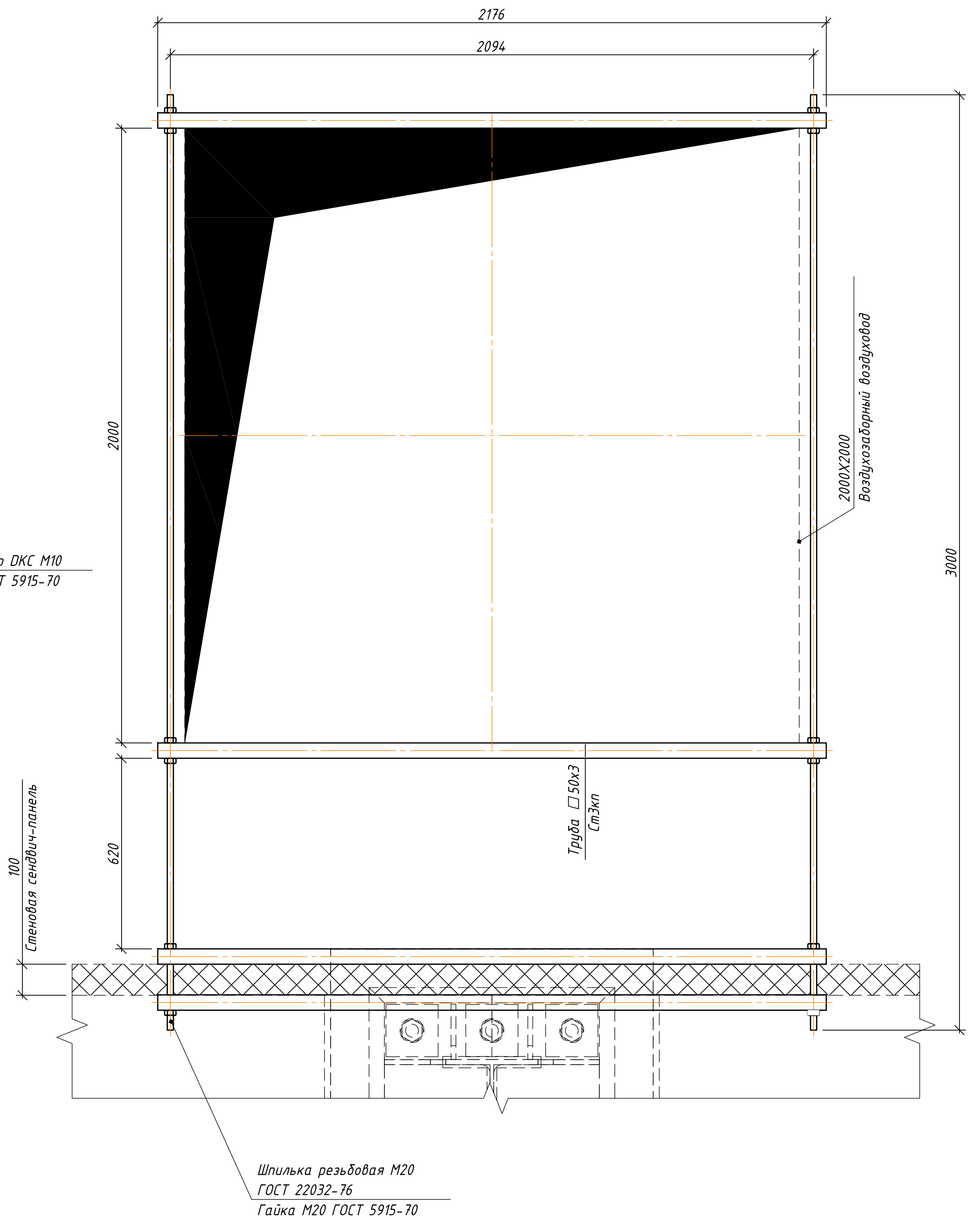
Опора КР3  
1 опора



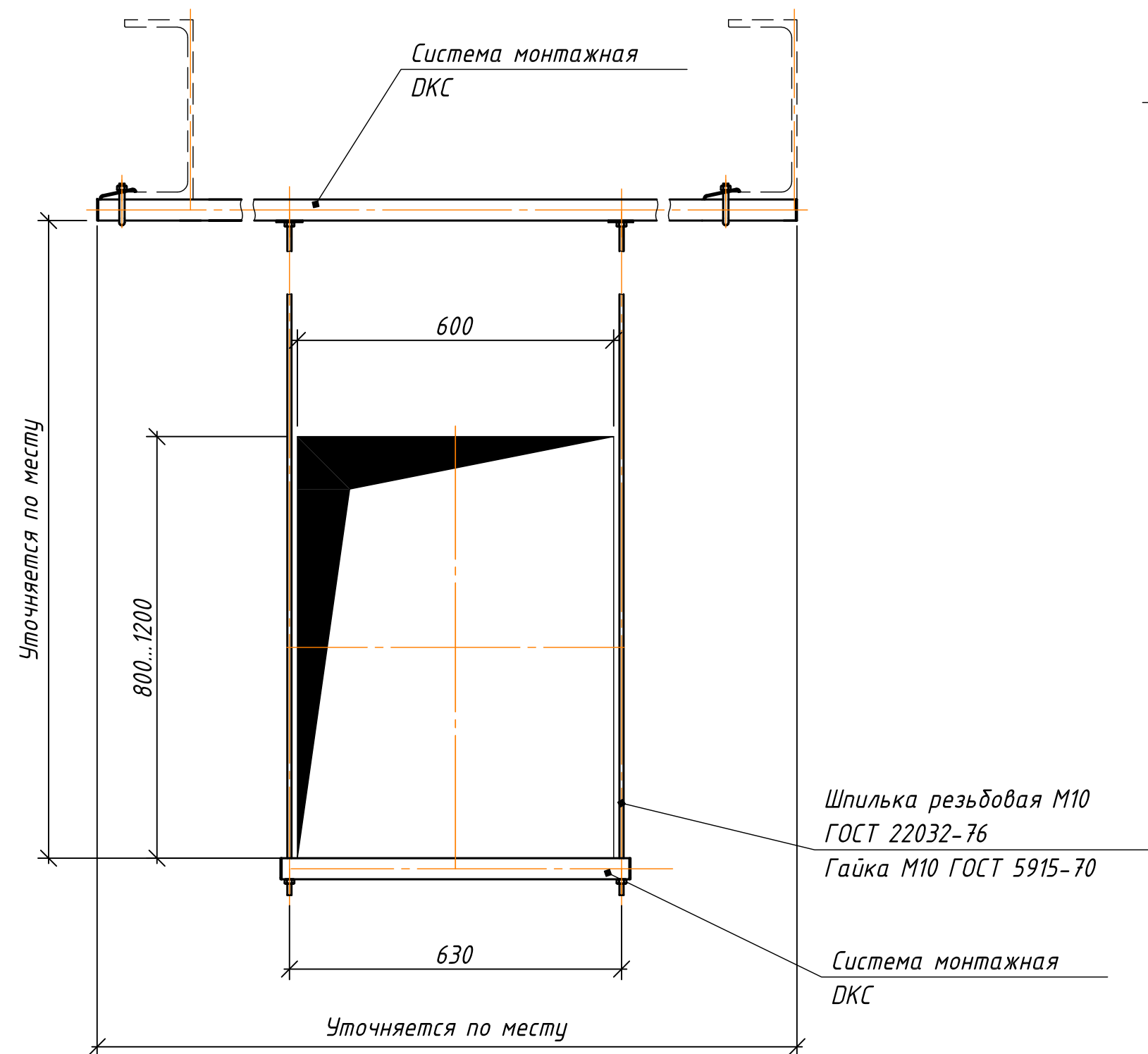
Опора КР6  
2 опоры



Опора КР4  
3 опоры



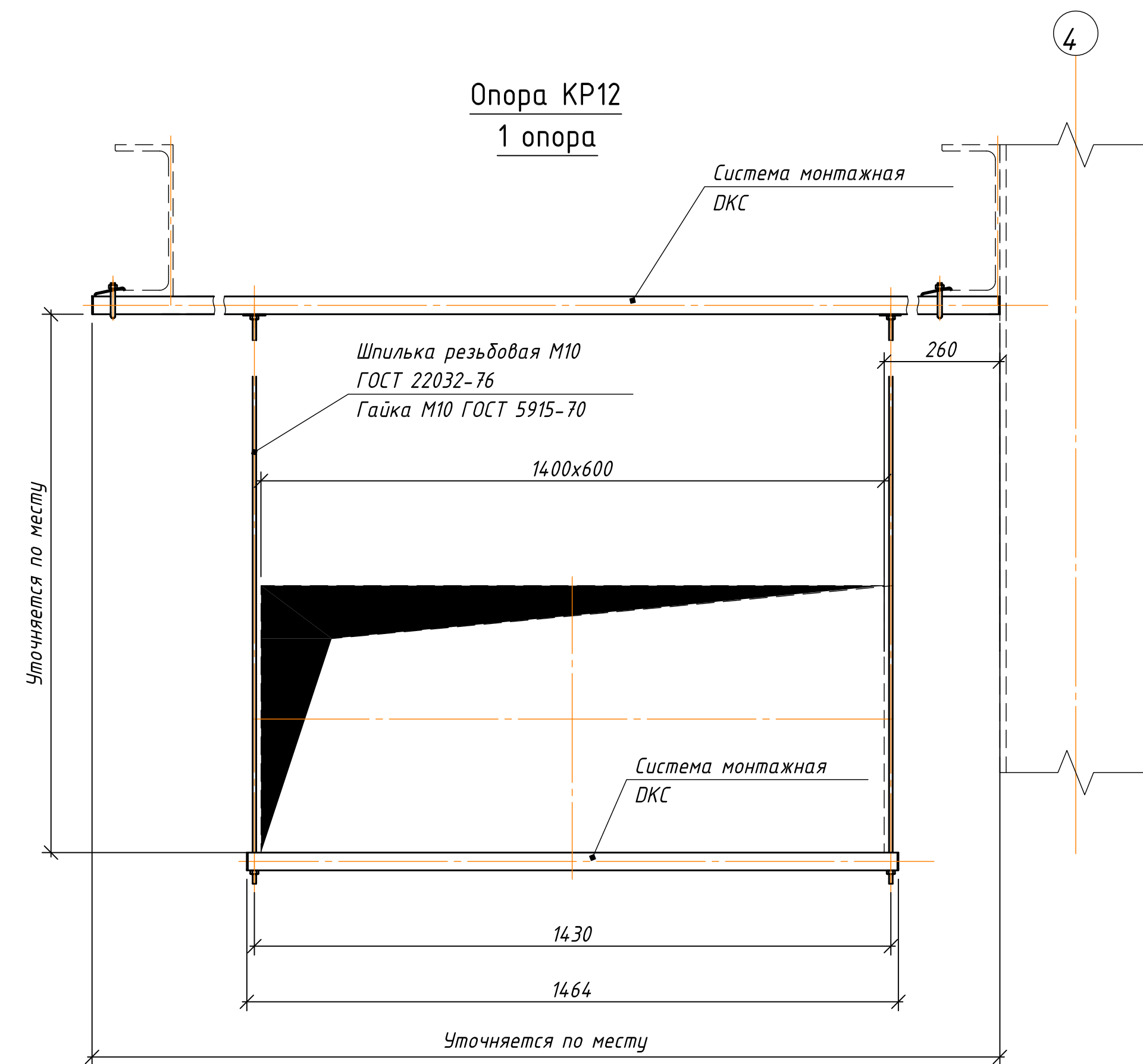
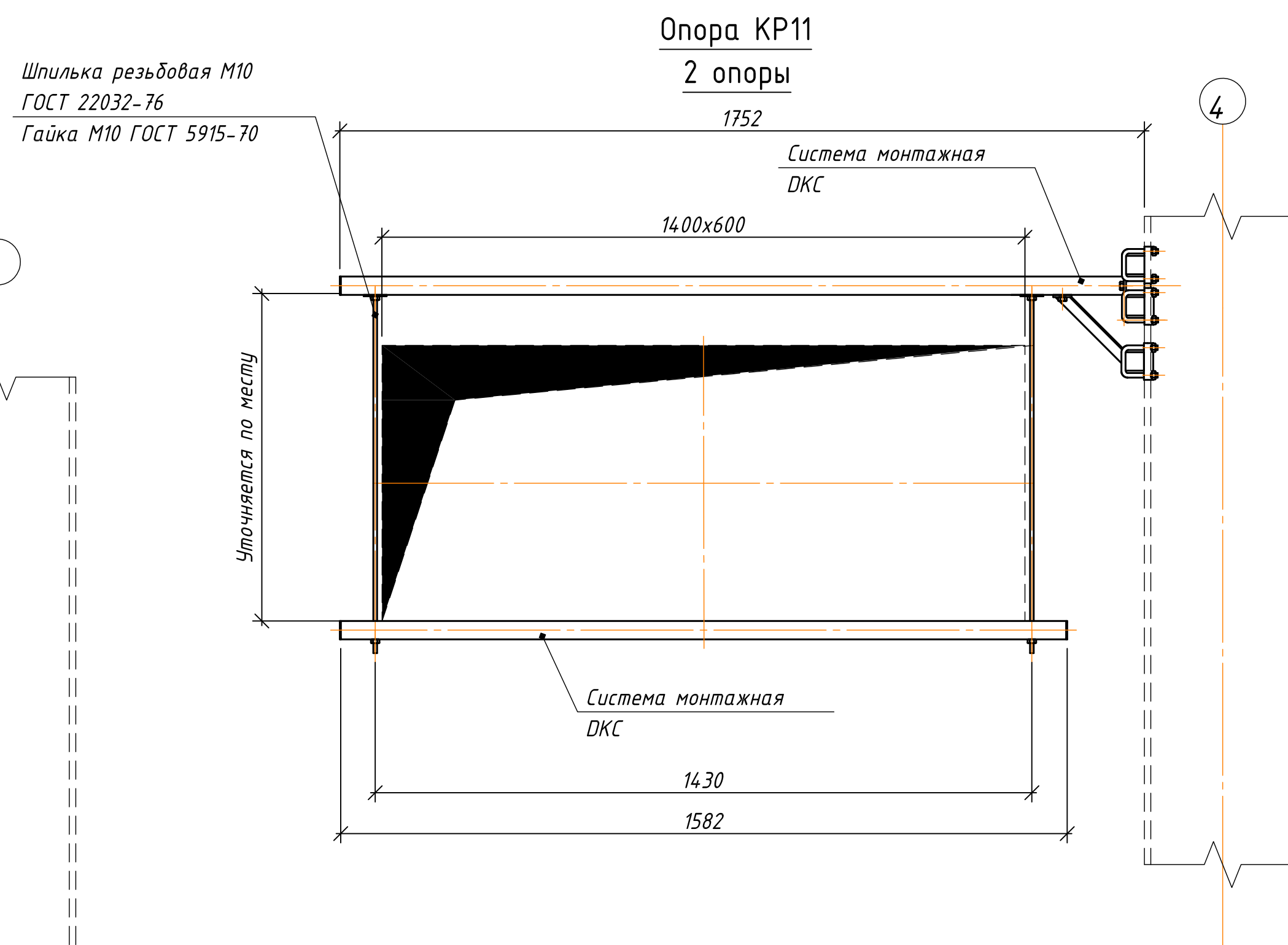
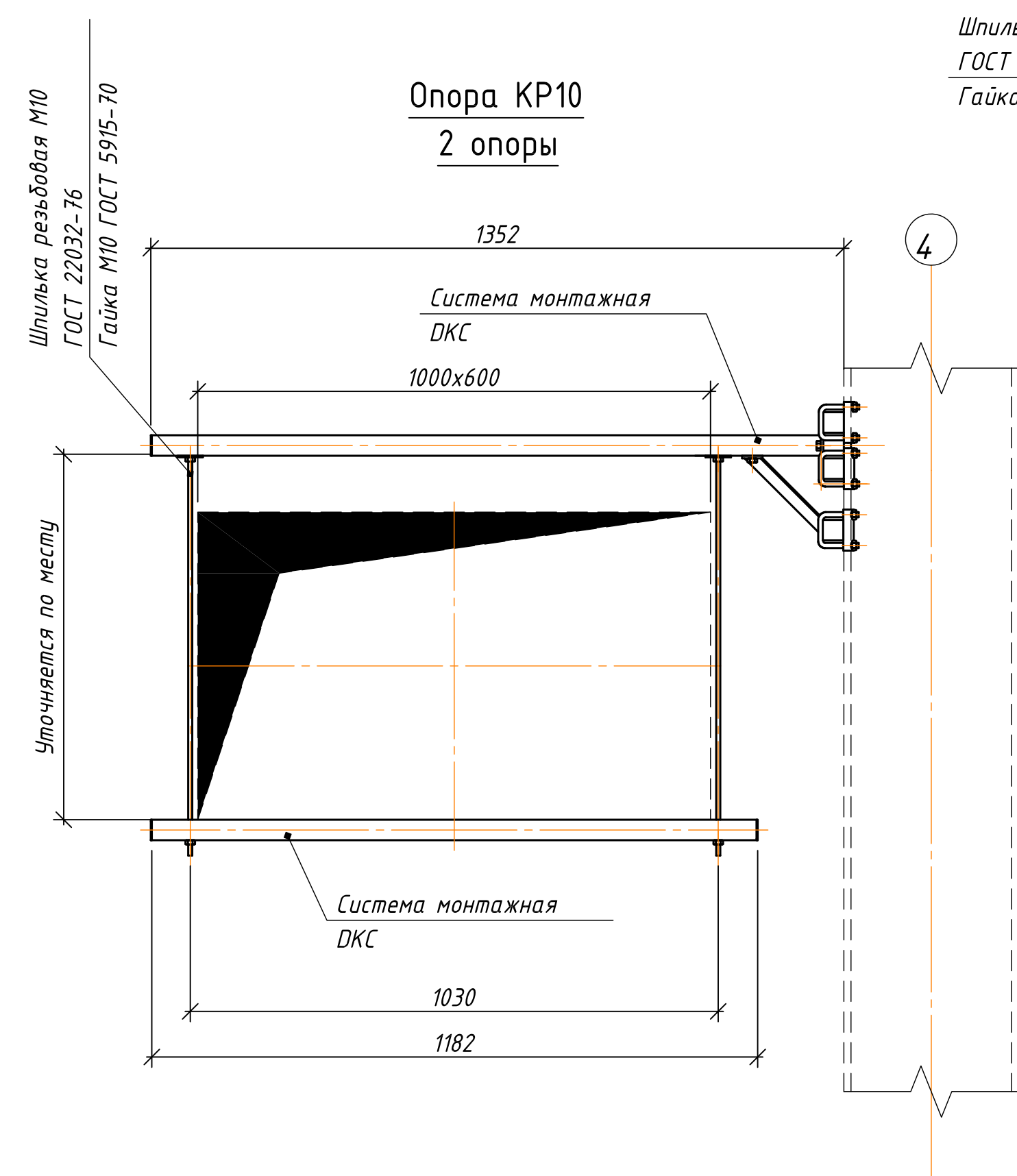
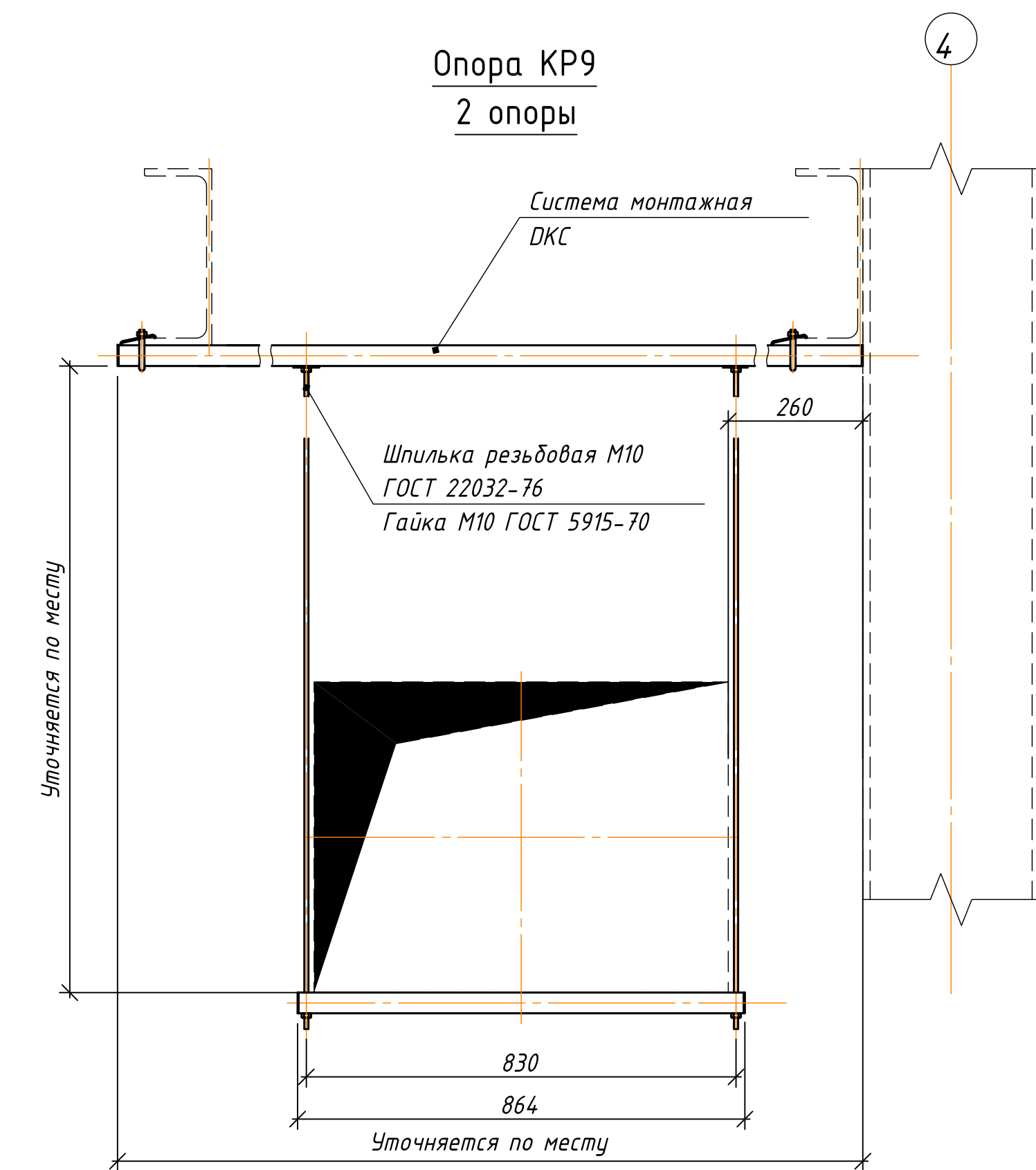
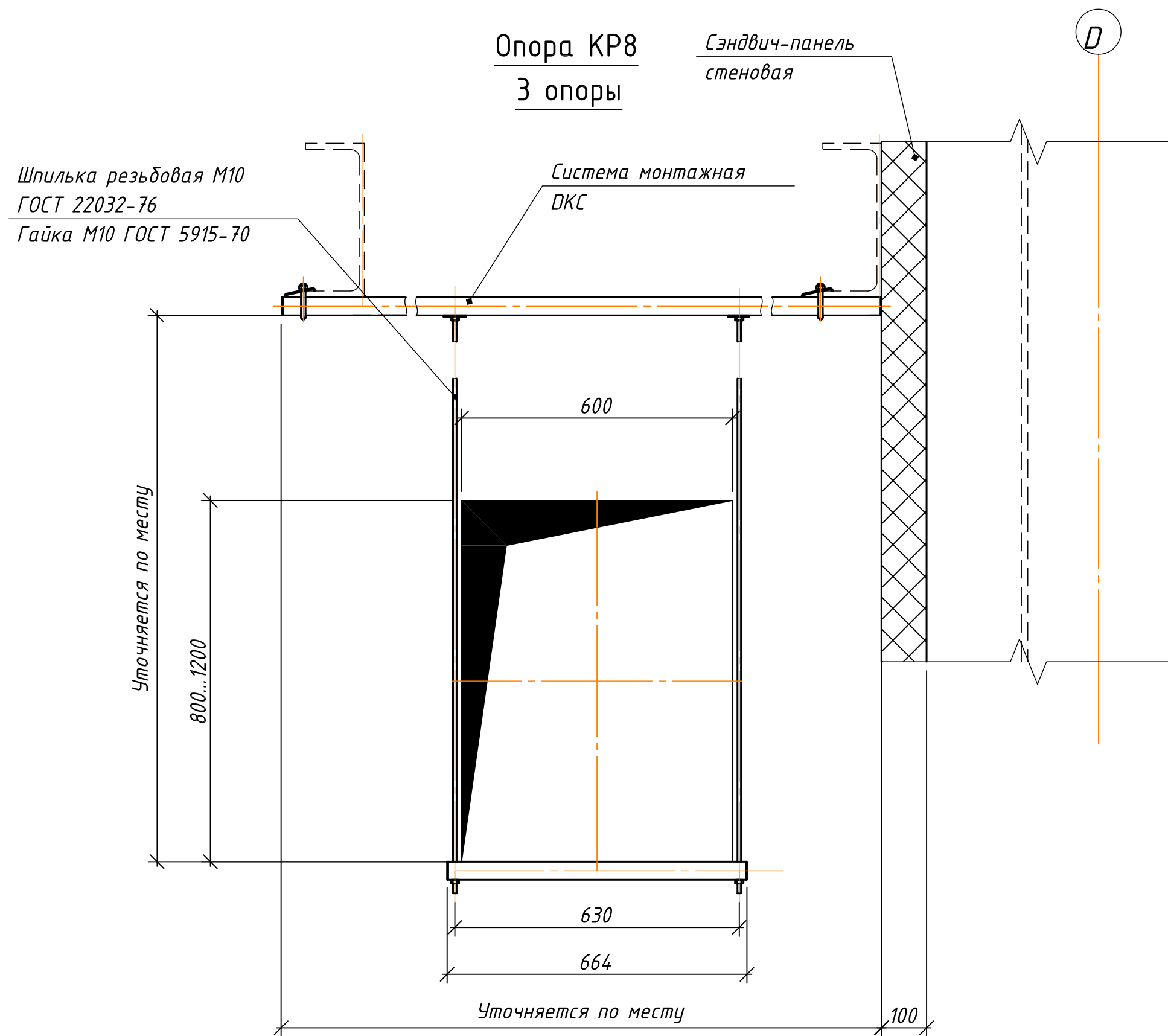
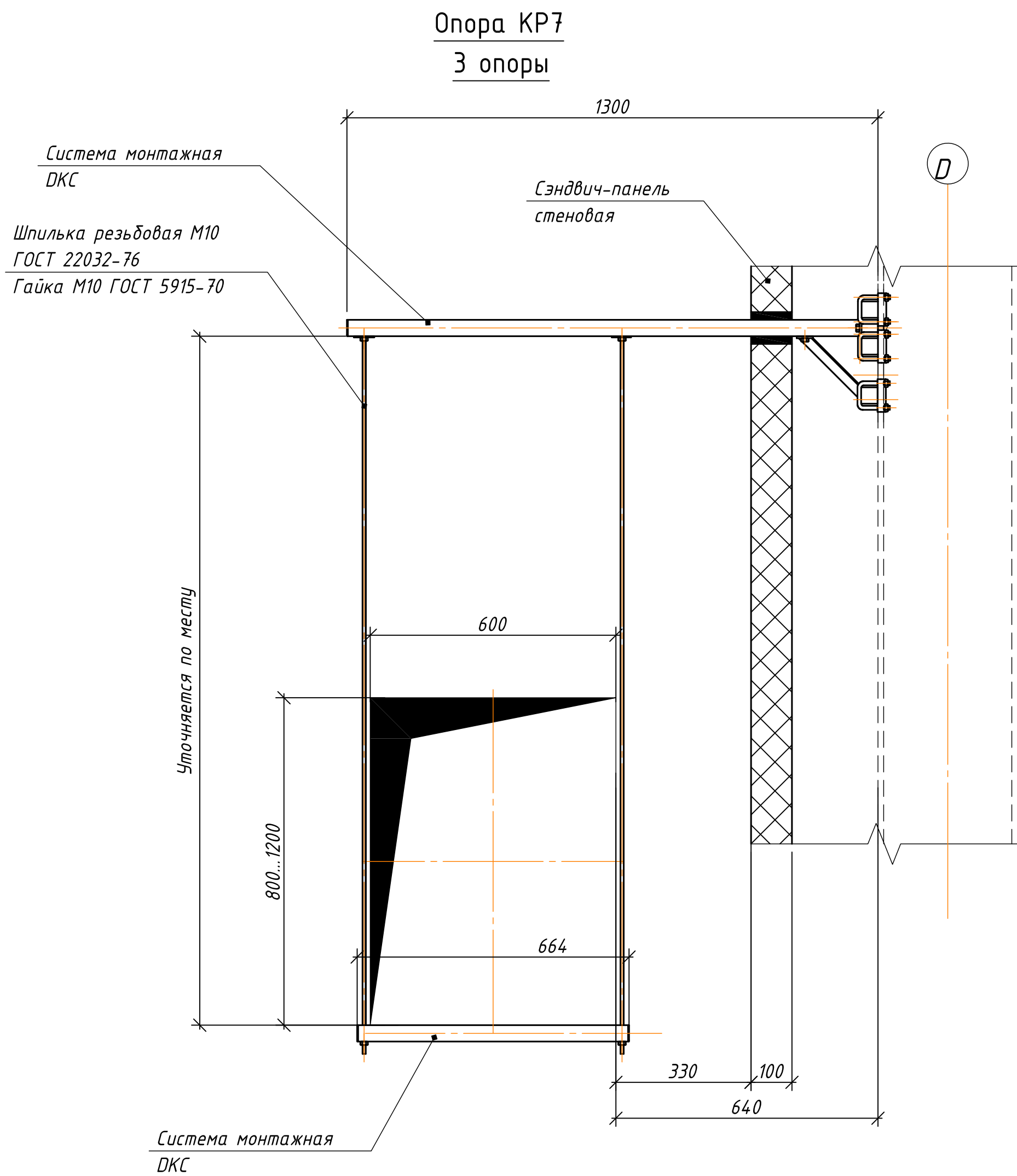
Опора КР5  
3 опоры



|                                                        |           |      |        |       |          |                                                                                                            |        |      |
|--------------------------------------------------------|-----------|------|--------|-------|----------|------------------------------------------------------------------------------------------------------------|--------|------|
| Е230-0001-8000571851-РД-01-10.20.010-ОВ                |           |      |        |       |          | Производство аммиака и карбамида, Кингисепп<br>Россия, Ленинградская область, Кингисеппский район          |        |      |
| Изм.                                                   | Колуч.    | Лист | № док. | Подп. | Дата     | Объект А17.710.2<br>(задание азотной установки и<br>узла феминерализованной воды)<br>Отопление, вентиляция | Стация | Лист |
| Разработал                                             | Савдатева | 1    | 1      | 1     | 25.02.22 |                                                                                                            | Р      | 16   |
| Проверил                                               | Шилинов   | 1    | 1      | 1     | 25.02.22 |                                                                                                            |        |      |
| Гл. инженер                                            | Афранов   | 1    | 1      | 1     | 25.02.22 |                                                                                                            |        |      |
| Н.Контроль                                             | Акилова   | 1    | 1      | 1     | 25.02.22 |                                                                                                            |        |      |
| ГИП                                                    | Неофидова | 1    | 1      | 1     | 25.02.22 |                                                                                                            |        |      |
| Типовые опоры, подвесы<br>и крепления (продолжение)    |           |      |        |       |          | ООО "ИСМ"<br>г. Санкт-Петербург                                                                            |        |      |
| Е230-0001-8000571851-РД-01-10.20.010-ОВ_0_0_RU_IFC.dwg |           |      |        |       |          | Формат А1                                                                                                  |        |      |



|             |              |              |              |  |  |
|-------------|--------------|--------------|--------------|--|--|
| Согласовано |              |              |              |  |  |
| Изм. №      | Подп. и дата | Взам. инв. № | Инв. № подл. |  |  |

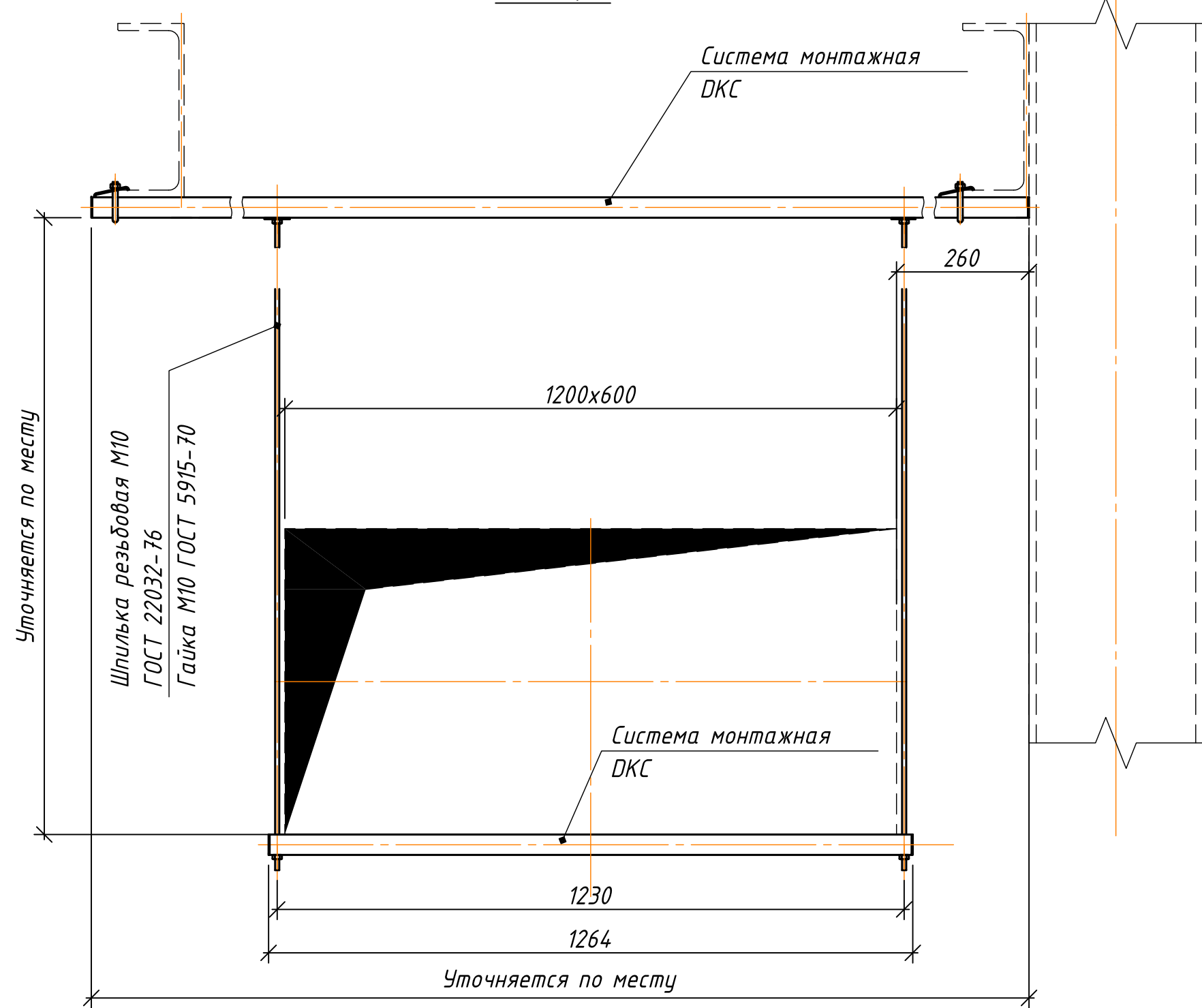


|                                                                                                            |           |          |          |                     |          |
|------------------------------------------------------------------------------------------------------------|-----------|----------|----------|---------------------|----------|
| Е230-0001-8000571851-РД-01-10.20.010-ОВ                                                                    |           |          |          |                     |          |
| Производство аммиака и карбамида, Кингисепп                                                                |           |          |          |                     |          |
| Россия, Ленинградская область, Кингисеппский район                                                         |           |          |          |                     |          |
| Изм.                                                                                                       | Копия     | Лист     | Изд.     | Подп.               | Дата     |
| Разработал                                                                                                 | Савдеев   | 25.02.23 | 25.02.23 | 25.02.23            | 25.02.23 |
| Проверил                                                                                                   | Шилинов   | 25.02.23 | 25.02.23 | 25.02.23            | 25.02.23 |
| Гл. инженер                                                                                                | Афратов   | 25.02.23 | 25.02.23 | 25.02.23            | 25.02.23 |
| Н.Контроль                                                                                                 | Акилова   | 25.02.23 | 25.02.23 | 25.02.23            | 25.02.23 |
| ГИП                                                                                                        | Неофидова | 25.02.23 | 25.02.23 | 25.02.23            | 25.02.23 |
| Объект А17.710.2<br>(задание азотной установки и<br>узла децентрализованной воды)<br>Отопление, вентиляция |           |          |          | Стация              | Лист     |
| Типовые опоры, подвесы<br>и крепления (продолжение)                                                        |           |          |          | Р                   | 17       |
| ООО "ИСМ"                                                                                                  |           |          |          | 2 (Санкт-Петербург) |          |

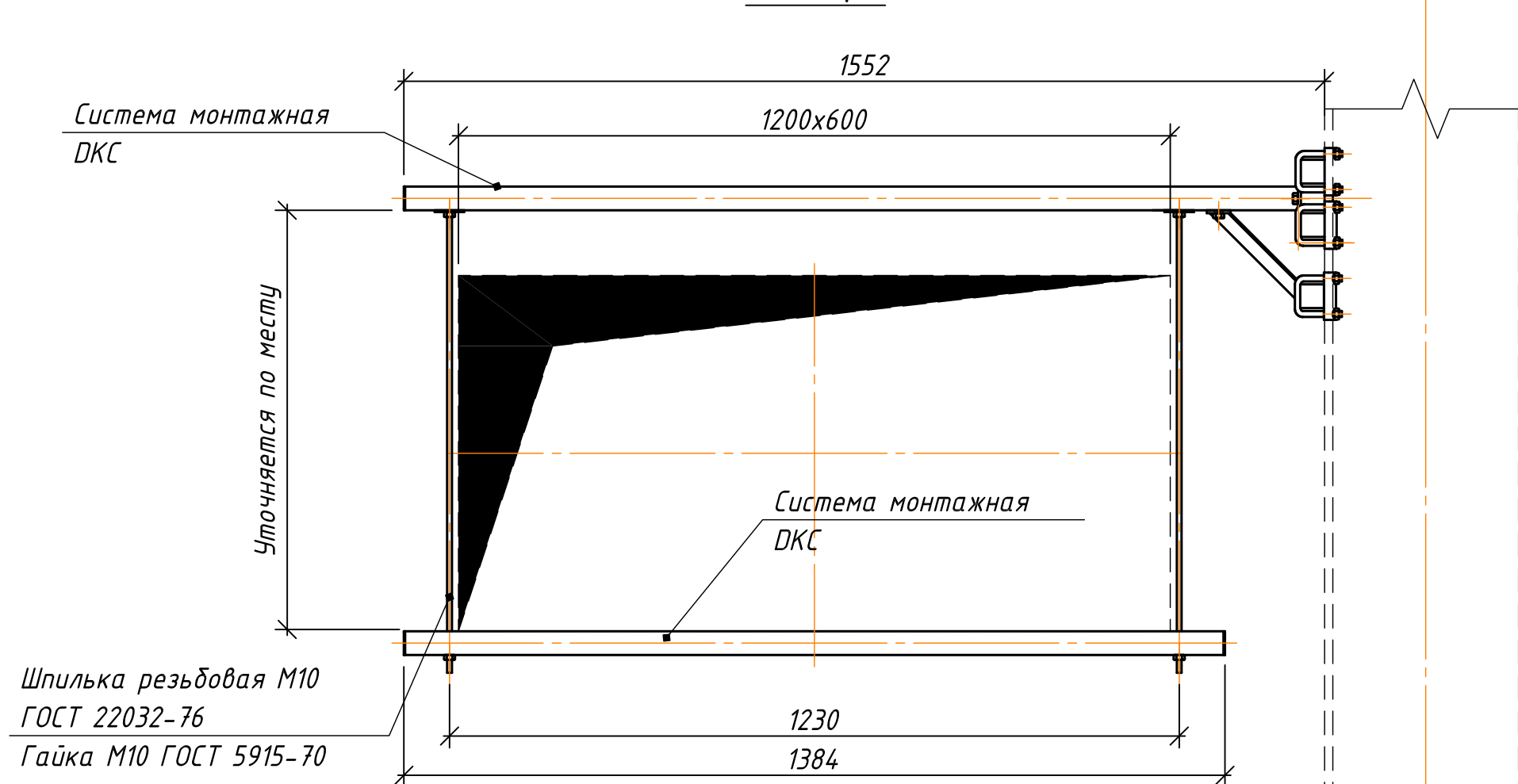


Согласовано  
Подп. и дата  
Инв. № подл.  
Взам. инв. №

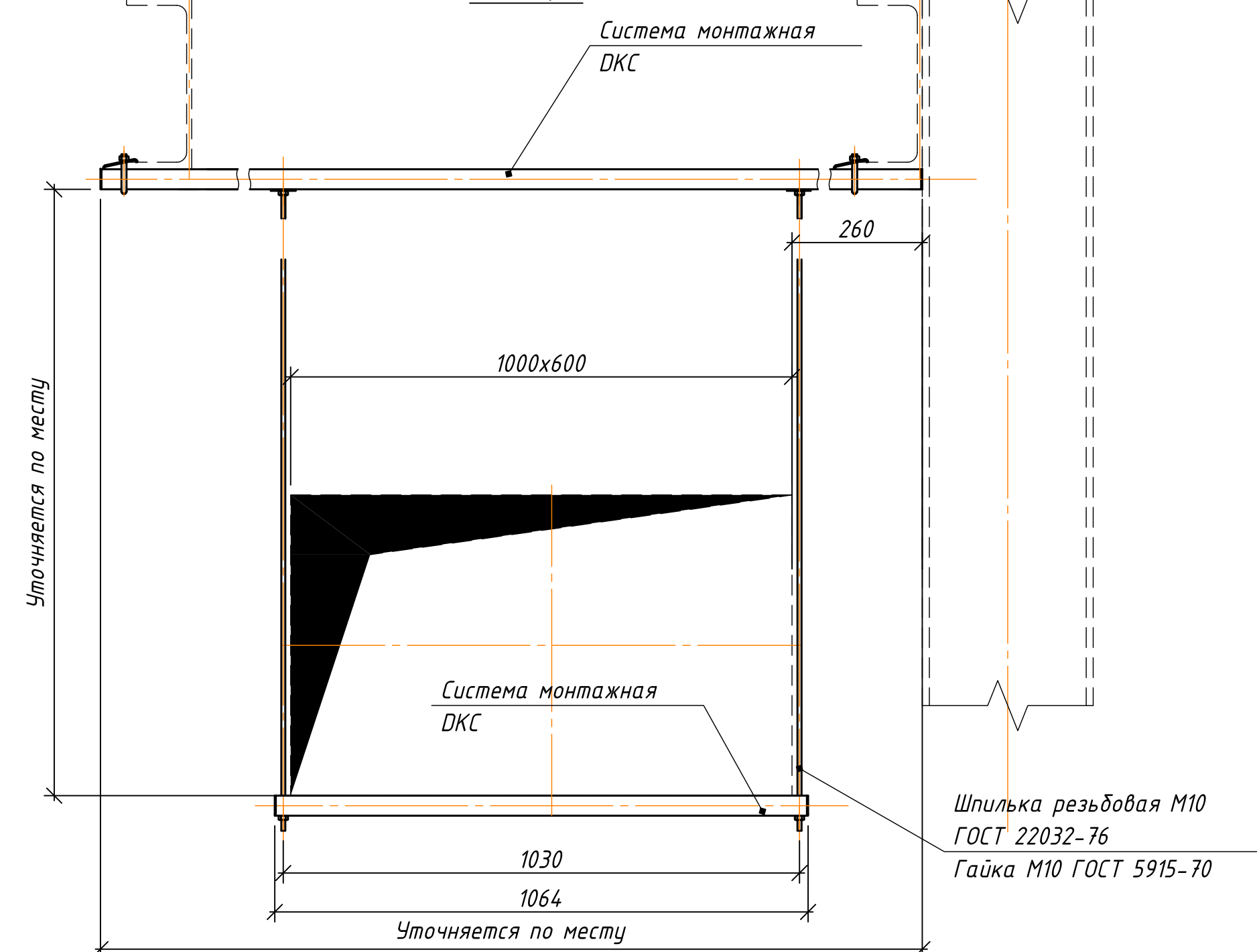
Опора KP13  
1 опора



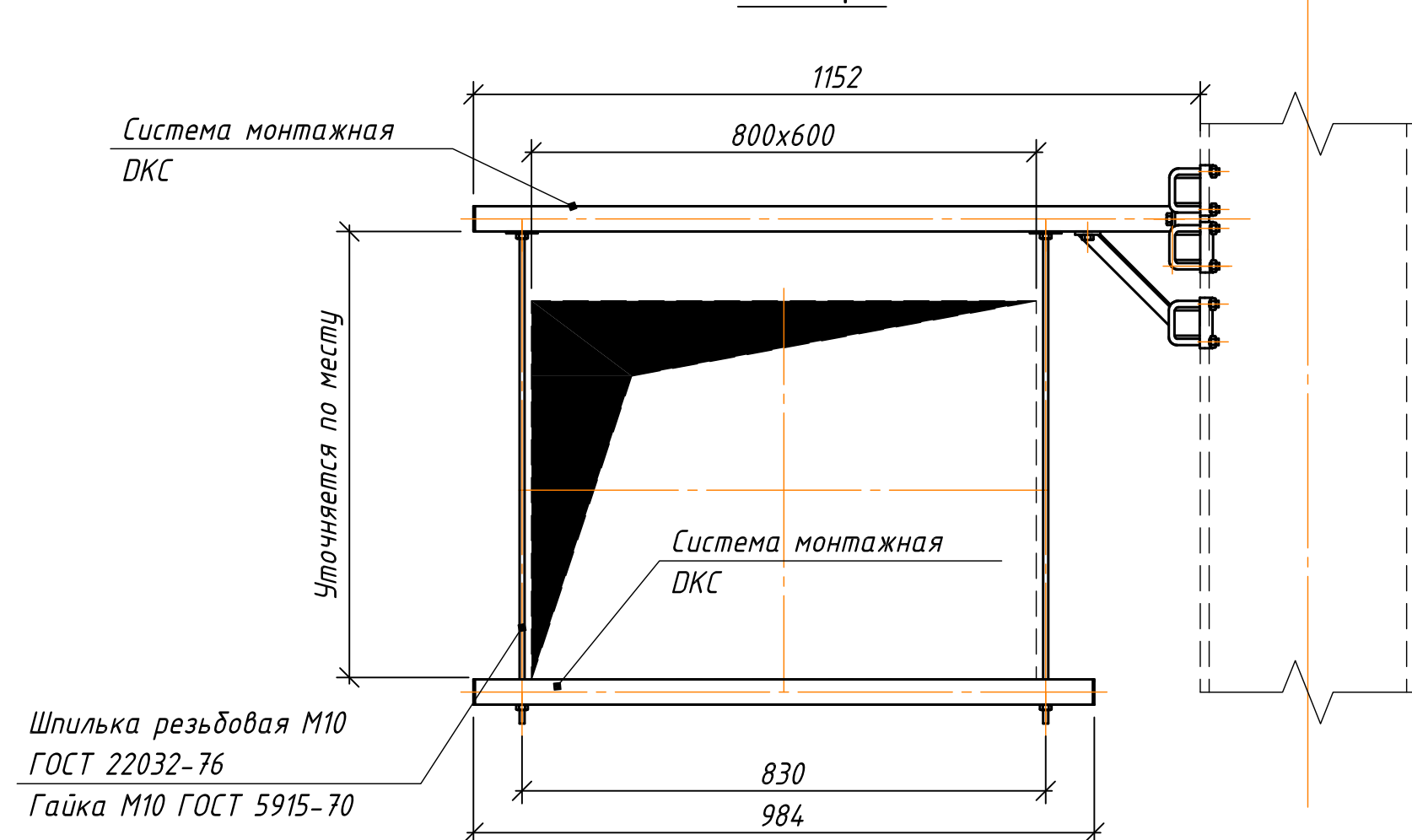
Опора KP14  
2 опоры



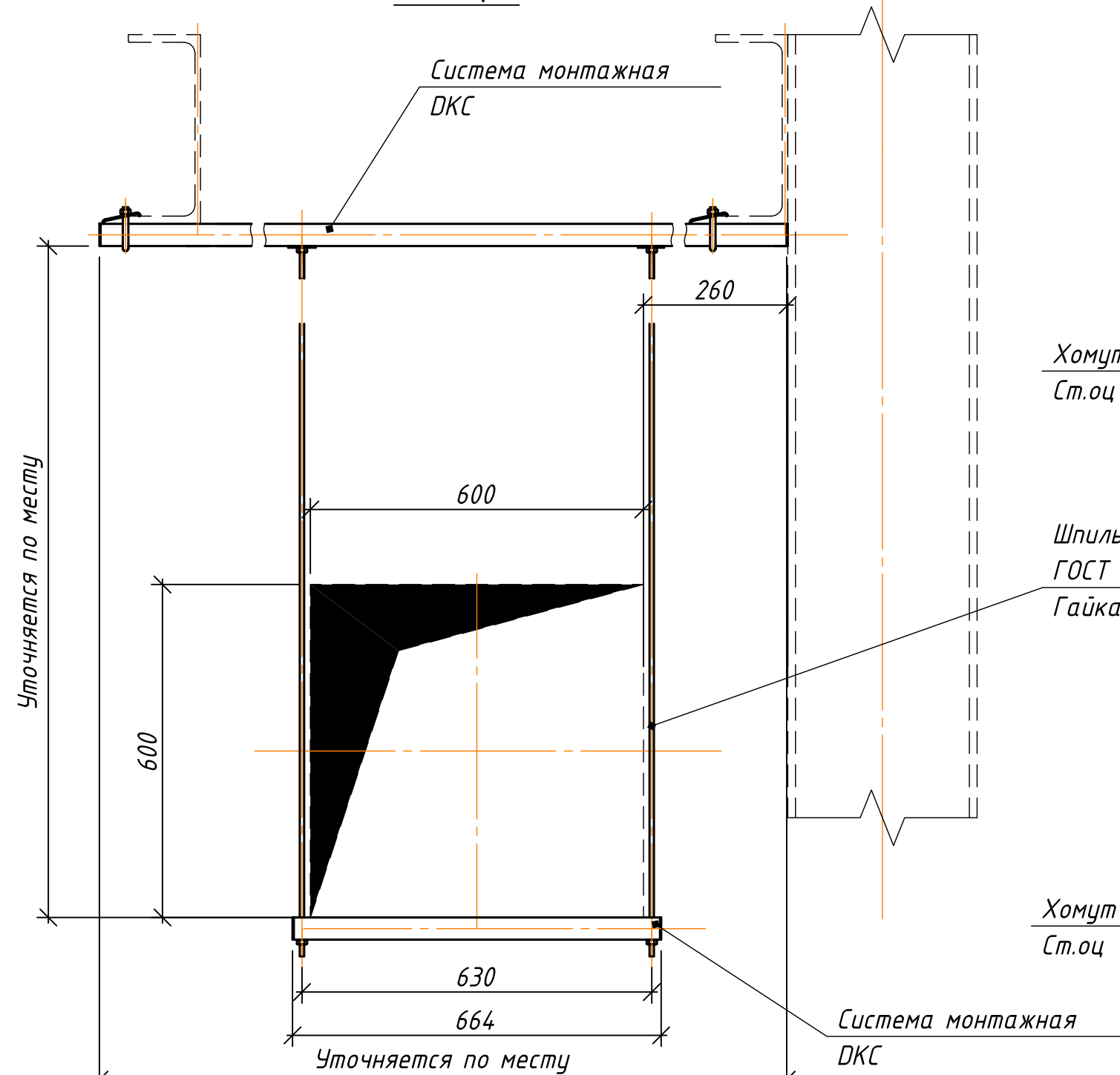
Опора KP15  
1 опора



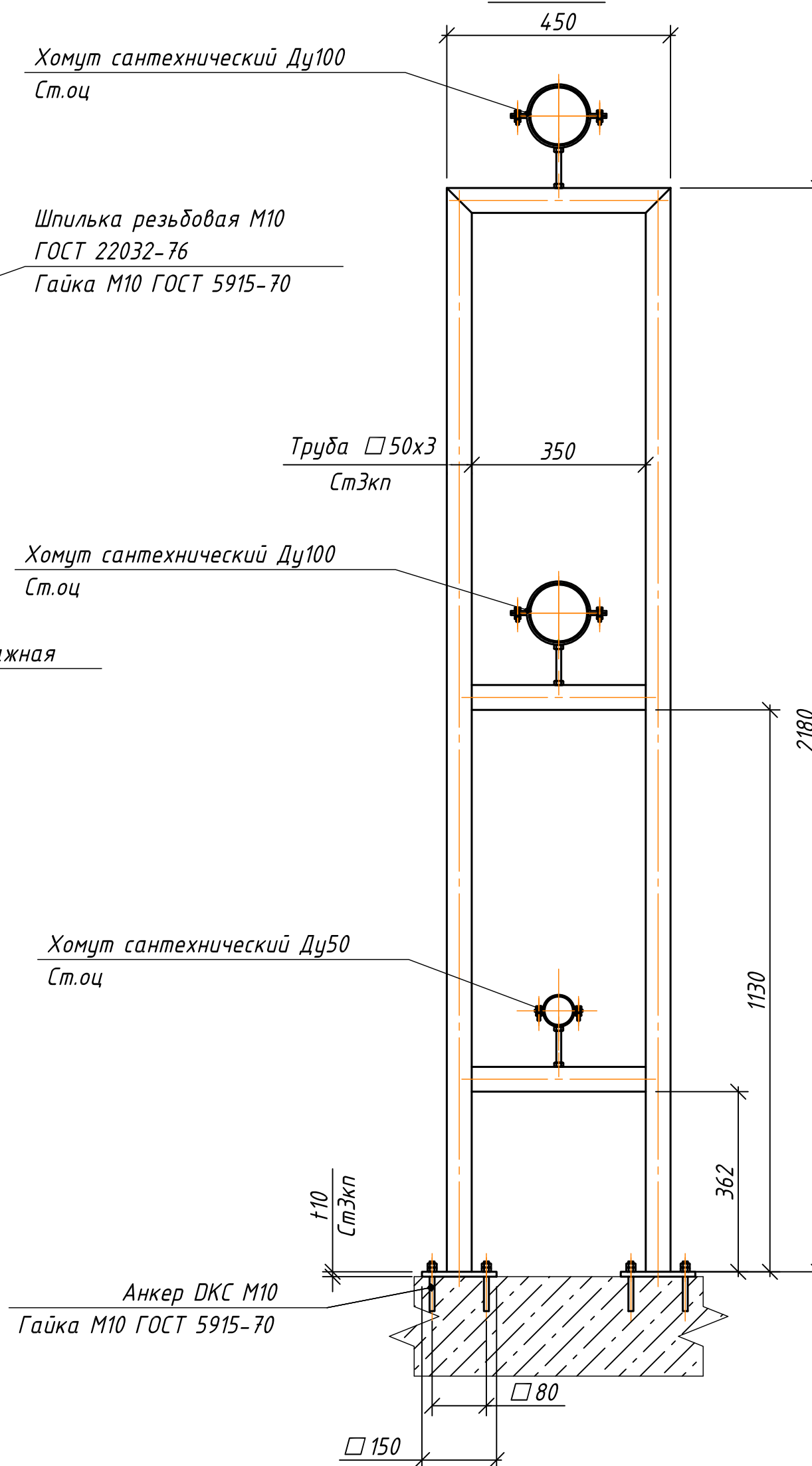
Опора KP16  
2 опоры



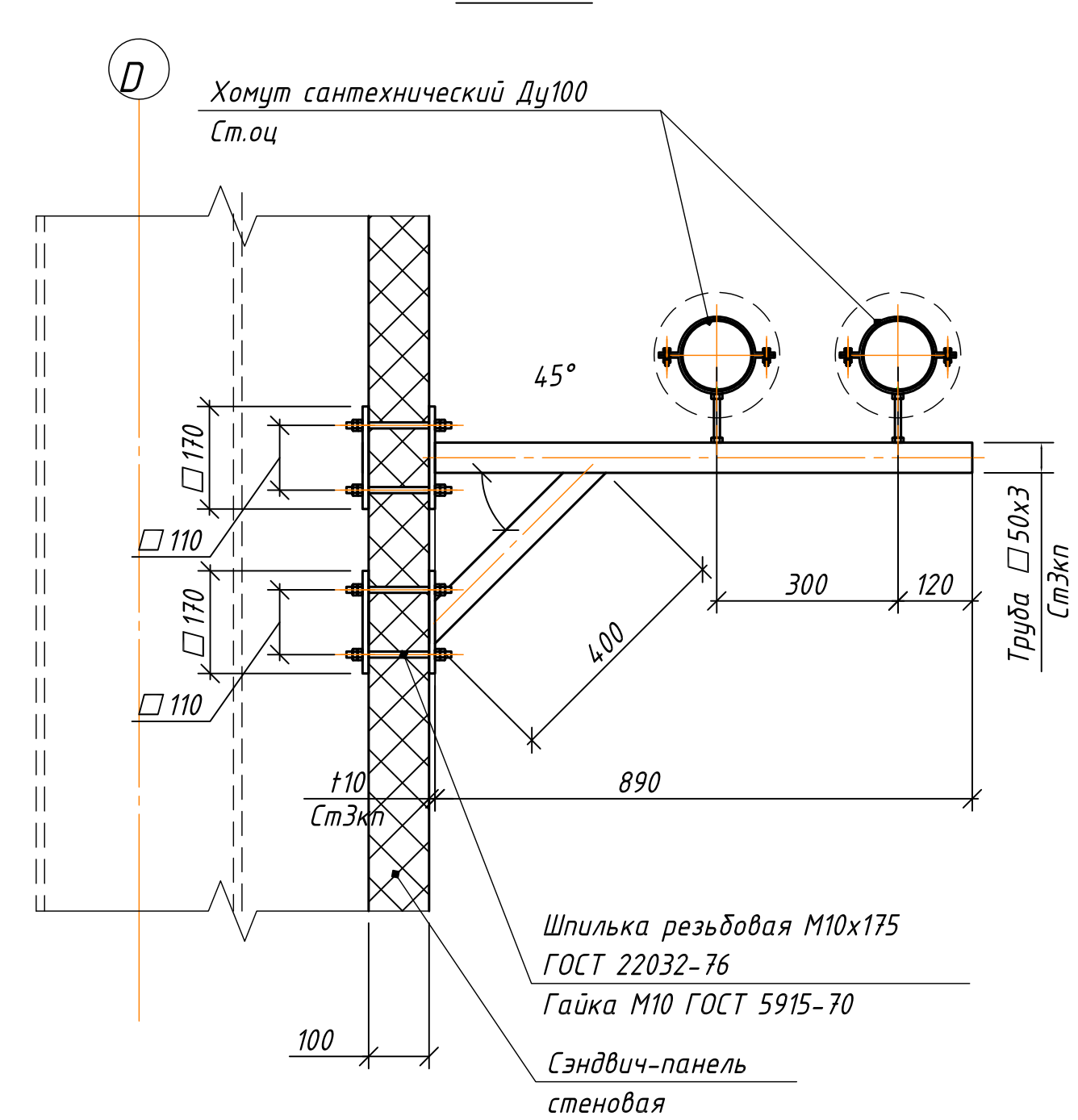
Опора KP17  
1 опора



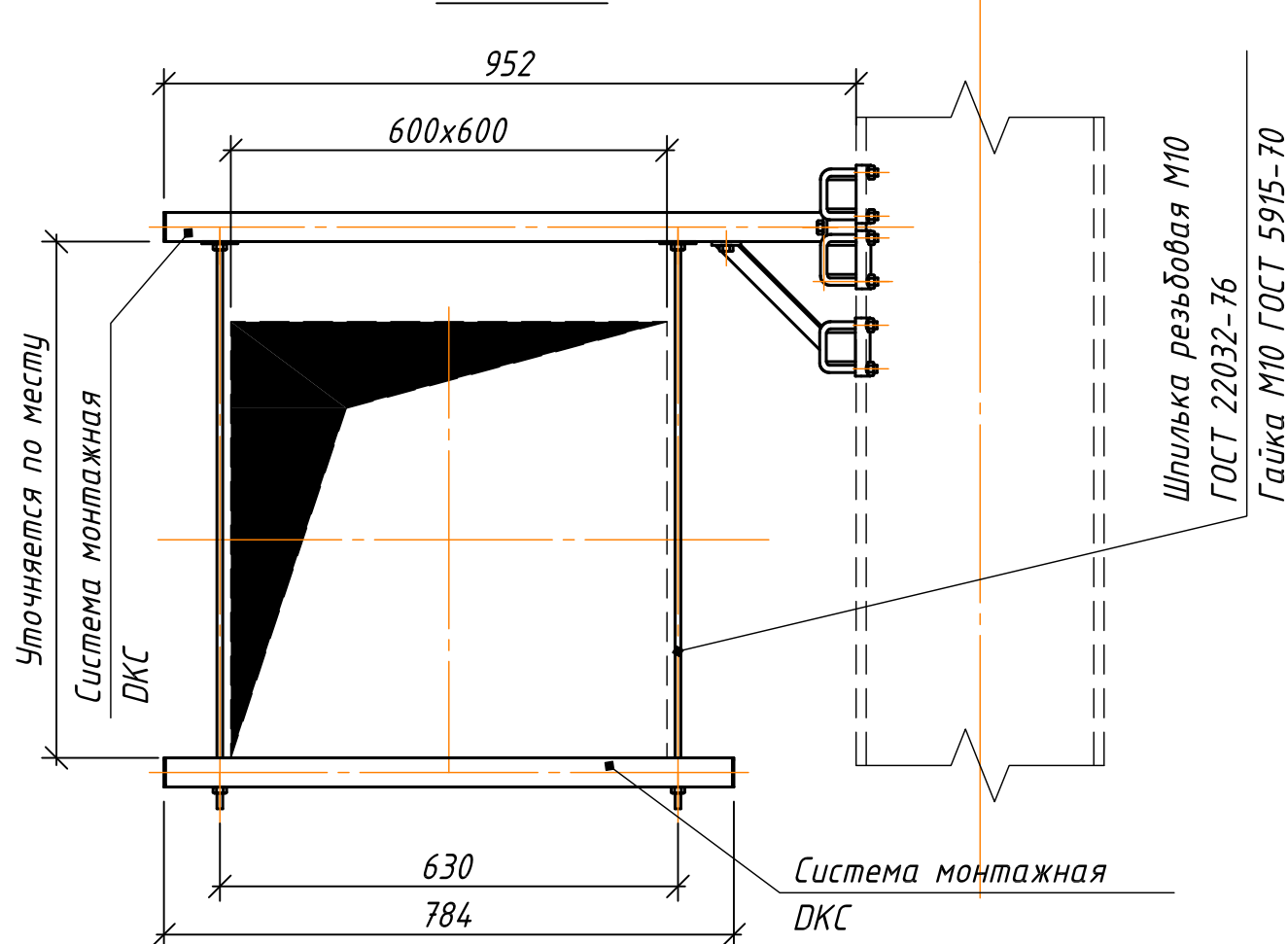
Опора KP19  
2 опоры



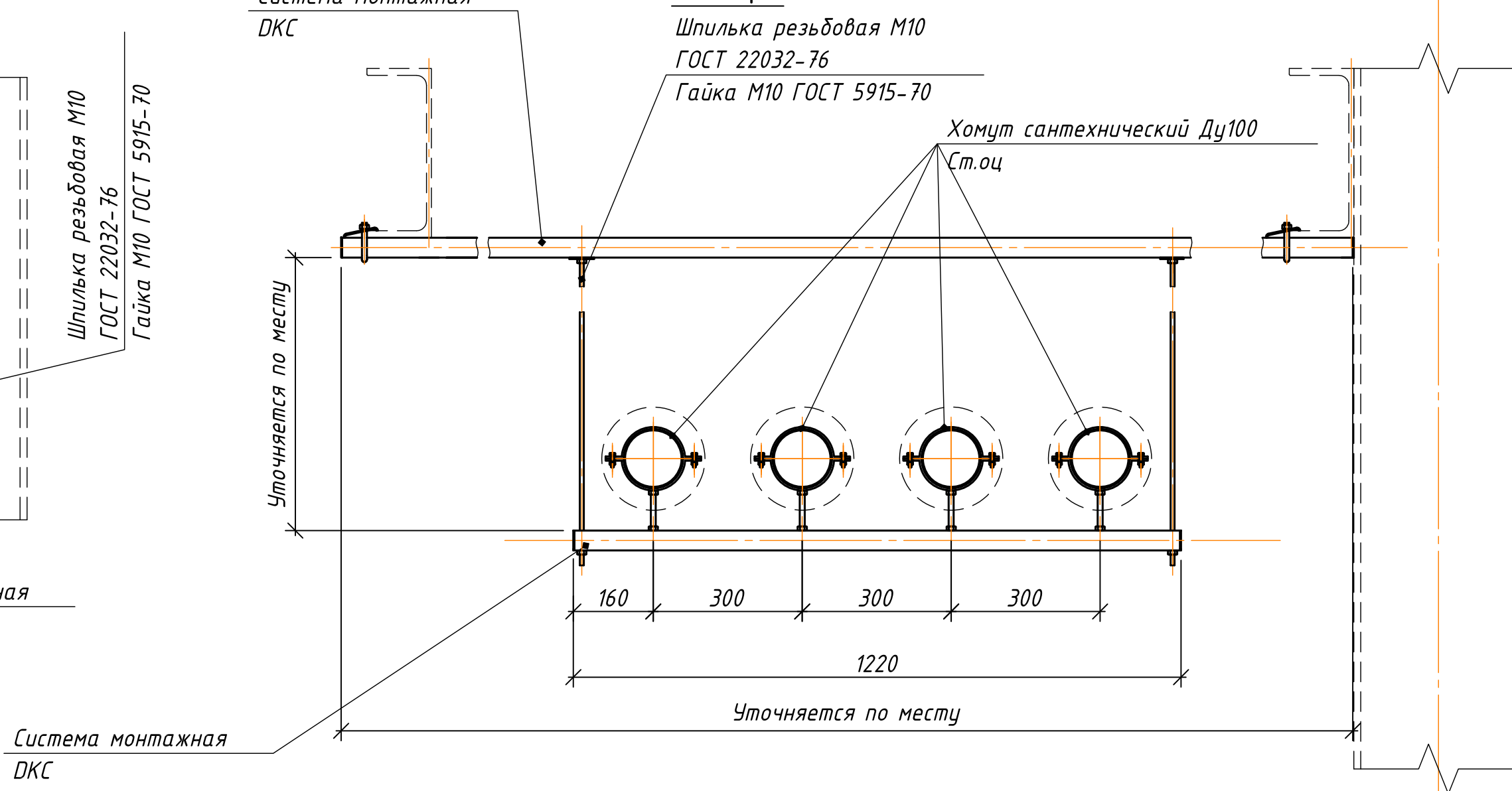
Опора KP21  
1 опора



Опора KP18  
2 опоры



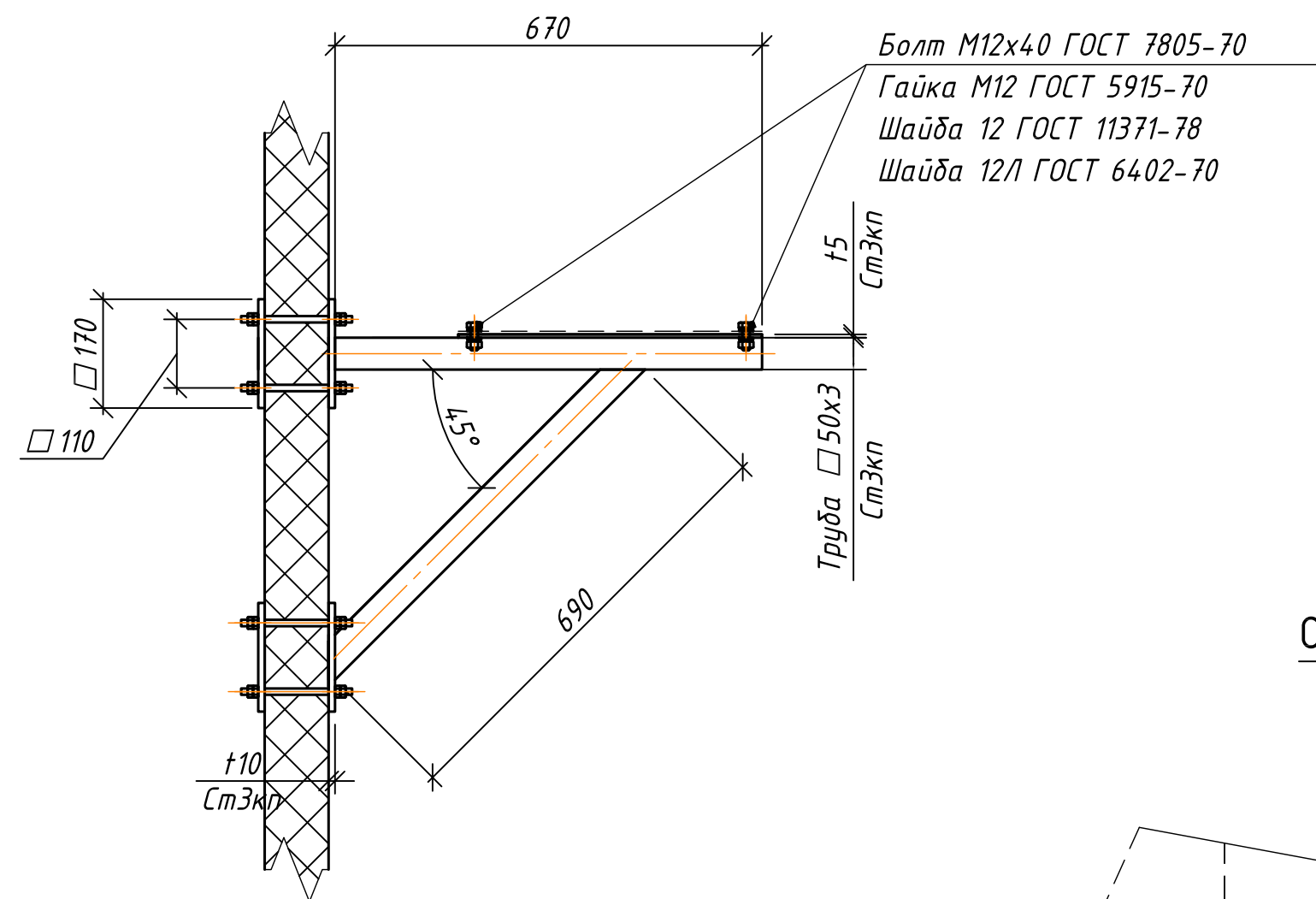
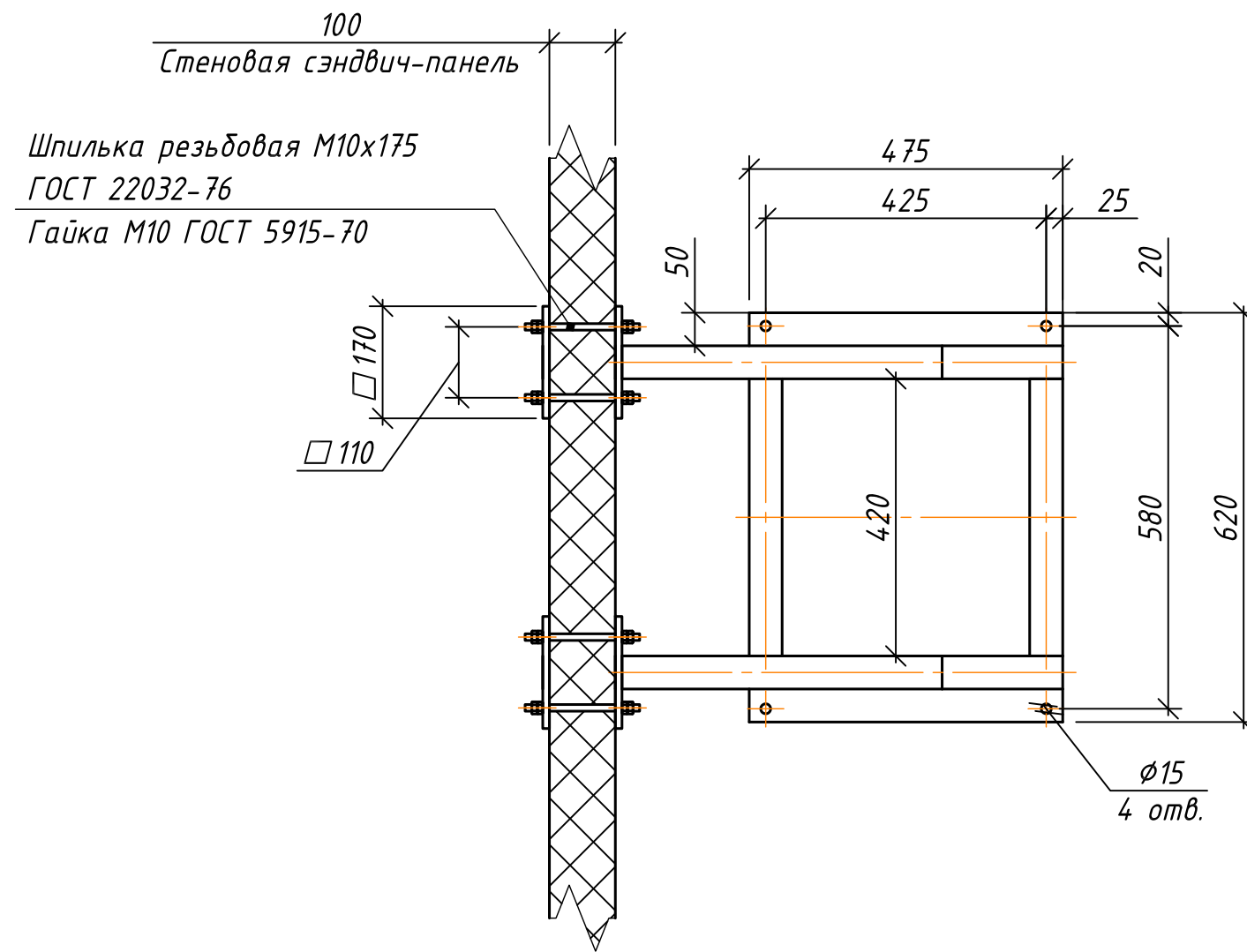
Опора KP20  
1 опора



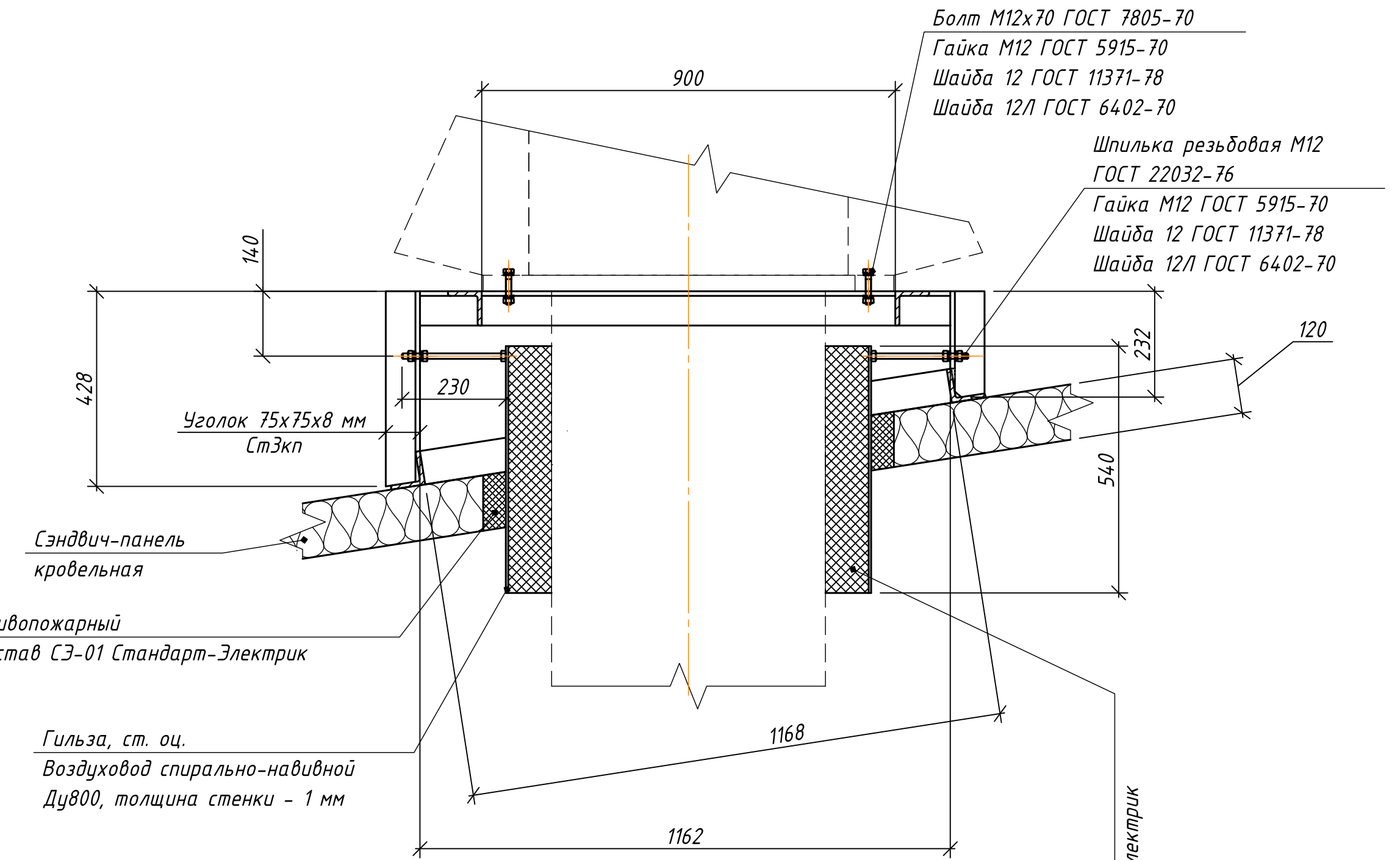
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| Е230-0001-8000571851-РД-01-10.20.010-ОВ |           |          |       |       |      | Производство аммиака и карбамида, Кингисепп<br>Россия, Ленинградская область, Кингисеппский район     |        |                    |
| Изм.                                    | Колуч.    | Лист     | №Док. | Подп. | Дата | Объект А17.710.2<br>(здание азотной установки и<br>узла деаэрированной воды)<br>Отопление, вентиляция | Стация | Лист               |
| Разработал                              | Савдеев   | 25.02.23 |       |       |      |                                                                                                       | Р      | 18                 |
| Проверил                                | Шилинов   | 25.02.23 |       |       |      |                                                                                                       |        |                    |
| Гл. инженер                             | Афонов    | 25.02.23 |       |       |      | Типовые опоры, подвесы<br>и крепления (продолжение)                                                   | ИСМ    | 000 "ИСМ"          |
| Н.Контроль                              | Акилова   | 25.02.23 |       |       |      |                                                                                                       |        | г. Санкт-Петербург |
| ГИП                                     | Неофидова | 25.02.23 |       |       |      |                                                                                                       |        | Формат А1          |



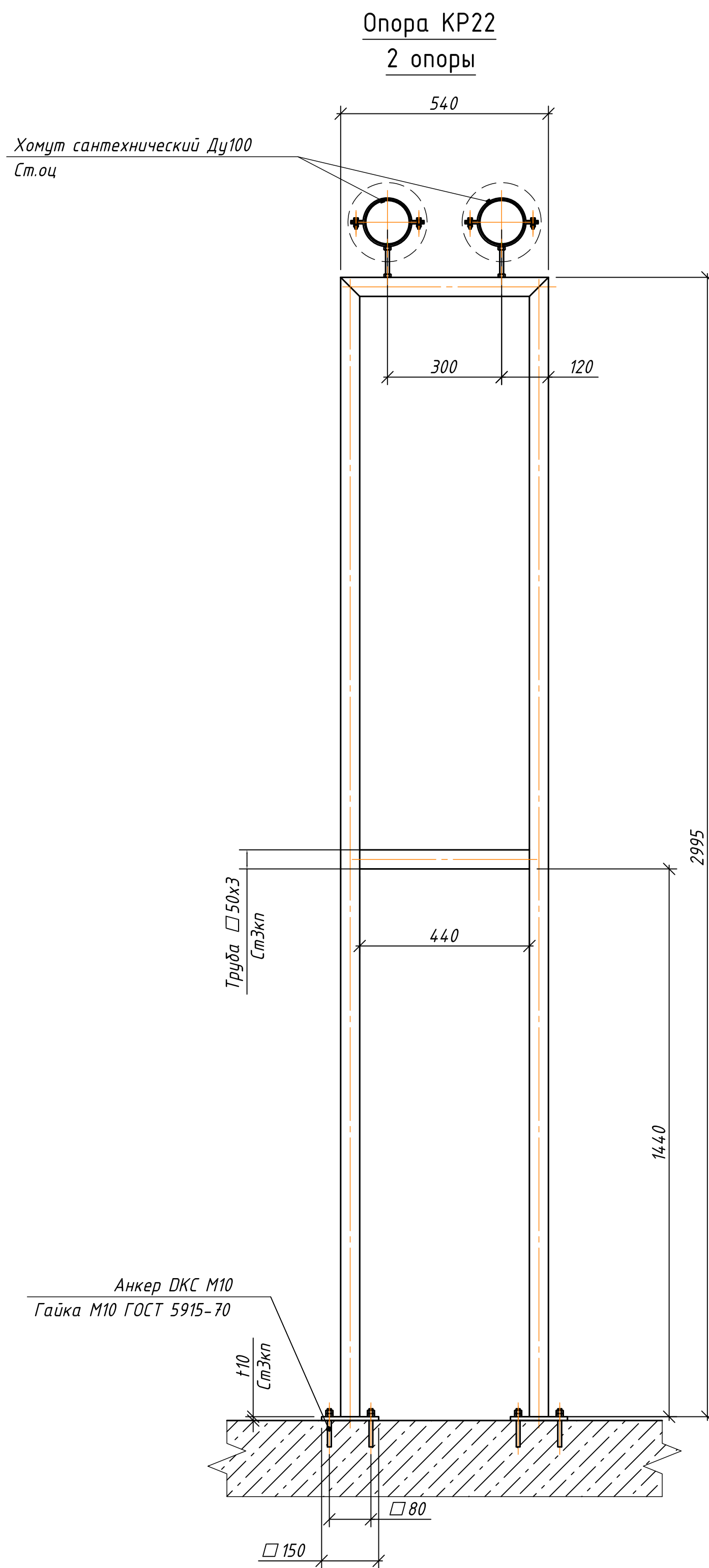
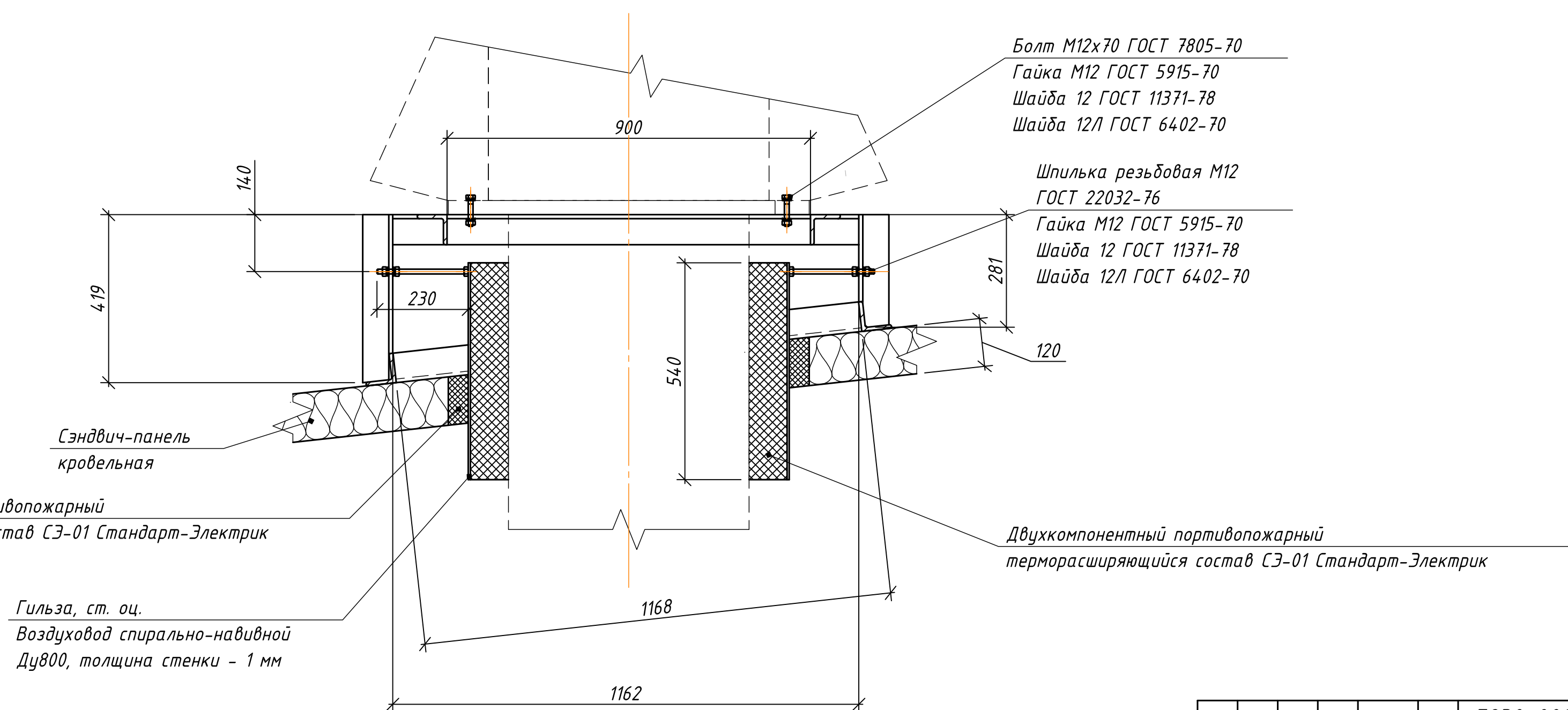
Опора КР23  
2 опоры

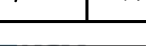


Опора КР2  
4 опоры



Опора КР2  
3 опоры



|             |           |                                                                                       |          |                                                                                               |  |                                                                                                                       |
|-------------|-----------|---------------------------------------------------------------------------------------|----------|-----------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------|
|             |           |                                                                                       |          | E230-0001-8000571851-РД-01-10.20.010-ОВ                                                       |  |                                                                                                                       |
|             |           |                                                                                       |          | Производство аммиака и карбамида, Кингисепп                                                   |  |                                                                                                                       |
|             |           |                                                                                       |          | Россия, Ленинградская область, Кингисеппский район                                            |  |                                                                                                                       |
| Изм. Колпч  | Лист №РДж | Подп.                                                                                 | Дата     | Объект А17.10.2<br>(задание эоломатической и<br>эоломатической воды)<br>Отопление, вентиляция |  | Стаядия                                                                                                               |
| Разработал  | Савдмеев  |  | 25.02.13 |                                                                                               |  | Лист                                                                                                                  |
| Проверил    | Шинилов   |  | 25.02.13 |                                                                                               |  | 19                                                                                                                    |
| Гл. инженер | Афромов   |  | 25.02.13 | Типовые опоры, подвесы<br>и крепления (продолжение)                                           |  |  ООО "ИСМ"<br>г. Санкт-Петербург |
| Н.Контроль  | Акулова   |  | 25.02.13 |                                                                                               |  |                                                                                                                       |
| ГИП         | Неведнова |  | 25.02.13 |                                                                                               |  |                                                                                                                       |



|                |  |
|----------------|--|
| Взам. инв. №   |  |
| Подпись и дата |  |
| Инв. № подл.   |  |

| Поз.  | Наименование и техническая характеристика                                  | Тип, марка, обозначение документа, опросного листа | Код оборудования, изделия, материала | Завод-изготовитель | Ед. измерения | Кол. | Масса 1 ед., кг | Примечания     |
|-------|----------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------|--------------------|---------------|------|-----------------|----------------|
| 1     | Система вентиляции                                                         |                                                    |                                      |                    |               |      |                 |                |
| 1.1   | П1                                                                         |                                                    |                                      |                    |               |      |                 |                |
| 1.1.1 | Приточная установка производительностью 46340 м3/ч; 450 Па                 | E230-0001-8000571851-РД-01-10.20.010-ОВ.0/11       | П1                                   | Системэйр          | к-т.          | 1    |                 | О/П            |
|       | в комплекте с щитом управления с узлами управления                         |                                                    |                                      |                    |               |      |                 | или аналог     |
|       | теплоносителем                                                             |                                                    |                                      |                    |               |      |                 |                |
| 1.1.2 | Труба ВГП 15Ц-15х2,8, ст. оц.                                              | ГОСТ 8732-78                                       |                                      |                    | м.п.          | 0,5  |                 | дренажный узел |
| 1.1.3 | Кран шаровый латунный муфтовый диаметр 15                                  | 065В8207                                           |                                      | Danfoss            | шт.           | 1    |                 | дренажный узел |
|       |                                                                            |                                                    |                                      |                    |               |      |                 | или аналог     |
| 1.1.4 | Воздухораспределитель для прямоугольных воздуховодов (965 х 275 мм - уст.) | ПВВ 1000-8                                         |                                      | Арктос             | шт.           | 24   |                 | или аналог     |
| 1.1.5 | Воздуховод из оцинкованной стали δ=0,8 мм., 1200х1200                      | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 7    |                 |                |
| 1.1.6 | Воздуховод из оцинкованной стали δ=0,8 мм., 1200х600                       | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 12   |                 |                |
| 1.1.7 | Воздуховод из оцинкованной стали δ=0,8 мм., 1000х600                       | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 14   |                 |                |
| 1.1.8 | Воздуховод из оцинкованной стали δ=0,8 мм., 800х600                        | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 11   |                 |                |

|             |        |           |       |         |          |                                                                                                                    |  |  |  |  |  |  |
|-------------|--------|-----------|-------|---------|----------|--------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|
|             |        |           |       |         |          | E230-0001-8000571851-РД-01-10.20.010-ОВ.СО                                                                         |  |  |  |  |  |  |
|             |        |           |       |         |          | Производство аммиака и карбамида, Кингисепп                                                                        |  |  |  |  |  |  |
| Изм.        | Кол.уч | Лист      | № док | Подпись | Дата     | Объект А17.710.2 (здание азотной установки и узла деминерализованной воды). Отопление и вентиляция.                |  |  |  |  |  |  |
| Разраб.     |        | Савватеев |       | АЮ      | 25.10.23 |                                                                                                                    |  |  |  |  |  |  |
| Проверил    |        | Шишинов   |       |         | 25.10.23 |                                                                                                                    |  |  |  |  |  |  |
|             |        |           |       |         |          | Спецификация оборудования, изделий и материалов                                                                    |  |  |  |  |  |  |
| Гл. инженер |        | Афремов   |       |         | 25.10.23 |                                                                                                                    |  |  |  |  |  |  |
| Н. контр    |        | Рядова    |       |         | 25.10.23 |                                                                                                                    |  |  |  |  |  |  |
| ГИП         |        | Неофидова |       |         | 25.10.23 |                                                                                                                    |  |  |  |  |  |  |
|             |        |           |       |         |          |  ООО «ИСМ»<br>Санкт-Петербург |  |  |  |  |  |  |

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| Инва.№ подл. | Подпись и дата | Взам.инв.№ |
|              |                |            |

| Поз.   | Наименование и техническая характеристика                  | Тип, марка, обозначение документа, опросного листа | Код оборудования, изделия, материала | Завод-изготовитель | Ед. измерения | Кол. | Масса 1 ед., кг | Примечания |
|--------|------------------------------------------------------------|----------------------------------------------------|--------------------------------------|--------------------|---------------|------|-----------------|------------|
|        |                                                            |                                                    |                                      |                    |               |      |                 |            |
| 1.1.9  | Переход из оцинкованной стали δ=0,8 мм., 1200х600/1000х600 | ГОСТ 14 918-2020                                   |                                      | КАПИТЕЛЬ           | шт.           | 2    |                 |            |
| 1.1.10 | Переход из оцинкованной стали δ=0,8 мм., 1000х600/800х600  | ГОСТ 14 918-2020                                   |                                      | КАПИТЕЛЬ           | шт.           | 2    |                 |            |
|        |                                                            |                                                    |                                      |                    |               |      |                 |            |
| 1.1.11 | Отвод-30° из оцинкованной стали δ=0,8 мм., 1200х1200       | ГОСТ 14 918-2020                                   |                                      | КАПИТЕЛЬ           | шт.           | 2    |                 |            |
| 1.1.12 | Отвод-90° из оцинкованной стали δ=0,8 мм., 1200х1200       | ГОСТ 14 918-2020                                   |                                      | КАПИТЕЛЬ           | шт.           | 2    |                 |            |
|        |                                                            |                                                    |                                      |                    |               |      |                 |            |
| 1.1.13 | Врезка из оцинкованной стали δ=0,8 мм, 1200х1200/1200х600  | ГОСТ 14 918-2020                                   |                                      | КАПИТЕЛЬ           | шт.           | 2    |                 |            |
| 1.1.14 | Врезка из оцинкованной стали δ=0,8 мм, 2000х2000/1200х1200 | ГОСТ 14 918-2020                                   |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |            |
| 1.1.15 | Врезка из оцинкованной стали δ=0,8 мм, 1200х600/965х275    | ГОСТ 14 918-2020                                   |                                      | КАПИТЕЛЬ           | шт.           | 8    |                 |            |
| 1.1.16 | Врезка из оцинкованной стали δ=0,8 мм, 1000х600/965х275    | ГОСТ 14 918-2020                                   |                                      | КАПИТЕЛЬ           | шт.           | 9    |                 |            |
| 1.1.17 | Врезка из оцинкованной стали δ=0,8 мм, 800х600/965х275     | ГОСТ 14 918-2020                                   |                                      | КАПИТЕЛЬ           | шт.           | 8    |                 |            |
|        |                                                            |                                                    |                                      |                    |               |      |                 |            |
| 1.1.18 | Заглушка из оцинкованной стали δ=0,8 мм 1200х1200 мм       | ГОСТ 14 918-2020                                   |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |            |
| 1.1.19 | Заглушка из оцинкованной стали δ=0,8 мм 800х600 мм         | ГОСТ 14 918-2020                                   |                                      | КАПИТЕЛЬ           | шт.           | 2    |                 |            |
|        |                                                            |                                                    |                                      |                    |               |      |                 |            |
| 1.1.20 | Клапан противопожарный с приводом 220 В и обогревом        | КПУ-1200х1200-НО-(220)-Е160                        |                                      |                    | шт.           | 1    |                 | или аналог |
|        |                                                            |                                                    |                                      |                    |               |      |                 |            |
| 1.1.21 | Маты теплоизоляционные δ=30 мм                             | ТЕХ МАТ                                            |                                      | ROCKWOOL           | м2            | 40   |                 |            |
| 1.1.22 | Лист оцинкованный, 0,5 мм укрывной                         |                                                    |                                      | ROCKWOOL           | м2            | 44   |                 |            |
|        |                                                            |                                                    |                                      |                    |               |      |                 |            |
| 1.2    | <u>Воздухозаборный воздуховод</u>                          | см. лист 5, узел 7                                 |                                      |                    |               |      |                 |            |
|        |                                                            |                                                    |                                      |                    |               |      |                 |            |

|      |       |      |       |       |      |                                            |      |
|------|-------|------|-------|-------|------|--------------------------------------------|------|
|      |       |      |       |       |      | E230-0001-8000571851-РД-01-10.20.010-ОВ.СО | Лист |
|      |       |      |       |       |      |                                            | 2    |
| Изм. | Кол.у | Лист | № док | Подп. | Дата |                                            |      |



|             |                |            |
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| Инв.№ подл. | Подпись и дата | Взам.инв.№ |
|             |                |            |

| Поз.   | Наименование и техническая характеристика                                  | Тип, марка, обозначение документа, опросного листа | Код оборудования, изделия, материала | Завод-изготовитель | Ед. измерения | Кол. | Масса 1 ед., кг | Примечания     |
|--------|----------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------|--------------------|---------------|------|-----------------|----------------|
|        |                                                                            |                                                    |                                      |                    |               |      |                 |                |
| 1.2.1  | Воздуховод из оцинкованной стали δ=1,0 мм., 2000х2000                      | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 12   |                 |                |
| 1.2.2  | Врезка из оцинкованной стали δ=0,8 мм, 2000х2000/1600х1600                 | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |                |
|        |                                                                            |                                                    |                                      |                    |               |      |                 |                |
| 1.2.3  | Заглушка из оцинкованной стали δ=0,8 мм, 2000х2000 мм                      | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |                |
| 1.2.4  | Решетка вентиляционная наружного исполнения                                | РДГ 1600х1600                                      |                                      | Арктос             | шт.           | 1    |                 | или аналог     |
|        |                                                                            |                                                    |                                      |                    |               |      |                 |                |
| 1.2.5  | Лист 16 мм, СтЗкп                                                          | ГОСТ 19903-2015                                    |                                      |                    | м2            | 2    |                 | узел крепления |
| 1.2.6  | Лист 5 мм, СтЗкп (полоса 200х5 мм)                                         | ГОСТ 19903-2015                                    |                                      |                    | м2            | 2    |                 | узел крепления |
| 1.2.7  | Резина-пластина 2КЩ-А-с                                                    | ГОСТ 7338-90                                       |                                      |                    | м2            | 2    |                 | узел крепления |
| 1.2.8  | Анкер М20х250, в комплекте с хим. составом                                 |                                                    |                                      | ДКС                | шт.           | 16   |                 | узел крепления |
| 1.2.9  | Гайка М20.40Х.016                                                          | ГОСТ 5915-70                                       |                                      |                    | шт.           | 32   |                 | узел крепления |
| 1.2.10 | Винт самонарезающий 2,5 мм                                                 | ГОСТ 11650-80                                      |                                      |                    | шт.           | 52   |                 | узел крепления |
|        |                                                                            |                                                    |                                      |                    |               |      |                 |                |
| 1.3    | <u>П2</u>                                                                  |                                                    |                                      |                    |               |      |                 |                |
|        |                                                                            |                                                    |                                      |                    |               |      |                 |                |
| 1.3.1  | Приточная установка производительностью 36500 м3/ч; 450 Па                 | E230-0001-8000571851-РД-01-10.20.010-ОВ.0/П2       | П2                                   | Системэйр          | к-т.          | 1    |                 | О/П2           |
|        | в комплекте с щитом управления с узлами управления                         |                                                    |                                      |                    |               |      |                 | или аналог     |
|        | теплоносителем                                                             |                                                    |                                      |                    |               |      |                 |                |
| 1.3.2  | Труба ВГП 15Ц-15х2,8, ст.оц.                                               | ГОСТ 8732-78                                       |                                      |                    | м.п.          | 0,5  |                 | дренажный узел |
| 1.3.3  | Кран шаровый латунный муфтовый диаметр 15                                  | 065В8207                                           |                                      | Danfoss            | шт.           | 1    |                 | дренажный узел |
|        |                                                                            |                                                    |                                      |                    |               |      |                 | или аналог     |
| 1.3.4  | Воздухораспределитель для прямоугольных воздуховодов (965 х 275 мм - уст.) | ПВВ 1000-8                                         |                                      | Арктос             | шт.           | 18   |                 |                |

|      |       |      |       |       |      |                                            |      |
|------|-------|------|-------|-------|------|--------------------------------------------|------|
|      |       |      |       |       |      | E230-0001-8000571851-РД-01-10.20.010-ОВ.СО | Лист |
|      |       |      |       |       |      |                                            | 3    |
| Изм. | Кол.у | Лист | № док | Подп. | Дата |                                            |      |

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| Интв.№ подл. | Подпись и дата | Взам.инв.№ |
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| Поз.   | Наименование и техническая характеристика                  | Тип, марка, обозначение документа, опросного листа | Код оборудования, изделия, материала | Завод-изготовитель | Ед. измерения | Кол. | Масса 1 ед., кг | Примечания |
|--------|------------------------------------------------------------|----------------------------------------------------|--------------------------------------|--------------------|---------------|------|-----------------|------------|
|        |                                                            |                                                    |                                      |                    |               |      |                 |            |
| 1.3.5  | Воздуховод из оцинкованной стали δ=0,8 мм., 1200х1200      | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 14,5 |                 |            |
| 1.3.6  | Воздуховод из оцинкованной стали δ=0,8 мм., 1400х600       | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 9    |                 |            |
| 1.3.6  | Воздуховод из оцинкованной стали δ=0,8 мм., 1200х600       | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 9    |                 |            |
| 1.3.7  | Воздуховод из оцинкованной стали δ=0,8 мм., 1000х600       | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 13   |                 |            |
| 1.3.8  | Воздуховод из оцинкованной стали δ=0,8 мм., 800х600        | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 11   |                 |            |
| 1.3.9  | Воздуховод из оцинкованной стали δ=0,8 мм., 600х600        | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 8,5  |                 |            |
|        |                                                            |                                                    |                                      |                    |               |      |                 |            |
| 1.3.10 | Переход из оцинкованной стали δ=0,8 мм., 1400х600/1200х600 | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |            |
| 1.3.11 | Переход из оцинкованной стали δ=0,8 мм., 1200х600/1000х600 | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |            |
| 1.3.12 | Переход из оцинкованной стали δ=0,8 мм., 1000х600/800х600  | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 2    |                 |            |
| 1.3.13 | Переход из оцинкованной стали δ=0,8 мм., 800х600/600х600   | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |            |
|        |                                                            |                                                    |                                      |                    |               |      |                 |            |
| 1.3.14 | Отвод-90° из оцинкованной стали δ=0,8 мм., 1200х1200       | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 5    |                 |            |
|        |                                                            |                                                    |                                      |                    |               |      |                 |            |
| 1.3.15 | Врезка из оцинкованной стали δ=0,8 мм, 2000х1200/1200х1200 | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |            |
| 1.3.16 | Врезка из оцинкованной стали δ=0,8 мм, 1200х1200/1400х600  | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |            |
| 1.3.17 | Врезка из оцинкованной стали δ=0,8 мм, 1200х1200/1000х600  | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |            |
| 1.3.18 | Врезка из оцинкованной стали δ=0,8 мм, 1400х600/965х275    | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 3    |                 |            |
| 1.3.19 | Врезка из оцинкованной стали δ=0,8 мм, 1200х600/965х275    | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 3    |                 |            |
| 1.3.20 | Врезка из оцинкованной стали δ=0,8 мм, 1000х600/965х275    | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 5    |                 |            |
| 1.3.21 | Врезка из оцинкованной стали δ=0,8 мм, 800х600/965х275     | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 4    |                 |            |
| 1.3.22 | Врезка из оцинкованной стали δ=0,8 мм, 600х600/965х275     | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 3    |                 |            |

|      |       |      |       |       |      |                                            |      |
|------|-------|------|-------|-------|------|--------------------------------------------|------|
|      |       |      |       |       |      | E230-0001-8000571851-ПД-01-10.20.010-ОВ.СО | Лист |
|      |       |      |       |       |      |                                            | 4    |
| Изм. | Кол.у | Лист | № док | Подп. | Дата |                                            |      |



|             |                |            |
|-------------|----------------|------------|
| Инв.№ подл. | Подпись и дата | Взам.инв.№ |
|             |                |            |

| Поз.   | Наименование и техническая характеристика                      | Тип, марка, обозначение документа, опросного листа | Код оборудования, изделия, материала | Завод-изготовитель | Ед. измерения | Кол. | Масса 1 ед., кг | Примечания |
|--------|----------------------------------------------------------------|----------------------------------------------------|--------------------------------------|--------------------|---------------|------|-----------------|------------|
|        |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.3.23 | Заглушка из оцинкованной стали δ=0,8 мм 1200х1200 мм           | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |            |
| 1.3.24 | Заглушка из оцинкованной стали δ=0,8 мм 800х600 мм             | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |            |
| 1.3.25 | Заглушка из оцинкованной стали δ=0,8 мм 600х600 мм             | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 1    |                 |            |
|        |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.3.26 | Клапан противопожарный с приводом 220 В и обогревом            | КПУ-1200х1200-НО-(220)-Е160                        |                                      |                    | шт.           | 1    |                 | или аналог |
|        |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.3.27 | Маты теплоизоляционные δ=30 мм                                 | ТЕХ МАТ                                            |                                      | ROCKWOOL           | м2            | 31   |                 |            |
| 1.3.28 | Лист оцинкованный, 0,5 мм укрывной                             |                                                    |                                      | ROCKWOOL           | м2            | 34   |                 |            |
|        |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.4    | ПА1-2                                                          |                                                    |                                      |                    |               |      |                 |            |
|        |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.4.1  | Вентилятор канальный, производительность 14470 м3/час, 2,2 КВт | E230-0001-8000571851-РД-01-10.20.010-ОВ.013        | ПА1, ПА2                             | Завод Вентилятор   | компл.        | 2    |                 | или аналог |
|        | В комплекте с крепежом, фитингами и шкафом управления          | В013-284 №7.1 4/30°-71 90L4                        |                                      |                    |               |      |                 |            |
| 1.4.2  | Клапан воздушный обратный, Ø710 мм                             | КВО 710М                                           |                                      | Арктос             | шт.           | 2    |                 | или аналог |
| 1.4.3  | Решетка вентиляционная круглая Ø710 мм                         | CG 710                                             |                                      | Арктос             | шт.           | 2    |                 | или аналог |
|        |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.4.4  | Воздуховод из оцинкованной стали δ=0,8 мм., Ø710 мм            | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 1    |                 |            |
| 1.4.5  | Воздуховод из оцинкованной стали δ=0,8 мм., 800х800            | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 8    |                 |            |
|        |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.4.6  | Отвод-90° из оцинкованной стали δ=0,8 мм., 800х800             | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 4    |                 |            |
| 1.4.7  | Переход из оцинкованной стали δ=0,8 мм., 800х800/Ø710          | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 2    |                 |            |
|        |                                                                |                                                    |                                      |                    |               |      |                 |            |

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|      |       |      |       |       |      | E230-0001-8000571851-РД-01-10.20.010-ОВ.СО | Лист |
|      |       |      |       |       |      |                                            | 5    |
| Изм. | Кол.у | Лист | № док | Подп. | Дата |                                            |      |

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| Инв.№ подл. | Подпись и дата | Взам.инв.№ |
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| Поз.  | Наименование и техническая характеристика                      | Тип, марка, обозначение документа, опросного листа | Код оборудования, изделия, материала | Завод-изготовитель | Ед. измерения | Кол. | Масса 1 ед., кг | Примечания |
|-------|----------------------------------------------------------------|----------------------------------------------------|--------------------------------------|--------------------|---------------|------|-----------------|------------|
|       |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.4.8 | Врезка из оцинкованной стали δ=0,8 мм, 2000х2000/800х800       | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 2    |                 |            |
|       |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.5   | <u>B1-7</u>                                                    |                                                    |                                      |                    |               |      |                 |            |
|       |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.5.1 | Крышный вентилятор ВКРФ №6,3, 5,5 КВт, 22560 м3/час            | E230-0001-8000571851-РД-01-10.20.010-ОВ.0Л4        | B1, B2, B3                           | Завод Вентилятор   | компл.        | 3    |                 | или аналог |
|       | в комплекте с крепежом, фитингами и шкафом управления          | ВКРФ №6.3 РВ9 5.5/1500                             |                                      |                    |               |      |                 |            |
| 1.5.2 | Крышный вентилятор ВКРФ №6,3, 0,75 КВт, 8755 м3/час            | E230-0001-8000571851-РД-01-10.20.010-ОВ.0Л5        | B4, B5, B6, B7                       | Завод Вентилятор   | компл.        | 4    |                 | или аналог |
|       | в комплекте с крепежом, фитингами и шкафом управления          | ВКРФ №5.6 РВ6 0.75/1000 80А6                       |                                      |                    |               |      |                 |            |
|       |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.5.3 | Клапан воздушный обратный, Ø600 мм                             | КВО 600М                                           |                                      | Арктос             | шт.           | 4    |                 | или аналог |
| 1.5.4 | Клапан воздушный обратный, Ø700 мм                             | КВО 700М                                           |                                      | Арктос             | шт.           | 3    |                 | или аналог |
|       |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.5.5 | Воздуховод из оцинкованной стали δ=0,8 мм., Ø600 мм            | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 4    |                 |            |
| 1.5.6 | Воздуховод из оцинкованной стали δ=0,8 мм., Ø700 мм            | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 3    |                 |            |
|       |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.5.7 | Решетка вентиляционная круглая Ø600 мм                         | СГ 600                                             |                                      | Арктос             | шт.           | 4    |                 | или аналог |
| 1.5.8 | Решетка вентиляционная круглая Ø700 мм                         | СГ 700                                             |                                      | Арктос             | шт.           | 3    |                 | или аналог |
|       |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.6   | <u>BA1-2</u>                                                   |                                                    |                                      |                    |               |      |                 |            |
|       |                                                                |                                                    |                                      |                    |               |      |                 |            |
| 1.6.1 | Вентилятор радиальный, производительностью 15080 м3/час, 3 КВт | E230-0001-8000571851-РД-01-10.20.010-ОВ.0Л6        | BA1, BA2                             | Завод Вентилятор   | компл.        | 2    |                 | или аналог |
|       | в комплекте с рамой, крепежом, фитингами и шкафом управления   | ВР280-46-8 исп. 5                                  |                                      |                    |               |      |                 |            |

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|      |       |      |       |       |      | E230-0001-8000571851-РД-01-10.20.010-ОВ.СО | Лист |
|      |       |      |       |       |      |                                            | 6    |
| Изм. | Кол.у | Лист | № док | Подп. | Дата |                                            |      |



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| Поз.  | Наименование и техническая характеристика           | Тип, марка, обозначение документа, опросного листа | Код оборудования, изделия, материала | Завод-изготовитель | Ед. измерения | Кол. | Масса 1 ед., кг | Примечания                  |
|-------|-----------------------------------------------------|----------------------------------------------------|--------------------------------------|--------------------|---------------|------|-----------------|-----------------------------|
|       |                                                     |                                                    |                                      |                    |               |      |                 |                             |
| 1.6.2 | Клапан воздушный обратный, Ø800 мм                  | КВО 800М                                           |                                      | Арктос             | шт.           | 2    |                 | или аналог                  |
| 1.6.3 | Решетка вентиляционная круглая Ø800 мм              | СБ 800                                             |                                      | Арктос             | шт.           | 2    |                 | или аналог                  |
| 1.6.4 | Решетка вентиляционная 600х600 мм                   | РДГ 600х600 мм                                     |                                      | Арктос             | шт.           | 2    |                 | или аналог                  |
|       |                                                     |                                                    |                                      |                    |               |      |                 |                             |
| 1.6.5 | Воздуховод из оцинкованной стали δ=0,8 мм., Ø800 мм | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 7    |                 |                             |
| 1.6.6 | Воздуховод из оцинкованной стали δ=0,8 мм., 600х600 | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 5,5  |                 |                             |
| 1.6.7 | Отвод-90° из оцинкованной стали δ=0,8 мм., Ø800 мм  | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 4    |                 |                             |
| 1.6.8 | Отвод-90° из оцинкованной стали δ=0,8 мм., 600х600  | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 2    |                 |                             |
| 1.6.9 | Отвод-45° из оцинкованной стали δ=0,8 мм., 600х600  | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | шт.           | 2    |                 |                             |
|       |                                                     |                                                    |                                      |                    |               |      |                 |                             |
| 1.7   | <u>BE1</u>                                          |                                                    |                                      |                    |               |      |                 |                             |
|       |                                                     |                                                    |                                      |                    |               |      |                 |                             |
| 1.7.1 | Решетка вентиляционная                              | АРН 450х450 мм                                     |                                      | Арктос             | шт.           | 2    |                 | или аналог                  |
|       |                                                     |                                                    |                                      |                    |               |      |                 |                             |
| 2     | <u>Система отопления</u>                            |                                                    |                                      |                    |               |      |                 |                             |
|       |                                                     |                                                    |                                      |                    |               |      |                 |                             |
| 2.1   | <u>Узел цпрвления</u>                               | см. лист 11, 14                                    |                                      |                    |               |      |                 | данные по ЗРА - см. лист 14 |
|       |                                                     |                                                    |                                      |                    |               |      |                 |                             |
| 2.1.1 | Труба ф130х5, ст20                                  | ГОСТ 8732-78                                       |                                      |                    | м.п.          | 2    |                 |                             |
| 2.1.2 | Труба ф109х4,5, ст20                                | ГОСТ 8732-78                                       |                                      |                    | м.п.          | 12   |                 |                             |
| 2.1.3 | Труба ф57х3,2, ст20                                 | ГОСТ 8732-78                                       |                                      |                    | м.п.          | 9    |                 |                             |
|       |                                                     |                                                    |                                      |                    |               |      |                 |                             |

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|      |       |      |       |       |      | E230-0001-8000571851-РД-01-10.20.010-ОВ.СО | Лист |
|      |       |      |       |       |      |                                            | 7    |
| Изм. | Кол.у | Лист | № док | Подп. | Дата |                                            |      |

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| Инв.№ подл. | Подпись и дата | Взам.инв.№ |
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| Поз.   | Наименование и техническая характеристика       | Тип, марка, обозначение документа, опросного листа | Код оборудования, изделия, материала | Завод-изготовитель | Ед. измерения | Кол. | Масса 1 ед., кг | Примечания                      |
|--------|-------------------------------------------------|----------------------------------------------------|--------------------------------------|--------------------|---------------|------|-----------------|---------------------------------|
|        |                                                 |                                                    |                                      |                    |               |      |                 |                                 |
| 2.1.4  | Труба ф34х3,2, ст20                             | ГОСТ 8732-78                                       |                                      |                    | м.п.          | 6    |                 |                                 |
|        |                                                 |                                                    |                                      |                    |               |      |                 |                                 |
| 2.1.5  | Переход концентрический Ду120хДу100 Ст20        | ГОСТ 17378-2001                                    |                                      |                    | шт.           | 2    |                 |                                 |
| 2.1.7  | Отвод Ду100 90 гр. Ст20                         | ГОСТ 17375-2001                                    |                                      |                    | шт.           | 4    |                 |                                 |
| 2.1.8  | Отвод Ду50 90 гр. Ст20                          | ГОСТ 17375-2001                                    |                                      |                    | шт.           | 7    |                 |                                 |
| 2.1.9  | Отвод Ду25 90 гр. Ст20                          | ГОСТ 17375-2001                                    |                                      |                    | шт.           | 6    |                 |                                 |
| 2.1.10 | Тройник Ду120хДу100хДу120, Ст20                 | ГОСТ 17376-2001                                    |                                      |                    | шт.           | 2    |                 |                                 |
| 2.1.11 | Тройник Ду50хДу25хДу50, Ст20                    | ГОСТ 17376-2001                                    |                                      |                    | шт.           | 2    |                 |                                 |
| 2.1.12 | Тройник равнопроходной Ду50, Ст20               | ГОСТ 17376-2001                                    |                                      |                    | шт.           | 4    |                 |                                 |
|        |                                                 |                                                    |                                      |                    |               |      |                 |                                 |
| 2.1.13 | Эмаль под покраску акриловая АС-7               | ГОСТ 9825-73                                       |                                      |                    | м2            | 14   |                 | 2 слоя                          |
| 2.1.14 | Грунтовка под эмаль                             | ГОСТ 51693-2000                                    |                                      |                    | м2            | 7    |                 | 1 слой                          |
|        |                                                 |                                                    |                                      |                    |               |      |                 |                                 |
| 2.2    | <u>Теплоснабжение приточных установок Т1/Т2</u> |                                                    |                                      |                    |               |      |                 | данные по ЗРА - см. лист 14     |
|        |                                                 |                                                    |                                      |                    |               |      |                 |                                 |
| 2.2.1  | Труба ф109х4,5, ст20                            | ГОСТ 8732-78                                       |                                      |                    | м.п.          | 83   |                 |                                 |
| 2.2.2  | Труба ф34х3,2, ст20                             | ГОСТ 8732-78                                       |                                      |                    | м.п.          | 1    |                 | Для врезки под воздухоотводчики |
|        |                                                 |                                                    |                                      |                    |               |      |                 |                                 |
| 2.2.3  | Отвод Ду100 90 гр. Ст20                         | ГОСТ 17375-2001                                    |                                      |                    | шт.           | 40   |                 |                                 |
| 2.2.4  | Тройник равнопроходной Ду100, Ст20              | ГОСТ 17376-2001                                    |                                      |                    | шт.           | 2    |                 |                                 |
|        |                                                 |                                                    |                                      |                    |               |      |                 |                                 |
|        |                                                 |                                                    |                                      |                    |               |      |                 |                                 |

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|      |       |      |       |       |      | E230-0001-8000571851-ПД-01-10.20.010-ОВ.СО | Лист |
|      |       |      |       |       |      |                                            | 8    |
| Изм. | Кол.у | Лист | № док | Подп. | Дата |                                            |      |



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| Поз.   | Наименование и техническая характеристика              | Тип, марка, обозначение документа, опросного листа | Код оборудования, изделия, материала | Завод-изготовитель | Ед. измерения | Кол. | Масса 1 ед., кг | Примечания            |
|--------|--------------------------------------------------------|----------------------------------------------------|--------------------------------------|--------------------|---------------|------|-----------------|-----------------------|
|        |                                                        |                                                    |                                      |                    |               |      |                 |                       |
| 2.2.5  | Фланец воротниковый Ду32, исполнение 11, PN16, Ст20    | ГОСТ 33259-2015                                    |                                      |                    | шт.           | 6    |                 | с крепежом под фланец |
| 2.2.6  | Прокладка под фланцевое соединение А-100-16            | ГОСТ 15180-86                                      |                                      |                    | шт.           | 4    |                 |                       |
|        | материал АГПМ ТУ 2577-004-12058737-2002                |                                                    |                                      |                    |               |      |                 |                       |
| 2.2.7  | Тепловая изоляция δ=50 мм, НГ, цилиндры                | ProRox PS 970 RU                                   |                                      | Rockwool           | м.            | 83   |                 |                       |
| 2.2.8  | Лист оцинкованный, 0,5 мм укрывной                     |                                                    |                                      | ROCKWOOL           | м2            | 54   |                 |                       |
| 2.2.9  | Эмаль под покраску акриловая АС-7                      | ГОСТ 9825-73                                       |                                      |                    | м2            | 52   |                 | 2 слоя                |
| 2.2.10 | Грунтовка под эмаль                                    | ГОСТ 51693-2000                                    |                                      |                    | м2            | 26   |                 | 1 слой                |
|        |                                                        |                                                    |                                      |                    |               |      |                 |                       |
| 3.     | Опоры и крепления                                      | см. лист                                           |                                      |                    |               |      |                 | кроме п.1.2           |
|        |                                                        |                                                    |                                      |                    |               |      |                 |                       |
| 3.1    | Труба квадратная 40х40х2 мм, Ст3кп                     | ГОСТ 8639-82                                       |                                      |                    | м.п.          | 38,2 |                 |                       |
| 3.2    | Труба квадратная 50х50х3 мм, Ст3кп                     | ГОСТ 8639-82                                       |                                      |                    | м.п.          | 60   |                 |                       |
| 3.3    | Уголок 75х75х8 мм, Ст3кп                               | ГОСТ 8509-83                                       |                                      |                    | м.п.          | 88,2 |                 |                       |
| 3.4    | Лист 5 мм, Ст3кп                                       | ГОСТ 19903-2015                                    |                                      |                    | м2            | 2    |                 |                       |
| 3.5    | Лист 10 мм, Ст3кп                                      | ГОСТ 19903-2015                                    |                                      |                    | м2            | 14   |                 |                       |
| 3.6    | Профиль перфорированный монтажный 40х40                |                                                    |                                      | DKC                | м.п.          | 45   |                 | или аналог            |
| 3.7    | Профиль перфорированный монтажный 40х60                |                                                    |                                      | DKC                | м.п.          | 59   |                 | или аналог            |
| 3.8    | Укосина для консолей, с комплектом крепления и деталей |                                                    |                                      | DKC                | шт.           | 15   |                 | или аналог            |
| 3.9    | Монтажная струбцина                                    |                                                    |                                      | DKC                | компл.        | 116  |                 | или аналог            |
| 3.10   | Хомут крепежный для трубопровода Ду50                  |                                                    |                                      | DKC                | шт.           | 2    |                 | или аналог            |
| 3.11   | Хомут крепежный для трубопровода Ду100                 |                                                    |                                      | DKC                | шт.           | 14   |                 | или аналог            |
|        |                                                        |                                                    |                                      |                    |               |      |                 |                       |

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|      |       |      |       |       |      | E230-0001-8000571851-РД-01-10.20.010-ОВ.СО | Лист |
|      |       |      |       |       |      |                                            | 9    |
| Изм. | Кол.у | Лист | № док | Подп. | Дата |                                            |      |

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| Поз. | Наименование и техническая характеристика           | Тип, марка, обозначение документа, опросного листа | Код оборудования, изделия, материала | Завод-изготовитель | Ед. измерения | Кол. | Масса 1 ед., кг | Примечания |
|------|-----------------------------------------------------|----------------------------------------------------|--------------------------------------|--------------------|---------------|------|-----------------|------------|
|      |                                                     |                                                    |                                      |                    |               |      |                 |            |
| 3.12 | Шпилька резьбовая М8.40Х.016                        | ГОСТ 22032-76                                      |                                      |                    | м.п.          | 0,2  |                 |            |
| 3.13 | Шпилька резьбовая М10.40Х.016                       | ГОСТ 22032-76                                      |                                      |                    | м.п.          | 483  |                 |            |
| 3.14 | Шпилька резьбовая М20.40Х.016                       | ГОСТ 22032-76                                      |                                      |                    | м.п.          | 18   |                 |            |
| 3.15 | Гайка М8.40Х.016                                    | ГОСТ 5915-70                                       |                                      |                    | шт.           | 4    |                 |            |
| 3.16 | Гайка М10.40Х.016                                   | ГОСТ 5915-70                                       |                                      |                    | шт.           | 684  |                 |            |
| 3.17 | Гайка М20.40Х.016                                   | ГОСТ 5915-70                                       |                                      |                    | шт.           | 36   |                 |            |
| 3.18 | Шайба 8.СтЭкп.016                                   | ГОСТ 11371-78                                      |                                      |                    | шт.           | 4    |                 |            |
| 3.19 | Шайба 10.СтЭкп.016                                  | ГОСТ 11371-78                                      |                                      |                    | шт.           | 416  |                 |            |
| 3.20 | Шайба 20.СтЭкп.016                                  | ГОСТ 11371-78                                      |                                      |                    | шт.           | 36   |                 |            |
| 3.21 | Воздуховод из оцинкованной стали δ=0,8 мм., Ø800 мм | ГОСТ 14918-2020                                    |                                      | КАПИТЕЛЬ           | м.п.          | 4    |                 |            |
| 3.22 | Анкер М10х150 в комплекте с хим. составом           |                                                    |                                      | ДКС                | шт.           | 128  |                 |            |
|      |                                                     |                                                    |                                      |                    |               |      |                 |            |
| 4    | Прочее                                              |                                                    |                                      |                    |               |      |                 |            |
|      |                                                     |                                                    |                                      |                    |               |      |                 |            |
| 4.1  | Заделка отверстий противопожарная Стандарт-Электрик | СЭ-01                                              |                                      | Стандарт-Электрик  | м3            | 0,15 |                 |            |
|      |                                                     |                                                    |                                      |                    |               |      |                 |            |
|      |                                                     |                                                    |                                      |                    |               |      |                 |            |
|      |                                                     |                                                    |                                      |                    |               |      |                 |            |
|      |                                                     |                                                    |                                      |                    |               |      |                 |            |
|      |                                                     |                                                    |                                      |                    |               |      |                 |            |
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Согласовано

Взаим. инв. №

Подп. и дата

Инв. № подл.

| №           |        | Наименование                                                   |      |                                                                                     |          | Ед. изм.                                                                                               | Количество | Примечание |  |                                                                                                                    |      |        |  |
|-------------|--------|----------------------------------------------------------------|------|-------------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------------------------------------|------------|------------|--|--------------------------------------------------------------------------------------------------------------------|------|--------|--|
| 1           |        | Теплоснабжение                                                 |      |                                                                                     |          |                                                                                                        |            |            |  |                                                                                                                    |      |        |  |
| 1.1         |        | Оборудование                                                   |      |                                                                                     |          |                                                                                                        |            |            |  |                                                                                                                    |      |        |  |
| 1.1.1       |        | Установка узла управления 808,1 кВт, установка элементов узла: |      |                                                                                     |          | шт.                                                                                                    | 1          |            |  |                                                                                                                    |      |        |  |
| 1.1.1.1     |        | Труба Ду100                                                    |      |                                                                                     |          | пог. м                                                                                                 | 12         |            |  |                                                                                                                    |      |        |  |
| 1.1.1.2     |        | Труба ДУ 50                                                    |      |                                                                                     |          | пог. м                                                                                                 | 9          |            |  |                                                                                                                    |      |        |  |
| 1.1.1.3     |        | Труба ДУ 25                                                    |      |                                                                                     |          | пог. м                                                                                                 | 6          |            |  |                                                                                                                    |      |        |  |
| 1.1.1.4     |        | Сборка коллектора Т1                                           |      |                                                                                     |          | шт.                                                                                                    | 1          |            |  |                                                                                                                    |      |        |  |
| 1.1.1.5     |        | Сборка коллектора Т2                                           |      |                                                                                     |          | шт.                                                                                                    | 1          |            |  |                                                                                                                    |      |        |  |
| 1.1.1.6     |        | Отвод 90 гр. Ду100                                             |      |                                                                                     |          | шт.                                                                                                    | 4          |            |  |                                                                                                                    |      |        |  |
| 1.1.1.7     |        | Отвод 90 гр. Ду50                                              |      |                                                                                     |          | шт.                                                                                                    | 7          |            |  |                                                                                                                    |      |        |  |
| 1.1.1.8     |        | Отвод 90 гр. Ду25                                              |      |                                                                                     |          | шт.                                                                                                    | 6          |            |  |                                                                                                                    |      |        |  |
| 1.1.1.9     |        | Переход концентрический Ду120хДу100                            |      |                                                                                     |          | шт.                                                                                                    | 2          |            |  |                                                                                                                    |      |        |  |
| 1.1.1.10    |        | Тройник равнопроходной Ду50                                    |      |                                                                                     |          | шт.                                                                                                    | 4          |            |  |                                                                                                                    |      |        |  |
| 1.1.1.11    |        | Тройник Ду50хДу25                                              |      |                                                                                     |          | шт.                                                                                                    | 2          |            |  |                                                                                                                    |      |        |  |
| 1.1.2       |        | Установка арматуры узла управления 808,1 кВт:                  |      |                                                                                     |          | шт.                                                                                                    | 1          |            |  |                                                                                                                    |      |        |  |
| 1.1.2.1     |        | Вентиль фланцевый стальной Ду100                               |      |                                                                                     |          | шт.                                                                                                    | 2          |            |  |                                                                                                                    |      |        |  |
| 1.1.2.2     |        | Вентиль фланцевый стальной Ду50                                |      |                                                                                     |          | шт.                                                                                                    | 2          |            |  |                                                                                                                    |      |        |  |
| 1.1.2.3     |        | Кран шаровый Ду100                                             |      |                                                                                     |          | шт.                                                                                                    | 8          |            |  |                                                                                                                    |      |        |  |
| 1.1.2.4     |        | Кран шаровый Ду50                                              |      |                                                                                     |          | шт.                                                                                                    | 4          |            |  |                                                                                                                    |      |        |  |
| 1.1.2.5     |        | Кран шаровый Ду25                                              |      |                                                                                     |          | шт.                                                                                                    | 22         |            |  |                                                                                                                    |      |        |  |
| 1.1.2.6     |        | Грязевик абонентский вертикальный Ду100                        |      |                                                                                     |          | шт.                                                                                                    | 2          |            |  |                                                                                                                    |      |        |  |
| 1.1.2.7     |        | Воздухоотводчик G1/2”                                          |      |                                                                                     |          | шт.                                                                                                    | 6          |            |  |                                                                                                                    |      |        |  |
| 1.1.2.8     |        | Фильтр грубой очистки ВР/ВР угловой Ду100                      |      |                                                                                     |          | шт.                                                                                                    | 2          |            |  |                                                                                                                    |      |        |  |
|             |        |                                                                |      |                                                                                     |          |                                                                                                        |            |            |  |                                                                                                                    |      |        |  |
|             |        |                                                                |      |                                                                                     |          | E230-0001-8000571851-РД-01-10.20.010-ОВ.ВОР                                                            |            |            |  |                                                                                                                    |      |        |  |
|             |        |                                                                |      |                                                                                     |          | Производство аммиака и карбамида, Кингисепп<br>Россия, Ленинградская область, Кингисеппский район      |            |            |  |                                                                                                                    |      |        |  |
| Изм.        | Кол.уч | Лист                                                           | №док | Подпись                                                                             | Дата     | Объект А17.710.2 (здание азотной установки и узла деминерализованной воды).<br>Отопление и вентиляция. |            |            |  | Стадия                                                                                                             | Лист | Листов |  |
| Разраб.     |        | Савватеев                                                      |      |  | 25.10.23 |                                                                                                        |            |            |  | Р                                                                                                                  | 1    | 7      |  |
| Проверил    |        | Шишинов                                                        |      |  | 25.10.23 | Ведомость объемов работ                                                                                |            |            |  |  ООО «ИСМ»<br>Санкт-Петербург |      |        |  |
|             |        |                                                                |      |                                                                                     |          |                                                                                                        |            |            |  |                                                                                                                    |      |        |  |
| Гл. инженер |        | Афремов                                                        |      |  | 25.10.23 |                                                                                                        |            |            |  |                                                                                                                    |      |        |  |
| Н. контр.   |        | Акулова                                                        |      |  | 25.10.23 |                                                                                                        |            |            |  |                                                                                                                    |      |        |  |
| ГИП         |        | Неофидова                                                      |      |  | 25.10.23 |                                                                                                        |            |            |  |                                                                                                                    |      |        |  |





|      |        |      |      |         |      |                                             |  |           |
|------|--------|------|------|---------|------|---------------------------------------------|--|-----------|
| Изм. | Кол.уч | Лист | №док | Подпись | Дата | E230-0001-8000571851-РД-01-10.20.010-ОВ.ВОР |  | Лист<br>3 |
|      |        |      |      |         |      |                                             |  |           |
|      |        |      |      |         |      |                                             |  |           |
|      |        |      |      |         |      |                                             |  |           |

| №      | Наименование                                                                                          | Ед. изм. | Количество | Примечание |
|--------|-------------------------------------------------------------------------------------------------------|----------|------------|------------|
| 2.1.1  | Монтаж приточной установки П1.<br>В комплекте с узлом регулирования теплоносителя и щитом управления. | шт.      | 1          |            |
| 2.1.2  | Монтаж приточной установки П2.<br>В комплекте с узлом регулирования теплоносителя и щитом управления. | шт.      | 1          |            |
| 2.1.3  | Монтаж приточной аварийной установки ПА1.<br>В комплекте с щитом управления.                          | шт.      | 1          |            |
| 2.1.4  | Монтаж приточной аварийной установки ПА2.<br>В комплекте с щитом управления.                          | шт.      | 1          |            |
| 2.1.5  | Монтаж вентилятора крышного вытяжного В1-3,<br>массой 208 кг.<br>В комплекте с щитом управления.      | шт.      | 3          |            |
| 2.1.6  | Монтаж вентилятора крышного вытяжного В4-7,<br>массой 102 кг.<br>В комплекте с щитом управления.      | шт.      | 4          |            |
| 2.1.7  | Монтаж вытяжной аварийной установки ВА1-2.<br>В комплекте с щитом управления.                         | шт.      | 2          |            |
| 2.1.8  | Монтаж клапана КПУ-НО-1200х1200                                                                       | шт.      | 1          |            |
| 2.1.9  | Монтаж клапана обратного КВО 600М                                                                     | шт.      | 4          |            |
| 2.1.10 | Монтаж клапана обратного КВО 700М                                                                     | шт.      | 3          |            |
| 2.1.11 | Монтаж клапана обратного КВО 710М                                                                     | шт.      | 2          |            |
| 2.1.12 | Монтаж клапана обратного КВО 800М                                                                     | шт.      | 2          |            |
| 2.1.13 | Монтаж решетки вентиляционной ПВВ 1000-8                                                              | шт.      | 42         |            |
| 2.1.14 | Монтаж решетки вентиляционной РДГ 1600х1600                                                           | шт.      | 1          |            |
| 2.1.15 | Монтаж решетки вентиляционной РДГ 600х600                                                             | шт.      | 2          |            |
| 2.1.16 | Монтаж решетки вентиляционной АРН 450х450                                                             | шт.      | 2          |            |
| 2.1.17 | Монтаж решетки вентиляционной круглой CG600                                                           | шт.      | 4          |            |
| 2.1.18 | Монтаж решетки вентиляционной круглой CG700                                                           | шт.      | 3          |            |
| 2.1.19 | Монтаж решетки вентиляционной круглой CG710                                                           | шт.      | 2          |            |
| 2.1.20 | Монтаж решетки вентиляционной круглой CG800                                                           | шт.      | 2          |            |
| 2.2    | <b>Воздуховоды</b>                                                                                    |          |            |            |

| Инв. № подл. | Подп. и дата | Взам. инв. № |
|--------------|--------------|--------------|
|              |              |              |

E230-0001-8000571851-РД-01-10.20.010-ОВ.ВОР\_0\_0\_RU\_IFC.DOCX    Формат А4





|               |  |        |                |      |      |         |      |                                             |  |      |
|---------------|--|--------|----------------|------|------|---------|------|---------------------------------------------|--|------|
| Взаим. инв. № |  | 2.6.17 | Установка КР17 |      |      |         | шт.  | 1                                           |  |      |
|               |  | 2.6.18 | Установка КР18 |      |      |         | шт.  | 2                                           |  |      |
|               |  | 2.6.19 | Установка КР19 |      |      |         | шт.  | 2                                           |  |      |
| Подп. и дата  |  |        |                |      |      |         |      |                                             |  |      |
|               |  |        |                |      |      |         |      |                                             |  |      |
|               |  |        |                |      |      |         |      |                                             |  |      |
|               |  |        |                |      |      |         |      |                                             |  |      |
| Инв. № подл.  |  |        |                |      |      |         |      | E230-0001-8000571851-РД-01-10.20.010-ОВ.ВОР |  | Лист |
|               |  |        |                |      |      |         |      |                                             |  | 6    |
|               |  | Изм.   | Кол.уч         | Лист | №док | Подпись | Дата |                                             |  |      |

| №      | Наименование                                | Ед. изм. | Количество | Примечание |
|--------|---------------------------------------------|----------|------------|------------|
| 2.5    | Узел крепления воздухозаборного воздуховода |          |            |            |
| 2.5.1  | Полоса 5 мм                                 | шт.      | 4          |            |
| 2.5.2  | Лист 16 мм                                  | шт.      | 1          |            |
| 2.5.3  | Анкерное крепление с резиной M20x250        | шт.      | 16         |            |
| 2.5.4  | Крепление воздуховода к узлу саморезами     | шт.      | 52         |            |
| 2.6    | Установка опор и креплений                  |          |            |            |
| 2.6.1  | Установка КР1                               | шт.      | 1          |            |
| 2.6.2  | Установка КР2                               | шт.      | 2          |            |
| 2.6.3  | Установка КР3                               | шт.      | 1          |            |
| 2.6.4  | Установка КР4                               | шт.      | 3          |            |
| 2.6.5  | Установка КР5                               | шт.      | 3          |            |
| 2.6.6  | Установка КР6                               | шт.      | 2          |            |
| 2.6.7  | Установка КР7                               | шт.      | 3          |            |
| 2.6.8  | Установка КР8                               | шт.      | 3          |            |
| 2.6.9  | Установка КР9                               | шт.      | 2          |            |
| 2.6.10 | Установка КР10                              | шт.      | 2          |            |
| 2.6.11 | Установка КР11                              | шт.      | 2          |            |
| 2.6.12 | Установка КР12                              | шт.      | 1          |            |
| 2.6.13 | Установка КР13                              | шт.      | 1          |            |
| 2.6.14 | Установка КР14                              | шт.      | 2          |            |
| 2.6.15 | Установка КР15                              | шт.      | 1          |            |
| 2.6.16 | Установка КР16                              | шт.      | 2          |            |
| 2.6.17 | Установка КР17                              | шт.      | 1          |            |
| 2.6.18 | Установка КР18                              | шт.      | 2          |            |
| 2.6.19 | Установка КР19                              | шт.      | 2          |            |

|              |              |               |      |         |      |  |  |  |                                             |  |  |  |  |  |      |
|--------------|--------------|---------------|------|---------|------|--|--|--|---------------------------------------------|--|--|--|--|--|------|
| Инв. № подл. | Подп. и дата | Взаим. инв. № |      |         |      |  |  |  | Е230-0001-8000571851-РД-01-10.20.010-ОВ.ВОР |  |  |  |  |  | Лист |
|              |              |               |      |         |      |  |  |  |                                             |  |  |  |  |  | 7    |
|              |              |               |      |         |      |  |  |  |                                             |  |  |  |  |  |      |
|              |              |               |      |         |      |  |  |  |                                             |  |  |  |  |  |      |
| Изм.         | Кол.уч       | Лист          | №док | Подпись | Дата |  |  |  |                                             |  |  |  |  |  |      |

| №      | Наименование   | Ед. изм. | Количество | Примечание |
|--------|----------------|----------|------------|------------|
| 2.6.20 | Установка КР20 | шт.      | 1          |            |
| 2.6.21 | Установка КР21 | шт.      | 1          |            |
| 2.6.22 | Установка КР22 | шт.      | 2          |            |
| 2.6.23 | Установка КР23 | шт.      | 2          |            |
| 2.6.24 | Установка КР24 | шт.      | 4          |            |
| 2.6.25 | Установка КР25 | шт.      | 3          |            |



## УТВЕРЖДАЮ

Должность

\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_  
«    » \_\_\_\_\_ 202 \_\_\_\_ г.

| СТАТУС / STATUS                                                                                                                      |                                                                                        |                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------|
| Замена изношенного оборудования                                                                                                      |                                                                                        | Для заполнения поставщиком                                       |
| Вновь вводимое оборудование                                                                                                          | Да                                                                                     |                                                                  |
|                                                                                                                                      |                                                                                        | <b>Наименование поставщика</b>                                   |
| Предприятие Заказчик                                                                                                                 | ООО «ЕвроХим Северо-Запад-2»                                                           | в ячейках ниже необходимо указать / подтвердить значение/наличие |
| Производство, цех №                                                                                                                  | Объект А17.710.2 (Здание азотной установки и узла деминерализованной воды)             |                                                                  |
| Дата заполнения                                                                                                                      |                                                                                        |                                                                  |
| ОПРОСНЫЙ ЛИСТ № E230-0001-8000571851-РД-01-10.20.010-ОВ.ОЛ1 на вентиляционное оборудование поз.№ (указать № технологической позиции) |                                                                                        | П1                                                               |
| № п/п                                                                                                                                | Наименование параметра                                                                 |                                                                  |
| 1                                                                                                                                    | Тип установки (внутреннее исполнение, наружное исполнение, работа в агрессивной среде) | Наружное исполнение – 1 шт (вентилятор 1 рабочий, 1 резервный)   |
| 2                                                                                                                                    | Назначение установки (приточная, вытяжная, приточно-вытяжная)                          | Приточная, напольного типа                                       |
| 3                                                                                                                                    | Сторона обслуживания                                                                   | Справа                                                           |
| 4                                                                                                                                    | Материальное исполнение установки                                                      | Общего назначения, напольного типа                               |
| <b>Параметры вентилятора</b>                                                                                                         |                                                                                        |                                                                  |
| 5                                                                                                                                    | Требуемая производительность/расчетная производительность, м <sup>3</sup> /ч, L        | теплый период: 46340 м3/ч<br>холодный период: 33380 м3/ч         |
| 6                                                                                                                                    | Требуемое полное давление, Па                                                          | 450                                                              |
| <b>Характеристики электродвигателя</b>                                                                                               |                                                                                        |                                                                  |
| 7                                                                                                                                    | Частота, Гц                                                                            | 50                                                               |
| 8                                                                                                                                    | Количество фаз                                                                         | 3                                                                |
| 9                                                                                                                                    | Напряжение, В                                                                          | 220/380                                                          |
| 10                                                                                                                                   | Мощность потребляемая/номинальная, (кВт)                                               | 15/15 (определяется проектом поставщика)                         |
| 11                                                                                                                                   | Число оборотов синхронная (справочно), об/мин                                          | Уточняет поставщик оборудования                                  |
| 12                                                                                                                                   | Степень защиты оболочки, IP                                                            | не менее IP54                                                    |
| 13                                                                                                                                   | Маркировка взрывозащиты                                                                | Общего назначения                                                |
| 14                                                                                                                                   | Дополнительно                                                                          | Плавное регулирование оборотов (частотный регулятор)             |
| <b>Параметры фильтра</b>                                                                                                             |                                                                                        |                                                                  |
| 15                                                                                                                                   | Класс фильтра (G3, F6, F7)                                                             | G3                                                               |
| 16                                                                                                                                   | Максимально допустимый перепад давления, Па                                            | 150                                                              |
| <b>Параметры воздушонагревателя</b>                                                                                                  |                                                                                        |                                                                  |
| 17                                                                                                                                   | Тип воздушонагревателя (водяной, электрический, паровой)                               | водяной                                                          |
| 18                                                                                                                                   | Тип теплоносителя                                                                      | горячая вода                                                     |
| 19                                                                                                                                   | Температура воздуха до / после                                                         | Минус 24°C / +20°C                                               |
| 20                                                                                                                                   | Мощность нагревателя, кВт                                                              | 380,2                                                            |
| 21                                                                                                                                   | Температура теплоносителя (по температурному графику)                                  | вход - 115°C/выход - 70°C                                        |
| <b>Параметры воздухоохладителя</b>                                                                                                   |                                                                                        |                                                                  |
| 22                                                                                                                                   | Тип воздухоохладителя (водяной, фреоновый)                                             | -                                                                |
| 23                                                                                                                                   | Тип теплоносителя                                                                      | -                                                                |
| 24                                                                                                                                   | Мощность потребляемая/номинальная (если электрический) - для справки, (кВт)            | -                                                                |
| 25                                                                                                                                   | Хладопроизводительность, кВт                                                           | -                                                                |
| 26                                                                                                                                   | Температура воздуха вход / выход                                                       | -                                                                |
| <b>Параметры рекуператора</b>                                                                                                        |                                                                                        |                                                                  |
| 27                                                                                                                                   | Тип рекуператора (ротаторный, пластинчатый, гликолевый)                                | нет                                                              |
| 28                                                                                                                                   | Дополнительно                                                                          | -                                                                |
| <b>Параметры увлажнителя</b>                                                                                                         |                                                                                        |                                                                  |
| 29                                                                                                                                   | Тип увлажнителя (ячейковый, форсуночный, паровой)                                      | -                                                                |
| 30                                                                                                                                   | Потребление (вода/пар), кг/ч                                                           | -                                                                |
| 31                                                                                                                                   | Уровень обеспечиваемой влажности в обслуживаемом помещении, % относительной влажности  | -                                                                |
| 32                                                                                                                                   | Мощность потребляемая/номинальная (если электрический) - для справки, (кВт)            | -                                                                |
| 33                                                                                                                                   | Дополнительно                                                                          | -                                                                |
| <b>Условия установки</b>                                                                                                             |                                                                                        |                                                                  |
| 34                                                                                                                                   | Место расположения                                                                     | Улица                                                            |
| 35                                                                                                                                   | Температура окружающей среды, (min/max) °C                                             | -35 °C/ +40 °C                                                   |
| 36                                                                                                                                   | Влажность                                                                              | 75%                                                              |
| 37                                                                                                                                   | Климатическое исполнение и категория размещения по ГОСТ 15150-69                       | У1                                                               |
| 38                                                                                                                                   | Класс взрывоопасной и пожароопасной зоны по ПУЭ                                        | -                                                                |
| 39                                                                                                                                   | Категория помещения/Категория блока                                                    | -                                                                |
| 40                                                                                                                                   | Дополнительно                                                                          | -                                                                |
| <b>Объем поставки</b>                                                                                                                |                                                                                        |                                                                  |
| 41                                                                                                                                   | Вентоборудование (марка, количество), да/нет                                           | да (см. примечание п.1)                                          |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                 |                                                                                                           |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--|
| 42                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ЗИП (указать состав, на какой период эксплуатации)                                                              | -                                                                                                         |  |
| 43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Шкаф силовой питания и управления вентоборудованием, да/нет                                                     | да (см. примечание п.5)                                                                                   |  |
| 44                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Аксессуары (рама, присоединительные фланцы, гибкие вставки, шумоглушитель, воздушная заслонка)                  | Рама, гибкие вставки, секции, крепеж, рама крепления, воздушная заслонка и т.д.                           |  |
| 45                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Вводное устройство с взрывозащищенным кабельным вводом, да/нет                                                  | нет                                                                                                       |  |
| 46                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Антикоррозионное защитное покрытие агрегатов                                                                    | нет                                                                                                       |  |
| 47                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Необходимые КИП к поставке (указать какой) / да/нет                                                             | нет (см. примечание)                                                                                      |  |
| 48                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Шеф-монтаж да/нет                                                                                               | да                                                                                                        |  |
| 49                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Пуско-наладка да/нет                                                                                            | да                                                                                                        |  |
| <b>Документация</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                 |                                                                                                           |  |
| 51                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Паспорт на оборудование, на русском языке                                                                       | Выдается поставщиком оборудования                                                                         |  |
| 52                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Паспорт электродвигателя, руководство по эксплуатации в соответствии с ГОСТ 2.601-2013, ГОСТ 2.610-2019, да/нет | Выдается поставщиком оборудования                                                                         |  |
| 53                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Инструкция по эксплуатации, монтажу и ремонту                                                                   | Выдается поставщиком оборудования                                                                         |  |
| 54                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | с указанием объемов Т, С, К, ремонтов и ТО, структурой ремонтного цикла и межремонтных пробегов                 | Указать возможность ремонта по техническому состоянию                                                     |  |
| 55                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Сертификат взрывозащиты электрооборудования да/нет                                                              | нет                                                                                                       |  |
| 56                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Сертификат о подтверждении типа, выданный Федеральным агентством по техническому регулированию РФ, да/нет       | да                                                                                                        |  |
| 57                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Сертификат соответствия (ГОСТ Р, ТР, ТС), да/нет                                                                | да                                                                                                        |  |
| 58                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Разрешение на применение ФСЭТАН, да/нет                                                                         | -                                                                                                         |  |
| 59                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Разрешительная и эксплуатационная документация                                                                  | Выдается поставщиком оборудования                                                                         |  |
| 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Методика проверки на каждый тип оборудования и ЗИП                                                              | Выдается поставщиком оборудования, ЗИП на ПНР и 3 года эксплуатации                                       |  |
| 61                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Габаритные размеры оборудования (длина; ширина; высота), ДхШхВ, мм                                              | Не более 5500х2700х2800(н)                                                                                |  |
| <b>Показатели надежности</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                 |                                                                                                           |  |
| 62                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Наработка до отказа, час                                                                                        | Выдается поставщиком оборудования                                                                         |  |
| 63                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Назначенный ресурс, час                                                                                         | Выдается поставщиком оборудования                                                                         |  |
| 64                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Назначенный срок службы, лет                                                                                    | Выдается поставщиком оборудования                                                                         |  |
| <b>Гарантия</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                 |                                                                                                           |  |
| 65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Срок гарантии, мес. с даты поставки                                                                             | Гарантийный срок службы – не менее 12 месяцев с начала эксплуатации и не менее 36 месяцев со дня поставки |  |
| <b>Примечания:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                 |                                                                                                           |  |
| 1. В комплект поставки входит:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                 |                                                                                                           |  |
| - Приточная установка (блочно-модульная) в составе - 1 компл.:<br>- Входной воздушный клапан (в комплекте с приводом и электрообогревом) - 1 шт.;<br>- Калорифер, водяной – 2 шт.;<br>- Воздухоохладитель – 2 шт.;<br>- Запорные воздушный клапан (в комплекте с приводом) - 2 шт.;<br>- Вентагрегат – 2 шт.;<br>- Обратный воздушный клапан - 2 шт.;<br>- Фильтр G3 – 1 шт.;<br>- Узел регулирования (в составе: циркуляционный насос, трехходовой смесительный регулирующий клапан с сервоприводом) – 1 шт.                |                                                                                                                 |                                                                                                           |  |
| - Приборы КИПиА в составе:<br>- Датчики перепада давления на фильтрах - 2 шт.;<br>- Датчик перепада давления на вент агрегате - 1 шт.;<br>- Датчик температуры приточного воздуха - 1 шт.;<br>- Датчик влажности приточного воздуха - 1 шт.;<br>- Датчик температуры воды в калорифере - 2 шт.;<br>- Концевые выключатели дверей и съёмных панелей установки - количество в соответствии с количеством съёмных элементов и дверей.                                                                                           |                                                                                                                 |                                                                                                           |  |
| - Шкаф силовой питания и управления вентоборудованием (в комплекте с преобразователем частоты и органами управления) – 1шт.                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                 |                                                                                                           |  |
| 2. Предусмотреть заземление корпуса приточной установки, шкафа силового управления вентоборудованием.                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                 |                                                                                                           |  |
| 3. Требования к электроприводам воздушных клапанов:<br>- Питание - 220 В;<br>- Управление - 220В;<br>- Датчик положения клапана - 2 шт.                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                 |                                                                                                           |  |
| 4. Требования к исполнению силового шкафа управления:<br>- Напряжение питания – ~ 220/380 В;<br>- Количество вводов – 1;<br>- Система заземления – TN-S;<br>- Степень защиты – не менее IP54;<br>- Подвод питающих отходящих кабелей – верхний/нижний (в соответствии с местом монтажа);<br>- Климатическое исполнение – У1.                                                                                                                                                                                                 |                                                                                                                 |                                                                                                           |  |
| 5. Шкаф силового управления вентоборудованием должен обеспечивать:                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                 |                                                                                                           |  |
| - Питание и электрическую защиту вентоборудования подключённого к шкафу силового управления, в составе:<br>- Вентиляторы с частотнорегулируемым управлением скорости вращения (1 рабочий, 1 резервный) - 2 шт.;<br>- Воздушный клапан (на воздухозаборе) - 1 шт.<br>- Воздушный клапан (регулирующий) - 2 шт.<br>- Насос циркуляционный (смесительный узел; 1 рабочий, 1 резервный) - 2 шт.;<br>- Внутреннее осветительное оборудование вентустановки - 3шт.;<br>- Клапан термостатический трёхходовой регулируемый - 1 шт.. |                                                                                                                 |                                                                                                           |  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| - Местное управление вентоборудованием (каждой единицы оборудования в отдельности):<br>- переключатель выбора режима местный/дистанционный;<br>- кнопки пуск/стоп (в местном режиме работы).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| - Местную сигнализацию состояния вводного питания:<br>- БЕЛАЯ – наличие сетевого питания (каждой фазы).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| - Местную сигнализацию состояния вентоборудования (каждой единицы оборудования в отдельности):<br>- ЗЕЛЕНАЯ – работа;<br>- КРАСНАЯ – авария.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| - Дистанционное управление вентоборудованием (каждой единицей оборудования в отдельности) из системы АСУТП:<br>- Пуск - Н.О. «сухой» контакт;<br>- Стоп - Н.З. «сухой» контакт.<br>- Дистанционное управление технологическими заслонками:<br>- Открытие заслонки - Н.О. «сухой» контакт;<br>- Закрытие заслонки - Н.О. «сухой» контакт.<br>- Для вентиляторов:<br>- Задание скорости вращения вентиляторов (аналоговый сигнал 4...20мА) - 2 шт. (отдельно на каждого вентилятора).<br>- Общий стоп вентоборудования по сигналу АСУ.                                                                                                                                                                 |  |
| - Дистанционную сигнализацию состояния вентоборудования (в систему АСУТП от каждой единицы оборудования в отдельности):<br>- Режим управления - местный/дистанционный - Н.О. «сухой» контакт;<br>- Оборудование в работе - Н.О. «сухой» контакт;<br>- Авария оборудования - Н.З. «сухой» контакт;<br>- Сигнализация частоты вращения вентилятора - аналоговый сигнал 4...20 мА (отдельно для каждого вентилятора с частотным регулированием).                                                                                                                                                                                                                                                        |  |
| - Все контакты дистанционного управления/сигнализации вывести на клеммник шкафа силового управления вентоборудованием.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| 5. ЧРП вентилятора должен удовлетворять документу "ОБЩИЕ ТЕХНИЧЕСКИЕ УСЛОВИЯ НА ЧАСТОТНО-РЕГУЛИРУЕМЫЕ ПРИВОДЫ (ЧРП)" (док. № 4124-NN-SG-200000016).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| 6. Вес агрегата не более 1000 кг                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
| 7. Средства измерения должны соответствовать согласованному списку поставщиков ООО «ЕвроХим Северо-Запад-2»                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
| 8. С ТП предоставить:<br>- номер и сроки действия сертификата (декларации) соответствия требованиям технического регламента с указанием завода-изготовителя;<br>- чертеж с габаритными размерами вентагрегата;<br>- техническое задание на подключение оборудования по разделам ЭМ, ОВ, ВК, АОВ.<br>- таблицу с параметрами предлагаемого оборудования в формате данного опросного листа;<br>- копию ТУ или № ТУ, титульный лист ТУ, выписку разделов ТУ по основным параметрам и характеристикам изготавливаемых вентиляторов, требованиям к материалам и покупным изделиям, сварке, их контролю, правилам приемке арматуры, методам контроля, требованиям по эксплуатации, показателям надежности. |  |

#### СОГЛАСОВАНО

Должность \_\_\_\_\_

Должность \_\_\_\_\_

Должность \_\_\_\_\_

ГИП \_\_\_\_\_

(ФИО)

Опросный лист заполнил:



Савватеев А.В.

25.10.2023 г.



## УТВЕРЖДАЮ

Должность

\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_  
« \_\_\_\_ » \_\_\_\_\_ 202 \_\_\_\_ г.

| СТАТУС / STATUS                                                                                                                       |                                                                                        |                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------|
| Замена изношенного оборудования                                                                                                       |                                                                                        | Для заполнения поставщиком                                       |
| Вновь вводимое оборудование                                                                                                           | Да                                                                                     |                                                                  |
|                                                                                                                                       |                                                                                        | <b>Наименование поставщика</b>                                   |
| Предприятие Заказчик                                                                                                                  | ООО «ЕвроХим Северо-Запад-2»                                                           | в ячейках ниже необходимо указать / подтвердить значение/наличие |
| Производство, цех №                                                                                                                   | Объект А17.710.2 (Здание азотной установки и узла деминерализованной воды)             |                                                                  |
| Дата заполнения                                                                                                                       |                                                                                        |                                                                  |
| ОПРОСНЫЙ ЛИСТ № E230-0001-8000571851-РД-01-10.20.010-ОВ.0.12 на вентиляционное оборудование поз.№ (указать № технологической позиции) |                                                                                        | П2                                                               |
| № п/п                                                                                                                                 | Наименование параметра                                                                 |                                                                  |
| 1                                                                                                                                     | Тип установки (внутреннее исполнение, наружное исполнение, работа в агрессивной среде) | Наружное исполнение – 1 шт (вентилятор 1 рабочий, 1 резервный)   |
| 2                                                                                                                                     | Назначение установки (приточная, вытяжная, приточно-вытяжная)                          | Приточная, напольного типа                                       |
| 3                                                                                                                                     | Сторона обслуживания                                                                   | Слева                                                            |
| 4                                                                                                                                     | Материальное исполнение установки                                                      | Общего назначения, напольного типа                               |
| <b>Параметры вентилятора</b>                                                                                                          |                                                                                        |                                                                  |
| 5                                                                                                                                     | Требуемая производительность/расчетная производительность, м <sup>3</sup> /ч, L        | теплый период 36500 м3/ч<br>холодный период: 36500 м3/ч          |
| 6                                                                                                                                     | Требуемое полное давление, Па                                                          | 450                                                              |
| <b>Характеристики электродвигателя</b>                                                                                                |                                                                                        |                                                                  |
| 7                                                                                                                                     | Частота, Гц                                                                            | 50                                                               |
| 8                                                                                                                                     | Количество фаз                                                                         | 3                                                                |
| 9                                                                                                                                     | Напряжение, В                                                                          | 220/380                                                          |
| 10                                                                                                                                    | Мощность потребляемая/номинальная, (кВт)                                               | 11/11 (определяется проектом поставщика)                         |
| 11                                                                                                                                    | Число оборотов синхронная (справочно), об/мин                                          | Уточняет поставщик оборудования                                  |
| 12                                                                                                                                    | Степень защиты оболочки, IP                                                            | не менее IP54                                                    |
| 13                                                                                                                                    | Маркировка взрывозащиты                                                                | Общего назначения                                                |
| 14                                                                                                                                    | Дополнительно                                                                          | Плавное регулирование оборотов (частотный регулятор)             |
| <b>Параметры фильтра</b>                                                                                                              |                                                                                        |                                                                  |
| 15                                                                                                                                    | Класс фильтра (G3, F6, F7)                                                             | G3                                                               |
| 16                                                                                                                                    | Максимально допустимый перепад давления, Па                                            | 150                                                              |
| <b>Параметры воздушонагревателя</b>                                                                                                   |                                                                                        |                                                                  |
| 17                                                                                                                                    | Тип воздушонагревателя (водяной, электрический, паровой)                               | водяной                                                          |
| 18                                                                                                                                    | Тип теплоносителя                                                                      | горячая вода                                                     |
| 19                                                                                                                                    | Температура воздуха до / после                                                         | Минус 24°C / +20°C                                               |
| 20                                                                                                                                    | Мощность нагревателя, кВт                                                              | 427,9                                                            |
| 21                                                                                                                                    | Температура теплоносителя (по температурному графику)                                  | вход - 115°C/выход - 70°C                                        |
| <b>Параметры воздухоохладителя</b>                                                                                                    |                                                                                        |                                                                  |
| 22                                                                                                                                    | Тип воздухоохладителя (водяной, фреоновый)                                             | -                                                                |
| 23                                                                                                                                    | Тип теплоносителя                                                                      | -                                                                |
| 24                                                                                                                                    | Мощность потребляемая/номинальная (если электрический) - для справки, (кВт)            | -                                                                |
| 25                                                                                                                                    | Хладопроизводительность, кВт                                                           | -                                                                |
| 26                                                                                                                                    | Температура воздуха вход / выход                                                       | -                                                                |
| <b>Параметры рекуператора</b>                                                                                                         |                                                                                        |                                                                  |
| 27                                                                                                                                    | Тип рекуператора (роторный, пластинчатый, гликолевый)                                  | нет                                                              |
| 28                                                                                                                                    | Дополнительно                                                                          | -                                                                |
| <b>Параметры увлажнителя</b>                                                                                                          |                                                                                        |                                                                  |
| 29                                                                                                                                    | Тип увлажнителя (ячейковый, форсуночный, паровой)                                      | -                                                                |
| 30                                                                                                                                    | Потребление (вода/пар), кг/ч                                                           | -                                                                |
| 31                                                                                                                                    | Уровень обеспечиваемой влажности в обслуживаемом помещении, % относительной влажности  | -                                                                |
| 32                                                                                                                                    | Мощность потребляемая/номинальная (если электрический) - для справки, (кВт)            | -                                                                |
| 33                                                                                                                                    | Дополнительно                                                                          | -                                                                |
| <b>Условия установки</b>                                                                                                              |                                                                                        |                                                                  |
| 34                                                                                                                                    | Место расположения                                                                     | Улица                                                            |
| 35                                                                                                                                    | Температура окружающей среды, (min/max) °C                                             | -35 °C/ +40 °C                                                   |
| 36                                                                                                                                    | Влажность                                                                              | 75%                                                              |
| 37                                                                                                                                    | Климатическое исполнение и категория размещения по ГОСТ 15150-69                       | У1                                                               |
| 38                                                                                                                                    | Класс взрывоопасной и пожароопасной зоны по ПУЭ                                        | -                                                                |
| 39                                                                                                                                    | Категория помещения/Категория блока                                                    | -                                                                |
| 40                                                                                                                                    | Дополнительно                                                                          | -                                                                |
| <b>Объем поставки</b>                                                                                                                 |                                                                                        |                                                                  |
| 41                                                                                                                                    | Вентоборудование (марка, количество), да/нет                                           | да (см. примечание п.1)                                          |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                 |                                                                                                           |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--|
| 42                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ЗИП (указать состав, на какой период эксплуатации)                                                              | -                                                                                                         |  |
| 43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Шкаф силовой питания и управления вентоборудованием, да/нет                                                     | да (см. примечание п.5)                                                                                   |  |
| 44                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Аксессуары (рама, присоединительные фланцы, гибкие вставки, шумоглушитель, воздушная заслонка)                  | Рама, гибкие вставки, секции, крепеж, рама крепления, воздушная заслонка и т.д.                           |  |
| 45                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Вводное устройство с взрывозащищенным кабельным вводом, да/нет                                                  | нет                                                                                                       |  |
| 46                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Антикоррозионное защитное покрытие агрегатов                                                                    | нет                                                                                                       |  |
| 47                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Необходимые КИП к поставке (указать какой) / да/нет                                                             | нет (см. примечание)                                                                                      |  |
| 48                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Шеф-монтаж да/нет                                                                                               | да                                                                                                        |  |
| 49                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Пуско-наладка да/нет                                                                                            | да                                                                                                        |  |
| <b>Документация</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                 |                                                                                                           |  |
| 51                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Паспорт на оборудование, на русском языке                                                                       | Выдается поставщиком оборудования                                                                         |  |
| 52                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Паспорт электродвигателя, руководство по эксплуатации в соответствии с ГОСТ 2.601-2013, ГОСТ 2.610-2019, да/нет | Выдается поставщиком оборудования                                                                         |  |
| 53                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Инструкция по эксплуатации, монтажу и ремонту                                                                   | Выдается поставщиком оборудования                                                                         |  |
| 54                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | с указанием объемов Т, С, К, ремонтов и ТО, структурой ремонтного цикла и межремонтных пробегов                 | Указать возможность ремонта по техническому состоянию                                                     |  |
| 55                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Сертификат взрывозащиты электрооборудования да/нет                                                              | нет                                                                                                       |  |
| 56                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Сертификат о подтверждении типа, выданный Федеральным агентством по техническому регулированию РФ, да/нет       | да                                                                                                        |  |
| 57                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Сертификат соответствия (ГОСТ Р, ТР, ТС), да/нет                                                                | да                                                                                                        |  |
| 58                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Разрешение на применение ФСЭТАН, да/нет                                                                         | -                                                                                                         |  |
| 59                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Разрешительная и эксплуатационная документация                                                                  | Выдается поставщиком оборудования                                                                         |  |
| 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Методика проверки на каждый тип оборудования и ЗИП                                                              | Выдается поставщиком оборудования, ЗИП на ПНР и 3 года эксплуатации                                       |  |
| 61                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Габаритные размеры оборудования (длина; ширина; высота), ДхШхВ, мм                                              | Не более 5500х2700х2800(н)                                                                                |  |
| <b>Показатели надежности</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                 |                                                                                                           |  |
| 62                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Наработка до отказа, час                                                                                        | Выдается поставщиком оборудования                                                                         |  |
| 63                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Назначенный ресурс, час                                                                                         | Выдается поставщиком оборудования                                                                         |  |
| 64                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Назначенный срок службы, лет                                                                                    | Выдается поставщиком оборудования                                                                         |  |
| <b>Гарантия</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                 |                                                                                                           |  |
| 65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Срок гарантии, мес. с даты поставки                                                                             | Гарантийный срок службы – не менее 12 месяцев с начала эксплуатации и не менее 36 месяцев со дня поставки |  |
| <b>Примечания:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                 |                                                                                                           |  |
| 1. В комплект поставки входит:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                 |                                                                                                           |  |
| - Приточная установка (блочно-модульная) в составе - 1 компл.:<br>- Входной воздушный клапан (в комплекте с приводом и электрообогревом) - 1 шт.;<br>- Калорифер, водяной – 2 шт.;<br>- Воздухоохладитель – 2 шт.;<br>- Запорные воздушный клапан (в комплекте с приводом) - 2 шт.;<br>- Вентагрегат – 2 шт.;<br>- Обратный воздушный клапан - 2 шт.;<br>- Фильтр G3 – 1 шт.;<br>- Узел регулирования (в составе: циркуляционный насос, трехходовой смесительный регулирующий клапан с сервоприводом) – 1 шт.                |                                                                                                                 |                                                                                                           |  |
| - Приборы КИПиА в составе:<br>- Датчики перепада давления на фильтрах - 2 шт.;<br>- Датчик перепада давления на вент агрегате - 1 шт.;<br>- Датчик температуры приточного воздуха - 1 шт.;<br>- Датчик влажности приточного воздуха - 1 шт.;<br>- Датчик температуры воды в калорифере - 2 шт.;<br>- Концевые выключатели дверей и съёмных панелей установки - количество в соответствии с количеством съёмных элементов и дверей.                                                                                           |                                                                                                                 |                                                                                                           |  |
| - Шкаф силовой питания и управления вентоборудованием (в комплекте с преобразователем частоты и органами управления) – 1шт.                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                 |                                                                                                           |  |
| 2. Предусмотреть заземление корпуса приточной установки, шкафа силового управления вентоборудованием.                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                 |                                                                                                           |  |
| 3. Требования к электроприводам воздушных клапанов:<br>- Питание - 220 В;<br>- Управление - 220В;<br>- Датчик положения клапана - 2 шт.                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                 |                                                                                                           |  |
| 4. Требования к исполнению силового шкафа управления:<br>- Напряжение питания – ~ 220/380 В;<br>- Количество вводов – 1;<br>- Система заземления – TN-S;<br>- Степень защиты – не менее IP54;<br>- Подвод питающих отходящих кабелей – верхний/нижний (в соответствии с местом монтажа);<br>- Климатическое исполнение – У1.                                                                                                                                                                                                 |                                                                                                                 |                                                                                                           |  |
| 5. Шкаф силового управления вентоборудованием должен обеспечивать:                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                 |                                                                                                           |  |
| - Питание и электрическую защиту вентоборудования подключённого к шкафу силового управления, в составе:<br>- Вентиляторы с частотнорегулируемым управлением скорости вращения (1 рабочий, 1 резервный) - 2 шт.;<br>- Воздушный клапан (на воздухозаборе) - 1 шт.<br>- Воздушный клапан (регулирующий) - 2 шт.<br>- Насос циркуляционный (смесительный узел; 1 рабочий, 1 резервный) - 2 шт.;<br>- Внутреннее осветительное оборудование вентустановки - 3шт.;<br>- Клапан термостатический трёхходовой регулируемый - 1 шт.. |                                                                                                                 |                                                                                                           |  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| - Местное управление вентоборудованием (каждой единицы оборудования в отдельности):<br>- переключатель выбора режима местный/дистанционный;<br>- кнопки пуск/стоп (в местном режиме работы).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| - Местную сигнализацию состояния вводного питания:<br>- БЕЛАЯ – наличие сетевого питания (каждой фазы).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| - Местную сигнализацию состояния вентоборудования (каждой единицы оборудования в отдельности):<br>- ЗЕЛЕНАЯ – работа;<br>- КРАСНАЯ – авария.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| - Дистанционное управление вентоборудованием (каждой единицей оборудования в отдельности) из системы АСУТП:<br>- Пуск - Н.О. «сухой» контакт;<br>- Стоп - Н.З. «сухой» контакт.<br>- Дистанционное управление технологическими заслонками:<br>- Открытие заслонки - Н.О. «сухой» контакт;<br>- Закрытие заслонки - Н.О. «сухой» контакт.<br>- Для вентиляторов:<br>- Задание скорости вращения вентиляторов (аналоговый сигнал 4...20мА) - 2 шт. (отдельно на каждого вентилятора).<br>- Общий стоп вентоборудования по сигналу АСУ.                                                                                                                                                                 |  |
| - Дистанционную сигнализацию состояния вентоборудования (в систему АСУТП от каждой единицы оборудования в отдельности):<br>- Режим управления - местный/дистанционный - Н.О. «сухой» контакт;<br>- Оборудование в работе - Н.О. «сухой» контакт;<br>- Авария оборудования - Н.З. «сухой» контакт;<br>- Сигнализация частоты вращения вентилятора - аналоговый сигнал 4...20 мА (отдельно для каждого вентилятора с частотным регулированием).                                                                                                                                                                                                                                                        |  |
| - Все контакты дистанционного управления/сигнализации вывести на клеммник шкафа силового управления вентоборудованием.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| 5. ЧРП вентилятора должен удовлетворять документу "ОБЩИЕ ТЕХНИЧЕСКИЕ УСЛОВИЯ НА ЧАСТОТНО-РЕГУЛИРУЕМЫЕ ПРИВОДЫ (ЧРП)" (док. № 4124-NN-SG-200000016).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| 6. Вес агрегата не более 1000 кг                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
| 7. Средства измерения должны соответствовать согласованному списку поставщиков ООО «ЕвроХим Северо-Запад-2»                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
| 8. С ТП предоставить:<br>- номер и сроки действия сертификата (декларации) соответствия требованиям технического регламента с указанием завода-изготовителя;<br>- чертеж с габаритными размерами вентагрегата;<br>- техническое задание на подключение оборудования по разделам ЭМ, ОВ, ВК, АОВ.<br>- таблицу с параметрами предлагаемого оборудования в формате данного опросного листа;<br>- копию ТУ или № ТУ, титульный лист ТУ, выписку разделов ТУ по основным параметрам и характеристикам изготавливаемых вентиляторов, требованиям к материалам и покупным изделиям, сварке, их контролю, правилам приемке арматуры, методам контроля, требованиям по эксплуатации, показателям надежности. |  |

#### СОГЛАСОВАНО

Должность \_\_\_\_\_

Должность \_\_\_\_\_

Должность \_\_\_\_\_

ГИП \_\_\_\_\_

(ФИО)

Опросный лист заполнил:



Савватеев А.В.

25.10.2023 г.

УТВЕРЖДАЮ

Должность

«    »                    202    г.

| СТАТУС / STATUS                 |    | Для заполнения поставщиком |
|---------------------------------|----|----------------------------|
| Замена изношенного оборудования |    |                            |
| Вновь вводимое оборудование     | Да |                            |

|                                                                          |                                                                                                                 |                                                                                  |                                                                  |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------|
| Предприятие Заказчик                                                     |                                                                                                                 | ООО «ЕвроХим Северо-Запад-2»                                                     | Наименование поставщика                                          |
| Производство, цех №                                                      |                                                                                                                 | Объект А17.710.2 (Здание азотной установки и узла деминерализованной воды)       | в ячейках ниже необходимо указать / подтвердить значение/наличие |
| Дата заполнения                                                          |                                                                                                                 | 25.10.2023                                                                       |                                                                  |
| ОПРОСНЫЙ ЛИСТ № E230-0001-8000571851-РД-01-10.20.010-ОВ.ОЛЗ              |                                                                                                                 |                                                                                  |                                                                  |
| на вентиляционное оборудование поз.№ (указать № технологической позиции) |                                                                                                                 | ПА1-2                                                                            |                                                                  |
| № п/п                                                                    | Наименование параметра                                                                                          | Ответ                                                                            |                                                                  |
| 1                                                                        | Тип установки (внутреннее исполнение, наружное исполнение, работа в агрессивной среде)                          | Осевой вентилятор 2,2 кВт<br>ВО13-284 №7.1 4/30°-71 90L4                         | Завод Вентилятор                                                 |
|                                                                          |                                                                                                                 | 1 рабочий вентилятор                                                             |                                                                  |
| 2                                                                        | Назначение вентилятора (приточный, вытяжной, приточно-вытяжной)                                                 | Приточный, аварийный                                                             |                                                                  |
| 3                                                                        | Материальное исполнение установки                                                                               | Общепромышленное исполнение<br>(углеродистая сталь)                              |                                                                  |
| 4                                                                        | Конструктивное исполнение                                                                                       | Осевой                                                                           |                                                                  |
| Параметры вентилятора                                                    |                                                                                                                 |                                                                                  |                                                                  |
| 5                                                                        | Требуемая производительность/расчетная производительность, м <sup>3</sup> /ч, Q                                 | 14470                                                                            |                                                                  |
| 6                                                                        | Требуемое полное давление, Па                                                                                   | 300                                                                              |                                                                  |
| Характеристики электродвигателя                                          |                                                                                                                 |                                                                                  |                                                                  |
| 7                                                                        | Частота, Гц                                                                                                     | 50                                                                               |                                                                  |
| 8                                                                        | Количество фаз                                                                                                  | 3                                                                                |                                                                  |
| 9                                                                        | Напряжение, В                                                                                                   | 400                                                                              |                                                                  |
| 10                                                                       | Мощность (для справки), (кВт)                                                                                   | 2,2                                                                              |                                                                  |
| 11                                                                       | Число оборотов синхронная (справочно), об/мин                                                                   | регулируемое                                                                     |                                                                  |
| 12                                                                       | Степень защиты оболочки, IP                                                                                     | не менее IP54                                                                    |                                                                  |
| 13                                                                       | Маркировка взрывозащиты                                                                                         | Общепромышленное                                                                 |                                                                  |
| 14                                                                       | Дополнительно                                                                                                   | -                                                                                |                                                                  |
| Условия установки                                                        |                                                                                                                 |                                                                                  |                                                                  |
| 15                                                                       | Место расположения                                                                                              | Улица                                                                            |                                                                  |
| 16                                                                       | Температура окружающей среды, (min/max) °C                                                                      | -35 °C/ +40 °C                                                                   |                                                                  |
| 17                                                                       | Влажность                                                                                                       | 75%                                                                              |                                                                  |
| 18                                                                       | Климатическое исполнение и категория размещения по ГОСТ 15150-69                                                | У1                                                                               |                                                                  |
| 19                                                                       | Класс взрывоопасной и пожароопасной зоны по ПУЭ                                                                 | не категоризируется                                                              |                                                                  |
| 20                                                                       | Категория помещения/Категория блока                                                                             | -                                                                                |                                                                  |
| 21                                                                       | Дополнительно:                                                                                                  | -                                                                                |                                                                  |
| Объем поставки                                                           |                                                                                                                 |                                                                                  |                                                                  |
| 22                                                                       | Запорно-регулирующая арматура (марка, количество), да/нет                                                       | Частотный преобразователь                                                        |                                                                  |
| 23                                                                       | ЗИП (указать состав, на какой период эксплуатации)                                                              | на пуско-наладочные работы и 3 года эксплуатации                                 |                                                                  |
| 24                                                                       | Блок пуско-защиты, да/нет                                                                                       | да                                                                               |                                                                  |
| 25                                                                       | Аксессуары (рама, присоединительные фланцы, гибкие вставки, шумоглушитель, воздушная заслонка)                  | присоединительные фланцы, гибкие вставки, виброоснование                         |                                                                  |
| 26                                                                       | Вводное устройство с взрывозащищенным                                                                           | нет                                                                              |                                                                  |
|                                                                          | кабельным вводом, да/нет                                                                                        |                                                                                  |                                                                  |
| 27                                                                       | Антикоррозионное защитное покрытие агрегатов                                                                    | да                                                                               |                                                                  |
| 28                                                                       | Необходимые КИП к поставке (указать какой) /    да/нет                                                          | нет                                                                              |                                                                  |
| 29                                                                       | Шеф-монтаж да/нет                                                                                               | да                                                                               |                                                                  |
| 30                                                                       | Пуско-наладка да/нет                                                                                            | да                                                                               |                                                                  |
| Документация                                                             |                                                                                                                 |                                                                                  |                                                                  |
| 31                                                                       | Паспорт на оборудование, на русском языке                                                                       | Выдается поставщиком оборудования с отчетами заводских приемосдаточных испытаний |                                                                  |
| 32                                                                       | Паспорт электродвигателя, руководство по эксплуатации в соответствии с ГОСТ 2.601-2013, ГОСТ 2.610-2019, да/нет | Выдается поставщиком оборудования                                                |                                                                  |
|                                                                          | Инструкция по эксплуатации , монтажу и ремонту                                                                  | Выдается поставщиком оборудования                                                |                                                                  |



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                           |                                                                                                                                                                                   |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 33                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | с указанием объёмов Т, С, К, ремонтов и ТО, структурой ремонтного цикла и межремонтных пробегов           | Указать возможность ремонта по техническому состоянию                                                                                                                             |  |
| 34                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Сертификат взрывозащиты электрооборудования да/нет                                                        | нет                                                                                                                                                                               |  |
| 35                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Сертификат о подтверждении типа, выданный Федеральным агентством по техническому урегулированию РФ да/нет | да                                                                                                                                                                                |  |
| 36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Сертификат соответствия (ГОСТ Р, ТР, ТС), да/нет                                                          | да                                                                                                                                                                                |  |
| 37                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Разрешению на применение ФСЭТАН, да/нет                                                                   | -                                                                                                                                                                                 |  |
| 38                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Разрешительная и эксплуатационная документация                                                            | Декларация о соответствии ТР ТС 010/2011 по схеме 5д (действующий на момент поставки), Сертификат о соответствии ТР ТС 010/2011 на тип продукции (действующий на момент поставки) |  |
| 39                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Методика поверки на каждый тип оборудования и ЗИП                                                         | Выдается поставщиком оборудования                                                                                                                                                 |  |
| 40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Габаритные размеры оборудования, ДхШхВ, мм:                                                               | Не более 485х772х800(h)                                                                                                                                                           |  |
| <b>Показатели надежности</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                           |                                                                                                                                                                                   |  |
| 41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Наработка до отказа, час                                                                                  | Выдается поставщиком оборудования                                                                                                                                                 |  |
| 42                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Назначенный ресурс, час                                                                                   | Выдается поставщиком оборудования                                                                                                                                                 |  |
| 43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Назначенный срок службы, лет                                                                              | не менее 25 лет                                                                                                                                                                   |  |
| <b>Гарантия</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                           |                                                                                                                                                                                   |  |
| 44                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Срок гарантии, мес. с даты поставки                                                                       | Гарантийный срок службы – не менее 24 месяцев с даты ввода в эксплуатацию и не более 36 месяцев с даты поставки                                                                   |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                           |                                                                                                                                                                                   |  |
| <b>Примечания:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                           |                                                                                                                                                                                   |  |
| 1. В комплект поставки входит (на 2 системы ПА1-2):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                           |                                                                                                                                                                                   |  |
| - Вентилятор вытяжной - 2 шт.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                           |                                                                                                                                                                                   |  |
| - Шкаф силовой управления вентилятором (в комплекте с преобразователем частоты и органами управления) – 2 шт.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                           |                                                                                                                                                                                   |  |
| - Кабельная продукция для подключения:<br>- оборудования КИПиА к системе АСУТП;<br>- вентиляторов к шкафу силового управления с ЧРП;<br>- шкафа силового управления к системе АСУТП.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                           |                                                                                                                                                                                   |  |
| - Лотки и материалы для прокладки кабельных трасс.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                           |                                                                                                                                                                                   |  |
| 2. Разработать проект прокладки кабельных трасс с согласованием с Заказчиком и проектной организацией.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                           |                                                                                                                                                                                   |  |
| 3. Предусмотреть заземление корпуса установки, шкафа силового управления вентилятором.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                           |                                                                                                                                                                                   |  |
| 4. Шкаф силового управления вентиляторами должен обеспечивать:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                           |                                                                                                                                                                                   |  |
| - Питание и электрическую защиту вентилятора (привода вентилятора, элементов схем управления и контроля, частотное регулирование скорости вращения вентилятора);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                           |                                                                                                                                                                                   |  |
| - Местное управление вентиляторами (переключатель выбора режима местный/дистанционный, кнопки пуск/стоп);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                           |                                                                                                                                                                                   |  |
| - Местную сигнализацию состояния вентилятора (сигнальные лампы на панели шкафа).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                           |                                                                                                                                                                                   |  |
| 5. ЧРП вентиляторов должен удовлетворять документу "ОБЩИЕ ТЕХНИЧЕСКИЕ УСЛОВИЯ НА ЧАСТОТНО-РЕГУЛИРУЕМЫЕ ПРИВОДЫ (ЧРП)" (док. № 4124-NN-SG-200000016).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                           |                                                                                                                                                                                   |  |
| 6. Вес агрегата не более 100 кг                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                           |                                                                                                                                                                                   |  |
| 7. Средства измерения должны соответствовать согласованному списку поставщиков ООО «ЕвроХим Северо-Запад-2»                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                           |                                                                                                                                                                                   |  |
| 8. С ТКП предоставить:<br>- номер и сроки действия сертификата (декларации) соответствия требованиям технического регламента с указанием завода-изготовителя;<br>- чертеж с габаритными размерами вентагрегата;<br>- таблицу с параметрами предлагаемого оборудования в формате данного опросного листа;<br>- копию ТУ или № ТУ, титульный лист ТУ, выписку разделов ТУ по основным параметрам и характеристикам изготавливаемых вентиляторов, требованиям к материалам и покупным изделиям, сварке, их контролю, правилам приемке арматуры, методам контроля, требованиям по эксплуатации, показателям надежности.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                           |                                                                                                                                                                                   |  |
| 9. Требования к материальному исполнению шкафов управления:<br>1. РУ 0,4кВ должны обеспечивать защиту персонала от поражения электрическим током в соответствии с п. 8.4 МЭК 61439-<br>2. Щит должен быть укомплектован устройствами ввода-вывода для кабелей необходимого сечения.<br>3. Должно быть предусмотрено не менее 20 % резерва смонтированного и не менее 10% дополнительного резерва для будущего монтажа.<br>4. Предусмотреть установку передних панелей, исключающих возможность прикосновения к токоведущим частям.<br>5. Заводом-изготовителем поставляется следующее оборудование:<br>- щит с оборудованием;<br>- внутренняя проводка;<br>- оборудование, необходимое для маркировки и опознавания оборудования.<br>6. Завод-изготовитель выполняет монтаж и подключение всего оборудования, входящего в объем своей поставки.<br>7. Щит поставляется полностью укомплектованными с кабельной проводкой и маркировкой.<br>8. Щит должен иметь табличку согласно ГОСТ 12971, на которой указывают:<br>- товарный знак предприятия - изготовителя;<br>- тип исполнения щита;<br>- порядковый номер по системе нумерации предприятия - изготовителя;<br>- дату изготовления (год);<br>- номинальное напряжение в киловольтах;<br>- номинальный ток главных цепей щита в амперах;<br>- степень защиты по ГОСТ 14254.<br>9. Маркировка установленной в РУ-0,4кВ аппаратуры должна совпадать с обозначениями, приводимыми на схемах.<br>10. Наружные и внутренние металлические поверхности оболочки РУ-0,4кВ должны иметь антикоррозионное покрытие.и. |                                                                                                           |                                                                                                                                                                                   |  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 11. Поставляемые НКУ должны иметь ЗИП на два года эксплуатации.<br>12. Эксплуатационная документация должна включать:<br>- паспорт;<br>- руководство по установке/монтажу/эксплуатации/;<br>- чертежи общего вида и внутренней компоновки;<br>- однолинейную схему;<br>- схемы электрические принципиальные;<br>- паспорта и техническую документацию на установленные аппараты и другие изделия.<br>13. Сертификаты соответствия.<br>14. Щит должен удовлетворять документу 4124-NN-SG-200000017 «Общие технические условия. Низковольтные распределительные щиты»<br>15. Материал корпуса – нержавеющая сталь. Минимальная толщина металлического корпуса – 1,5 мм, Краска – порошковое |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

**СОГЛАСОВАНО**

Должность \_\_\_\_\_

Должность \_\_\_\_\_

Должность \_\_\_\_\_

ГИП \_\_\_\_\_ (ФИО)

Опросный лист заполнил: **Савватеев А.В.**  
25.10.2023 г.

УТВЕРЖДАЮ

Должность

«    »                    202\_\_ г.

| СТАТУС / STATUS                 |    | Для заполнения поставщиком |
|---------------------------------|----|----------------------------|
| Замена изношенного оборудования |    |                            |
| Вновь вводимое оборудование     | Да |                            |

|                                                                          |                                                                                                                 |                                                                                  |                                                                  |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------|
| Предприятие Заказчик                                                     |                                                                                                                 | ООО «ЕвроХим Северо-Запад-2»                                                     | Наименование поставщика                                          |
| Производство, цех №                                                      |                                                                                                                 | Объект А17.710.2 (Здание азотной установки и узла деминерализованной воды)       | в ячейках ниже необходимо указать / подтвердить значение/наличие |
| Дата заполнения                                                          |                                                                                                                 | 25.10.2023                                                                       |                                                                  |
| ОПРОСНЫЙ ЛИСТ № E230-0001-8000571851-РД-01-10.20.010-ОВ.ОЛ4              |                                                                                                                 |                                                                                  |                                                                  |
| на вентиляционное оборудование поз.№ (указать № технологической позиции) |                                                                                                                 | В1-В3                                                                            |                                                                  |
| № п/п                                                                    | Наименование параметра                                                                                          | Ответ                                                                            |                                                                  |
| 1                                                                        | Тип установки (внутреннее исполнение, наружное исполнение, работа в агрессивной среде)                          | Крышный вентилятор<br>ВКРФ №6,3 РВ6 5,5/1500 112М4                               | Завод Вентилятор                                                 |
|                                                                          |                                                                                                                 | 1 рабочий вентилятор                                                             |                                                                  |
| 2                                                                        | Назначение вентилятора (приточный, вытяжной, приточно-вытяжной)                                                 | Вытяжной                                                                         |                                                                  |
| 3                                                                        | Материальное исполнение установки                                                                               | Общепромышленное исполнение<br>(углеродистая сталь)                              |                                                                  |
| 4                                                                        | Конструктивное исполнение                                                                                       | Крышный                                                                          |                                                                  |
| Параметры вентилятора                                                    |                                                                                                                 |                                                                                  |                                                                  |
| 5                                                                        | Требуемая производительность/расчетная производительность, м <sup>3</sup> /ч, Q                                 | 22560                                                                            |                                                                  |
| 6                                                                        | Требуемое полное давление, Па                                                                                   | 250                                                                              |                                                                  |
| Характеристики электродвигателя                                          |                                                                                                                 |                                                                                  |                                                                  |
| 7                                                                        | Частота, Гц                                                                                                     | 50                                                                               |                                                                  |
| 8                                                                        | Количество фаз                                                                                                  | 3                                                                                |                                                                  |
| 9                                                                        | Напряжение, В                                                                                                   | 400                                                                              |                                                                  |
| 10                                                                       | Мощность (для справки), (кВт)                                                                                   | 5,5                                                                              |                                                                  |
| 11                                                                       | Число оборотов синхронная (справочно), об/мин                                                                   | регулируемое                                                                     |                                                                  |
| 12                                                                       | Степень защиты оболочки, IP                                                                                     | не менее IP54                                                                    |                                                                  |
| 13                                                                       | Маркировка взрывозащиты                                                                                         | Общепромышленное                                                                 |                                                                  |
| 14                                                                       | Дополнительно                                                                                                   | частота двигателя - 1500 об/мин                                                  |                                                                  |
| Условия установки                                                        |                                                                                                                 |                                                                                  |                                                                  |
| 15                                                                       | Место расположения                                                                                              | Улица/кровля                                                                     |                                                                  |
| 16                                                                       | Температура окружающей среды, (min/max) °C                                                                      | -35 °C/ +40 °C                                                                   |                                                                  |
| 17                                                                       | Влажность                                                                                                       | 75%                                                                              |                                                                  |
| 18                                                                       | Климатическое исполнение и категория размещения по ГОСТ 15150-69                                                | У1                                                                               |                                                                  |
| 19                                                                       | Класс взрывоопасной и пожароопасной зоны по ПУЭ                                                                 | не категоризируется                                                              |                                                                  |
| 20                                                                       | Категория помещения/Категория блока                                                                             | -                                                                                |                                                                  |
| 21                                                                       | Дополнительно:                                                                                                  | -                                                                                |                                                                  |
| Объем поставки                                                           |                                                                                                                 |                                                                                  |                                                                  |
| 22                                                                       | Запорно-регулирующая арматура (марка, количество), да/нет                                                       | Частотный преобразователь                                                        |                                                                  |
| 23                                                                       | ЗИП (указать состав, на какой период эксплуатации)                                                              | на пуско-наладочные работы и 3 года эксплуатации                                 |                                                                  |
| 24                                                                       | Блок пуско-защиты, да/нет                                                                                       | да                                                                               |                                                                  |
| 25                                                                       | Аксессуары (рама, присоединительные фланцы, гибкие вставки, шумоглушитель, воздушная заслонка)                  | присоединительные фланцы, гибкие вставки, виброоснование                         |                                                                  |
| 26                                                                       | Вводное устройство с взрывозащищенным                                                                           | нет                                                                              |                                                                  |
|                                                                          | кабельным вводом, да/нет                                                                                        |                                                                                  |                                                                  |
| 27                                                                       | Антикоррозионное защитное покрытие агрегатов                                                                    | да                                                                               |                                                                  |
| 28                                                                       | Необходимые КИП к поставке (указать какой) /    да/нет                                                          | нет                                                                              |                                                                  |
| 29                                                                       | Шеф-монтаж да/нет                                                                                               | да                                                                               |                                                                  |
| 30                                                                       | Пуско-наладка да/нет                                                                                            | да                                                                               |                                                                  |
| Документация                                                             |                                                                                                                 |                                                                                  |                                                                  |
| 31                                                                       | Паспорт на оборудование, на русском языке                                                                       | Выдается поставщиком оборудования с отчетами заводских приемосдаточных испытаний |                                                                  |
| 32                                                                       | Паспорт электродвигателя, руководство по эксплуатации в соответствии с ГОСТ 2.601-2013, ГОСТ 2.610-2019, да/нет | Выдается поставщиком оборудования                                                |                                                                  |
|                                                                          | Инструкция по эксплуатации , монтажу и ремонту                                                                  | Выдается поставщиком оборудования                                                |                                                                  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                           |                                                                                                                                                                                   |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 33                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | с указанием объёмов Т, С, К, ремонтов и ТО, структурой ремонтного цикла и межремонтных пробегов           | Указать возможность ремонта по техническому состоянию                                                                                                                             |  |
| 34                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Сертификат взрывозащиты электрооборудования да/нет                                                        | нет                                                                                                                                                                               |  |
| 35                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Сертификат о подтверждении типа, выданный Федеральным агентством по техническому урегулированию РФ да/нет | да                                                                                                                                                                                |  |
| 36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Сертификат соответствия (ГОСТ Р, ТР, ТС), да/нет                                                          | да                                                                                                                                                                                |  |
| 37                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Разрешению на применение ФСЭТАН, да/нет                                                                   | -                                                                                                                                                                                 |  |
| 38                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Разрешительная и эксплуатационная документация                                                            | Декларация о соответствии ТР ТС 010/2011 по схеме 5д (действующий на момент поставки), Сертификат о соответствии ТР ТС 010/2011 на тип продукции (действующий на момент поставки) |  |
| 39                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Методика поверки на каждый тип оборудования и ЗИП                                                         | Выдается поставщиком оборудования                                                                                                                                                 |  |
| 40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Габаритные размеры оборудования, ДхШхВ, мм:                                                               | Не более 900х1289х1091 (h)                                                                                                                                                        |  |
| Показатели надежности                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                           |                                                                                                                                                                                   |  |
| 41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Наработка до отказа, час                                                                                  | Выдается поставщиком оборудования                                                                                                                                                 |  |
| 42                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Назначенный ресурс, час                                                                                   | Выдается поставщиком оборудования                                                                                                                                                 |  |
| 43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Назначенный срок службы, лет                                                                              | не менее 25 лет                                                                                                                                                                   |  |
| Гарантия                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                           |                                                                                                                                                                                   |  |
| 44                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Срок гарантии, мес. с даты поставки                                                                       | Гарантийный срок службы – не менее 24 месяцев с даты ввода в эксплуатацию и не более 36 месяцев с даты поставки                                                                   |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                           |                                                                                                                                                                                   |  |
| Примечания:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                           |                                                                                                                                                                                   |  |
| 1. В комплект поставки входит (на системы В1-В3):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                           |                                                                                                                                                                                   |  |
| - Вентилятор вытяжной - 3 шт.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                           |                                                                                                                                                                                   |  |
| - Шкаф силовой управления вентилятором (в комплекте с преобразователем частоты и органами управления) – 3 шт.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                           |                                                                                                                                                                                   |  |
| - Кабельная продукция для подключения:<br>- оборудования КИПиА к системе АСУТП;<br>- вентиляторов к шкафу силового управления с ЧРП;<br>- шкафа силового управления к системе АСУТП.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                           |                                                                                                                                                                                   |  |
| - Лотки и материалы для прокладки кабельных трасс.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                           |                                                                                                                                                                                   |  |
| 2. Разработать проект прокладки кабельных трасс с согласованием с Заказчиком и проектной организацией.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                           |                                                                                                                                                                                   |  |
| 3. Предусмотреть заземление корпуса установки, шкафа силового управления вентилятором.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                           |                                                                                                                                                                                   |  |
| 4. Шкаф силового управления вентиляторами должен обеспечивать:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                           |                                                                                                                                                                                   |  |
| - Питание и электрическую защиту вентилятора (привода вентилятора, элементов схем управления и контроля, частотное регулирование скорости вращения вентилятора);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                           |                                                                                                                                                                                   |  |
| - Местное управление вентиляторами (переключатель выбора режима местный/дистанционный, кнопки пуск/стоп);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                           |                                                                                                                                                                                   |  |
| - Местную сигнализацию состояния вентилятора (сигнальные лампы на панели шкафа).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                           |                                                                                                                                                                                   |  |
| 5. ЧРП вентилятора должен удовлетворять документу "ОБЩИЕ ТЕХНИЧЕСКИЕ УСЛОВИЯ НА ЧАСТОТНО-РЕГУЛИРУЕМЫЕ ПРИВОДЫ (ЧРП)" (док. № 4124-NN-SG-200000016).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                           |                                                                                                                                                                                   |  |
| 6. Вес агрегата не более 208 кг                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                           |                                                                                                                                                                                   |  |
| 7. Средства измерения должны соответствовать согласованному списку поставщиков ООО «ЕвроХим Северо-Запад-2»                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                           |                                                                                                                                                                                   |  |
| 8. С ТКП предоставить:<br>- номер и сроки действия сертификата (декларации) соответствия требованиям технического регламента с указанием завода-изготовителя;<br>- чертеж с габаритными размерами вентагрегата;<br>- таблицу с параметрами предлагаемого оборудования в формате данного опросного листа;<br>- копию ТУ или № ТУ, титульный лист ТУ, выписку разделов ТУ по основным параметрам и характеристикам изготавливаемых вентиляторов, требованиям к материалам и покупным изделиям, сварке, их контролю, правилам приемке                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                           |                                                                                                                                                                                   |  |
| 9. Требования к материальному исполнению шкафов управления:<br>1. РУ 0,4кВ должны обеспечивать защиту персонала от поражения электрическим током в соответствии с п. 8.4 МЭК 61439-<br>2. Щит должен быть укомплектован устройствами ввода-вывода для кабелей необходимого сечения.<br>3. Должно быть предусмотрено не менее 20 % резерва смонтированного и не менее 10% дополнительного резерва для будущего монтажа.<br>4. Предусмотреть установку передних панелей, исключающих возможность прикосновения к токоведущим частям.<br>5. Заводом-изготовителем поставляется следующее оборудование:<br>- щит с оборудованием;<br>- внутренняя проводка;<br>- оборудование, необходимое для маркировки и опознавания оборудования.<br>6. Завод-изготовитель выполняет монтаж и подключение всего оборудования, входящего в объем своей поставки.<br>7. Щит поставляется полностью укомплектованными с кабельной проводкой и маркировкой.<br>8. Щит должен иметь табличку согласно ГОСТ 12971, на которой указывают:<br>- товарный знак предприятия - изготовителя;<br>- тип исполнения щита;<br>- порядковый номер по системе нумерации предприятия - изготовителя;<br>- дату изготовления (год);<br>- номинальное напряжение в киловольтах;<br>- номинальный ток главных цепей щита в амперах;<br>- степень защиты по ГОСТ 14254. |                                                                                                           |                                                                                                                                                                                   |  |
| 9. Маркировка установленной в РУ 0,4кВ аппаратуре должна соответствовать обозначениям, приведенным на схемах                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                           |                                                                                                                                                                                   |  |



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 11. Поставляемые НКУ должны иметь ЗИП на два года эксплуатации.<br>12. Эксплуатационная документация должна включать:<br>- паспорт;<br>- руководство по установке/монтажу/эксплуатации/;<br>- чертежи общего вида и внутренней компоновки;<br>- однолинейную схему;<br>- схемы электрические принципиальные;<br>- паспорта и техническую документацию на установленные аппараты и другие изделия.<br>13.Сертификаты соответствия.<br>14. Щит должен удовлетворять документу 4124-NN-SG-200000017 «Общие технические условия. Низковольтные распределительные щиты»<br>15. Материал корпуса – нержавеющая сталь. Минимальная толщина металлического корпуса – 1,5 мм, Краска – порошковое покрытие RAL 7025 |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

**СОГЛАСОВАНО**

Должность \_\_\_\_\_

Должность \_\_\_\_\_

Должность \_\_\_\_\_

ГИП \_\_\_\_\_ (ФИО)

Опросный лист заполнил: **Савватеев А.В.**  
25.10.2023 г.

УТВЕРЖДАЮ

Должность

«    »                    202    г.

| СТАТУС / STATUS                 |    |                            |
|---------------------------------|----|----------------------------|
| Замена изношенного оборудования |    | Для заполнения поставщиком |
| Вновь вводимое оборудование     |    |                            |
|                                 | Да |                            |

|                                                                          |                                                                                                                 |                                                                                  |                                                                  |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------|
| Предприятие Заказчик                                                     |                                                                                                                 | ООО «ЕвроХим Северо-Запад-2»                                                     | Наименование поставщика                                          |
| Производство, цех №                                                      |                                                                                                                 | Объект А17.710.2 (Здание азотной установки и узла деминерализованной воды)       | в ячейках ниже необходимо указать / подтвердить значение/наличие |
| Дата заполнения                                                          |                                                                                                                 | 25.10.2023                                                                       |                                                                  |
| ОПРОСНЫЙ ЛИСТ № E230-0001-8000571851-РД-01-10.20.010-ОВ.ОЛ5              |                                                                                                                 |                                                                                  |                                                                  |
| на вентиляционное оборудование поз.№ (указать № технологической позиции) |                                                                                                                 | В4-В7                                                                            |                                                                  |
| № п/п                                                                    | Наименование параметра                                                                                          | Ответ                                                                            |                                                                  |
| 1                                                                        | Тип установки (внутреннее исполнение, наружное исполнение, работа в агрессивной среде)                          | Крышный вентилятор<br>ВКРФ №5.6 РВ6 0.75/1000 80А6                               | Завод Вентилятор                                                 |
|                                                                          |                                                                                                                 | 1 рабочий вентилятор                                                             |                                                                  |
| 2                                                                        | Назначение вентилятора (приточный, вытяжной, приточно-вытяжной)                                                 | Вытяжной                                                                         |                                                                  |
| 3                                                                        | Материальное исполнение установки                                                                               | Общепромышленное исполнение<br>(углеродистая сталь)                              |                                                                  |
| 4                                                                        | Конструктивное исполнение                                                                                       | Крышный                                                                          |                                                                  |
| Параметры вентилятора                                                    |                                                                                                                 |                                                                                  |                                                                  |
| 5                                                                        | Требуемая производительность/расчетная производительность, м <sup>3</sup> /ч, Q                                 | 8755                                                                             |                                                                  |
| 6                                                                        | Требуемое полное давление, Па                                                                                   | 250                                                                              |                                                                  |
| Характеристики электродвигателя                                          |                                                                                                                 |                                                                                  |                                                                  |
| 7                                                                        | Частота, Гц                                                                                                     | 50                                                                               |                                                                  |
| 8                                                                        | Количество фаз                                                                                                  | 3                                                                                |                                                                  |
| 9                                                                        | Напряжение, В                                                                                                   | 400                                                                              |                                                                  |
| 10                                                                       | Мощность (для справки), (кВт)                                                                                   | 0,75                                                                             |                                                                  |
| 11                                                                       | Число оборотов синхронная (справочно), об/мин                                                                   | регулируемое                                                                     |                                                                  |
| 12                                                                       | Степень защиты оболочки, IP                                                                                     | не менее IP54                                                                    |                                                                  |
| 13                                                                       | Маркировка взрывозащиты                                                                                         | Общепромышленное                                                                 |                                                                  |
| 14                                                                       | Дополнительно                                                                                                   | частота двигателя - 1500 об/мин                                                  |                                                                  |
| Условия установки                                                        |                                                                                                                 |                                                                                  |                                                                  |
| 15                                                                       | Место расположения                                                                                              | Улица/кровля                                                                     |                                                                  |
| 16                                                                       | Температура окружающей среды, (min/max) °С                                                                      | -35 °С/ +40 °С                                                                   |                                                                  |
| 17                                                                       | Влажность                                                                                                       | 75%                                                                              |                                                                  |
| 18                                                                       | Климатическое исполнение и категория размещения по ГОСТ 15150-69                                                | У1                                                                               |                                                                  |
| 19                                                                       | Класс взрывоопасной и пожароопасной зоны по ПУЭ                                                                 | не категоризируется                                                              |                                                                  |
| 20                                                                       | Категория помещения/Категория блока                                                                             | -                                                                                |                                                                  |
| 21                                                                       | Дополнительно:                                                                                                  | -                                                                                |                                                                  |
| Объем поставки                                                           |                                                                                                                 |                                                                                  |                                                                  |
| 22                                                                       | Запорно-регулирующая арматура (марка, количество), да/нет                                                       | Частотный преобразователь                                                        |                                                                  |
| 23                                                                       | ЗИП (указать состав, на какой период эксплуатации)                                                              | на пуско-наладочные работы и 3 года эксплуатации                                 |                                                                  |
| 24                                                                       | Блок пуско-защиты, да/нет                                                                                       | да                                                                               |                                                                  |
| 25                                                                       | Аксессуары (рама, присоединительные фланцы, гибкие вставки, шумоглушитель, воздушная заслонка)                  | присоединительные фланцы, гибкие вставки, виброоснование                         |                                                                  |
| 26                                                                       | Вводное устройство с взрывозащищенным                                                                           | нет                                                                              |                                                                  |
|                                                                          | кабельным вводом, да/нет                                                                                        |                                                                                  |                                                                  |
| 27                                                                       | Антикоррозионное защитное покрытие агрегатов                                                                    | да                                                                               |                                                                  |
| 28                                                                       | Необходимые КИП к поставке (указать какой) /    да/нет                                                          | нет                                                                              |                                                                  |
| 29                                                                       | Шеф-монтаж да/нет                                                                                               | да                                                                               |                                                                  |
| 30                                                                       | Пуско-наладка да/нет                                                                                            | да                                                                               |                                                                  |
| Документация                                                             |                                                                                                                 |                                                                                  |                                                                  |
| 31                                                                       | Паспорт на оборудование, на русском языке                                                                       | Выдается поставщиком оборудования с отчетами заводских приемосдаточных испытаний |                                                                  |
| 32                                                                       | Паспорт электродвигателя, руководство по эксплуатации в соответствии с ГОСТ 2.601-2013, ГОСТ 2.610-2019, да/нет | Выдается поставщиком оборудования                                                |                                                                  |
|                                                                          | Инструкция по эксплуатации , монтажу и ремонту                                                                  | Выдается поставщиком оборудования                                                |                                                                  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                           |                                                                                                                                                                                   |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 33                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | с указанием объёмов Т, С, К, ремонтов и ТО, структурой ремонтного цикла и межремонтных пробегов           | Указать возможность ремонта по техническому состоянию                                                                                                                             |  |
| 34                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Сертификат взрывозащиты электрооборудования да/нет                                                        | нет                                                                                                                                                                               |  |
| 35                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Сертификат о подтверждении типа, выданный Федеральным агентством по техническому урегулированию РФ да/нет | да                                                                                                                                                                                |  |
| 36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Сертификат соответствия (ГОСТ Р, ТР, ТС), да/нет                                                          | да                                                                                                                                                                                |  |
| 37                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Разрешению на применение ФСЭТАН, да/нет                                                                   | -                                                                                                                                                                                 |  |
| 38                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Разрешительная и эксплуатационная документация                                                            | Декларация о соответствии ТР ТС 010/2011 по схеме 5д (действующий на момент поставки), Сертификат о соответствии ТР ТС 010/2011 на тип продукции (действующий на момент поставки) |  |
| 39                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Методика поверки на каждый тип оборудования и ЗИП                                                         | Выдается поставщиком оборудования                                                                                                                                                 |  |
| 40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Габаритные размеры оборудования, ДхШхВ, мм:                                                               | Не более 800x1078x1048 (h)                                                                                                                                                        |  |
| Показатели надежности                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                           |                                                                                                                                                                                   |  |
| 41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Наработка до отказа, час                                                                                  | Выдается поставщиком оборудования                                                                                                                                                 |  |
| 42                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Назначенный ресурс, час                                                                                   | Выдается поставщиком оборудования                                                                                                                                                 |  |
| 43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Назначенный срок службы, лет                                                                              | не менее 25 лет                                                                                                                                                                   |  |
| Гарантия                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                           |                                                                                                                                                                                   |  |
| 44                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Срок гарантии, мес. с даты поставки                                                                       | Гарантийный срок службы – не менее 24 месяцев с даты ввода в эксплуатацию и не более 36 месяцев с даты поставки                                                                   |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                           |                                                                                                                                                                                   |  |
| Примечания:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                           |                                                                                                                                                                                   |  |
| 1. В комплект поставки входит (на системы В4-В7):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                           |                                                                                                                                                                                   |  |
| - Вентилятор вытяжной - 4 шт.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                           |                                                                                                                                                                                   |  |
| - Шкаф силовой управления вентилятором (в комплекте с преобразователем частоты и органами управления) – 4 шт.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                           |                                                                                                                                                                                   |  |
| - Кабельная продукция для подключения:<br>- оборудования КИПиА к системе АСУТП;<br>- вентиляторов к шкафу силового управления с ЧРП;<br>- шкафа силового управления к системе АСУТП.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                           |                                                                                                                                                                                   |  |
| - Лотки и материалы для прокладки кабельных трасс.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                           |                                                                                                                                                                                   |  |
| 2. Разработать проект прокладки кабельных трасс с согласованием с Заказчиком и проектной организацией.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                           |                                                                                                                                                                                   |  |
| 3. Предусмотреть заземление корпуса установки, шкафа силового управления вентилятором.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                           |                                                                                                                                                                                   |  |
| 4. Шкаф силового управления вентиляторами должен обеспечивать:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                           |                                                                                                                                                                                   |  |
| - Питание и электрическую защиту вентилятора (привода вентилятора, элементов схем управления и контроля, частотное регулирование скорости вращения вентилятора);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                           |                                                                                                                                                                                   |  |
| - Местное управление вентиляторами (переключатель выбора режима местный/дистанционный, кнопки пуск/стоп);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                           |                                                                                                                                                                                   |  |
| - Местную сигнализацию состояния вентилятора (сигнальные лампы на панели шкафа).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                           |                                                                                                                                                                                   |  |
| 5. ЧРП вентилятора должен удовлетворять документу "ОБЩИЕ ТЕХНИЧЕСКИЕ УСЛОВИЯ НА ЧАСТОТНО-РЕГУЛИРУЕМЫЕ ПРИВОДЫ (ЧРП)" (док. № 4124-NN-SG-200000016).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                           |                                                                                                                                                                                   |  |
| 6. Вес агрегата не более 94 кг                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                           |                                                                                                                                                                                   |  |
| 7. Средства измерения должны соответствовать согласованному списку поставщиков ООО «ЕвроХим Северо-Запад-2»                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                           |                                                                                                                                                                                   |  |
| 8. С ТКП предоставить:<br>- номер и сроки действия сертификата (декларации) соответствия требованиям технического регламента с указанием завода-изготовителя;<br>- чертеж с габаритными размерами вентагрегата;<br>- таблицу с параметрами предлагаемого оборудования в формате данного опросного листа;<br>- копию ТУ или № ТУ, титульный лист ТУ, выписку разделов ТУ по основным параметрам и характеристикам изготавливаемых вентиляторов, требованиям к материалам и покупным изделиям, сварке, их контролю, правилам приемке оборудования, методом контроля, требованиям по эксплуатации, показателям надежности.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                           |                                                                                                                                                                                   |  |
| 9. Требования к материальному исполнению шкафов управления:<br>1. РУ 0,4кВ должны обеспечивать защиту персонала от поражения электрическим током в соответствии с п. 8.4 МЭК 61439-2.<br>2. Щит должен быть укомплектован устройствами ввода-вывода для кабелей необходимого сечения.<br>3. Должно быть предусмотрено не менее 20 % резерва смонтированного и не менее 10% дополнительного резерва для будущего монтажа.<br>4. Предусмотреть установку передних панелей, исключающих возможность прикосновения к токоведущим частям.<br>5. Заводом-изготовителем поставляется следующее оборудование:<br>- щит с оборудованием;<br>- внутренняя проводка;<br>- оборудование, необходимое для маркировки и опознавания оборудования.<br>6. Завод-изготовитель выполняет монтаж и подключение всего оборудования, входящего в объем своей поставки.<br>7. Щит поставляется полностью укомплектованными с кабельной проводкой и маркировкой.<br>8. Щит должен иметь табличку согласно ГОСТ 12971, на которой указывают:<br>- товарный знак предприятия - изготовителя;<br>- тип исполнения щита;<br>- порядковый номер по системе нумерации предприятия - изготовителя;<br>- дату изготовления (год);<br>- номинальное напряжение в киловольтах;<br>- номинальный ток главных цепей щита в амперах;<br>- степень защиты по ГОСТ 14254.<br>9. Маркировка установленной в РУ-0,4кВ аппаратуры должна совпадать с обозначениями, приводимыми на схемах.<br>10. Наружные и внутренние металлические поверхности оболочки РУ 0,4кВ должны иметь антикоррозионное покрытие. |                                                                                                           |                                                                                                                                                                                   |  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 11. Поставляемые НКУ должны иметь ЗИП на два года эксплуатации.<br>12. Эксплуатационная документация должна включать:<br>- паспорт;<br>- руководство по установке/монтажу/эксплуатации/;<br>- чертежи общего вида и внутренней компоновки;<br>- однолинейную схему;<br>- схемы электрические принципиальные;<br>- паспорта и техническую документацию на установленные аппараты и другие изделия.<br>13.Сертификаты соответствия.<br>14. Щит должен удовлетворять документу 4124-NN-SG-200000017 «Общие технические условия. Низковольтные распределительные щиты»<br>15. Материал корпуса – нержавеющая сталь. Минимальная толщина металлического корпуса – 1,5 мм, Краска – порошковое покрытие, RAL 7035 |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

**СОГЛАСОВАНО**

Должность \_\_\_\_\_

Должность \_\_\_\_\_

Должность \_\_\_\_\_

ГИП \_\_\_\_\_ (ФИО)

Опросный лист заполнил: **Савватеев А.В.**  
25.10.2023 г.



УТВЕРЖДАЮ

Должность

«    »                    202\_\_ г.

| СТАТУС / STATUS                 |    | Для заполнения поставщиком |
|---------------------------------|----|----------------------------|
| Замена изношенного оборудования |    |                            |
| Вновь вводимое оборудование     | Да |                            |

|                                                                          |                                                                                                                 |                                                                                  |                                                                  |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------|
| Предприятие Заказчик                                                     |                                                                                                                 | ООО «ЕвроХим Северо-Запад-2»                                                     | Наименование поставщика                                          |
| Производство, цех №                                                      |                                                                                                                 | Объект А17.710.2 (Здание азотной установки и узла деминерализованной воды)       | в ячейках ниже необходимо указать / подтвердить значение/наличие |
| Дата заполнения                                                          |                                                                                                                 | 25.10.2023                                                                       |                                                                  |
| ОПРОСНЫЙ ЛИСТ № E230-0001-8000571851-РД-01-10.20.010-ОВ.ОЛ6              |                                                                                                                 |                                                                                  |                                                                  |
| на вентиляционное оборудование поз.№ (указать № технологической позиции) |                                                                                                                 | ВА1-2                                                                            |                                                                  |
| № п/п                                                                    | Наименование параметра                                                                                          | Ответ                                                                            |                                                                  |
| 1                                                                        | Тип установки (внутреннее исполнение, наружное исполнение, работа в агрессивной среде)                          | Радиальный вентилятор 3 кВт<br>ВР280-46-8 исп. 5                                 | Завод Вентилятор                                                 |
|                                                                          |                                                                                                                 | 1 рабочий вентилятор                                                             |                                                                  |
| 2                                                                        | Назначение вентилятора (приточный, вытяжной, приточно-вытяжной)                                                 | Вытяжной, аварийный                                                              |                                                                  |
| 3                                                                        | Материальное исполнение установки                                                                               | Общепромышленное исполнение<br>(углеродистая сталь)                              |                                                                  |
| 4                                                                        | Конструктивное исполнение                                                                                       | Радиальный                                                                       |                                                                  |
| Параметры вентилятора                                                    |                                                                                                                 |                                                                                  |                                                                  |
| 5                                                                        | Требуемая производительность/расчетная производительность, м³/ч, Q                                              | 15080                                                                            |                                                                  |
| 6                                                                        | Требуемое полное давление, Па                                                                                   | 400                                                                              |                                                                  |
| Характеристики электродвигателя                                          |                                                                                                                 |                                                                                  |                                                                  |
| 7                                                                        | Частота, Гц                                                                                                     | 50                                                                               |                                                                  |
| 8                                                                        | Количество фаз                                                                                                  | 3                                                                                |                                                                  |
| 9                                                                        | Напряжение, В                                                                                                   | 400                                                                              |                                                                  |
| 10                                                                       | Мощность (для справки), (кВт)                                                                                   | 3                                                                                |                                                                  |
| 11                                                                       | Число оборотов синхронная (справочно), об/мин                                                                   | регулируемое                                                                     |                                                                  |
| 12                                                                       | Степень защиты оболочки, IP                                                                                     | не менее IP54                                                                    |                                                                  |
| 13                                                                       | Маркировка взрывозащиты                                                                                         | Общепромышленное                                                                 |                                                                  |
| 14                                                                       | Дополнительно                                                                                                   | -                                                                                |                                                                  |
| Условия установки                                                        |                                                                                                                 |                                                                                  |                                                                  |
| 15                                                                       | Место расположения                                                                                              | Улица                                                                            |                                                                  |
| 16                                                                       | Температура окружающей среды, (min/max) °C                                                                      | -35 °C/ +40 °C                                                                   |                                                                  |
| 17                                                                       | Влажность                                                                                                       | 75%                                                                              |                                                                  |
| 18                                                                       | Климатическое исполнение и категория размещения по ГОСТ 15150-69                                                | У1                                                                               |                                                                  |
| 19                                                                       | Класс взрывоопасной и пожароопасной зоны по ПУЭ                                                                 | не категоризируется                                                              |                                                                  |
| 20                                                                       | Категория помещения/Категория блока                                                                             | -                                                                                |                                                                  |
| 21                                                                       | Дополнительно:                                                                                                  | -                                                                                |                                                                  |
| Объем поставки                                                           |                                                                                                                 |                                                                                  |                                                                  |
| 22                                                                       | Запорно-регулирующая арматура (марка, количество), да/нет                                                       | Частотный преобразователь                                                        |                                                                  |
| 23                                                                       | ЗИП (указать состав, на какой период эксплуатации)                                                              | на пуско-наладочные работы и 3 года эксплуатации                                 |                                                                  |
| 24                                                                       | Блок пуско-защиты, да/нет                                                                                       | да                                                                               |                                                                  |
| 25                                                                       | Аксессуары (рама, присоединительные фланцы, гибкие вставки, шумоглушитель, воздушная заслонка)                  | присоединительные фланцы, гибкие вставки, виброоснование                         |                                                                  |
| 26                                                                       | Вводное устройство с взрывозащищенным                                                                           | нет                                                                              |                                                                  |
|                                                                          | кабельным вводом, да/нет                                                                                        |                                                                                  |                                                                  |
| 27                                                                       | Антикоррозионное защитное покрытие агрегатов                                                                    | да                                                                               |                                                                  |
| 28                                                                       | Необходимые КИП к поставке (указать какой) /    да/нет                                                          | нет                                                                              |                                                                  |
| 29                                                                       | Шеф-монтаж да/нет                                                                                               | да                                                                               |                                                                  |
| 30                                                                       | Пуско-наладка да/нет                                                                                            | да                                                                               |                                                                  |
| Документация                                                             |                                                                                                                 |                                                                                  |                                                                  |
| 31                                                                       | Паспорт на оборудование, на русском языке                                                                       | Выдается поставщиком оборудования с отчетами заводских приемосдаточных испытаний |                                                                  |
| 32                                                                       | Паспорт электродвигателя, руководство по эксплуатации в соответствии с ГОСТ 2.601-2013, ГОСТ 2.610-2019, да/нет | Выдается поставщиком оборудования                                                |                                                                  |
|                                                                          | Инструкция по эксплуатации , монтажу и ремонту                                                                  | Выдается поставщиком оборудования                                                |                                                                  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                           |                                                                                                                                                                                      |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 33                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | с указанием объёмов Т, С, К, ремонтов и ТО, структурой ремонтного цикла и межремонтных пробегов           | Указать возможность ремонта по техническому состоянию                                                                                                                                |  |
| 34                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Сертификат взрывозащиты электрооборудования да/нет                                                        | нет                                                                                                                                                                                  |  |
| 35                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Сертификат о подтверждении типа, выданный Федеральным агентством по техническому урегулированию РФ да/нет | да                                                                                                                                                                                   |  |
| 36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Сертификат соответствия (ГОСТ Р, ТР, ТС), да/нет                                                          | да                                                                                                                                                                                   |  |
| 37                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Разрешению на применение ФСЭТАН, да/нет                                                                   | -                                                                                                                                                                                    |  |
| 38                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Разрешительная и эксплуатационная документация                                                            | Декларация о соответствии ТР ТС 010/2011 по схеме 5д (действующий на момент поставки),<br>Сертификат о соответствии ТР ТС 010/2011 на тип продукции (действующий на момент поставки) |  |
| 39                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Методика поверки на каждый тип оборудования и ЗИП                                                         | Выдается поставщиком оборудования                                                                                                                                                    |  |
| 40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Габаритные размеры оборудования, ДхШхВ, мм:                                                               | Не более 1322x1886x1436(h)                                                                                                                                                           |  |
| <b>Показатели надежности</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                           |                                                                                                                                                                                      |  |
| 41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Наработка до отказа, час                                                                                  | Выдается поставщиком оборудования                                                                                                                                                    |  |
| 42                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Назначенный ресурс, час                                                                                   | Выдается поставщиком оборудования                                                                                                                                                    |  |
| 43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Назначенный срок службы, лет                                                                              | не менее 25 лет                                                                                                                                                                      |  |
| <b>Гарантия</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                           |                                                                                                                                                                                      |  |
| 44                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Срок гарантии, мес. с даты поставки                                                                       | Гарантийный срок службы – не менее 24 месяцев с даты ввода в эксплуатацию и не более 36 месяцев с даты поставки                                                                      |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                           |                                                                                                                                                                                      |  |
| <b>Примечания:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                           |                                                                                                                                                                                      |  |
| 1. В комплект поставки входит (на 2 системы ВА1-2):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                           |                                                                                                                                                                                      |  |
| - Вентилятор вытяжной - 2 шт.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                           |                                                                                                                                                                                      |  |
| - Шкаф силовой управления вентилятором (в комплекте с преобразователем частоты и органами управления) – 2 шт.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                           |                                                                                                                                                                                      |  |
| - Кабельная продукция для подключения:<br>- оборудования КИПиА к системе АСУТП;<br>- вентиляторов к шкафу силового управления с ЧРП;<br>- шкафа силового управления к системе АСУТП.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                           |                                                                                                                                                                                      |  |
| - Лотки и материалы для прокладки кабельных трасс.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                           |                                                                                                                                                                                      |  |
| 2. Разработать проект прокладки кабельных трасс с согласованием с Заказчиком и проектной организацией.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                           |                                                                                                                                                                                      |  |
| 3. Предусмотреть заземление корпуса установки, шкафа силового управления вентилятором.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                           |                                                                                                                                                                                      |  |
| 4. Шкаф силового управления вентиляторами должен обеспечивать:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                           |                                                                                                                                                                                      |  |
| - Питание и электрическую защиту вентилятора (привода вентилятора, элементов схем управления и контроля, частотное регулирование скорости вращения вентилятора);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                           |                                                                                                                                                                                      |  |
| - Местное управление вентиляторами (переключатель выбора режима местный/дистанционный, кнопки пуск/стоп);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                           |                                                                                                                                                                                      |  |
| - Местную сигнализацию состояния вентилятора (сигнальные лампы на панели шкафа).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                           |                                                                                                                                                                                      |  |
| 5. ЧРП вентиляторов должен удовлетворять документу "ОБЩИЕ ТЕХНИЧЕСКИЕ УСЛОВИЯ НА ЧАСТОТНО-РЕГУЛИРУЕМЫЕ ПРИВОДЫ (ЧРП)" (док. № 4124-NN-SG-200000016).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                           |                                                                                                                                                                                      |  |
| 6. Вес агрегата не более 410 кг (без электродвигателя)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                           |                                                                                                                                                                                      |  |
| 7. Средства измерения должны соответствовать согласованному списку поставщиков ООО «ЕвроХим Северо-Запад-2»                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                           |                                                                                                                                                                                      |  |
| 8. С ТКП предоставить:<br>- номер и сроки действия сертификата (декларации) соответствия требованиям технического регламента с указанием завода-изготовителя;<br>- чертеж с габаритными размерами вентагрегата;<br>- таблицу с параметрами предлагаемого оборудования в формате данного опросного листа;<br>- копию ТУ или № ТУ, титульный лист ТУ, выписку разделов ТУ по основным параметрам и характеристикам изготавливаемых вентиляторов, требованиям к материалам и покупным изделиям, сварке, их контролю, правилам приемке                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                           |                                                                                                                                                                                      |  |
| 9. Требования к материальному исполнению шкафов управления:<br>1. РУ 0,4кВ должны обеспечивать защиту персонала от поражения электрическим током в соответствии с п. 8.4 МЭК 61439-<br>2. Щит должен быть укомплектован устройствами ввода-вывода для кабелей необходимого сечения.<br>3. Должно быть предусмотрено не менее 20 % резерва смонтированного и не менее 10% дополнительного резерва для будущего монтажа.<br>4. Предусмотреть установку передних панелей, исключающих возможность прикосновения к токоведущим частям.<br>5. Заводом-изготовителем поставляется следующее оборудование:<br>- щит с оборудованием;<br>- внутренняя проводка;<br>- оборудование, необходимое для маркировки и опознавания оборудования.<br>6. Завод-изготовитель выполняет монтаж и подключение всего оборудования, входящего в объем своей поставки.<br>7. Щит поставляется полностью укомплектованными с кабельной проводкой и маркировкой.<br>8. Щит должен иметь табличку согласно ГОСТ 12971, на которой указывают:<br>- товарный знак предприятия - изготовителя;<br>- тип исполнения щита;<br>- порядковый номер по системе нумерации предприятия - изготовителя;<br>- дату изготовления (год);<br>- номинальное напряжение в киловольтах;<br>- номинальный ток главных цепей щита в амперах;<br>- степень защиты по ГОСТ 14254. |                                                                                                           |                                                                                                                                                                                      |  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 11. Поставляемые НКУ должны иметь ЗИП на два года эксплуатации.<br>12. Эксплуатационная документация должна включать:<br>- паспорт;<br>- руководство по установке/монтажу/эксплуатации/;<br>- чертежи общего вида и внутренней компоновки;<br>- однолинейную схему;<br>- схемы электрические принципиальные;<br>- паспорта и техническую документацию на установленные аппараты и другие изделия.<br>13. Сертификаты соответствия.<br>14. Щит должен удовлетворять документу 4124-NN-SG-200000017 «Общие технические условия. Низковольтные распределительные щиты»<br>15. Материал корпуса – нержавеющая сталь. Минимальная толщина металлического корпуса – 1,5 мм, Краска – порошковое |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

**СОГЛАСОВАНО**

Должность \_\_\_\_\_

Должность \_\_\_\_\_

Должность \_\_\_\_\_

ГИП \_\_\_\_\_ (ФИО)

Опросный лист заполнил: **Савватеев А.В.**  
25.10.2023 г.

**3000 MTPD AMMONIA**  
**4000 MTPD UREA MELT AND GRANULATION**  
**DESIGN SPECIFICATION**  
**AMMONIA AND UREA PRODUCTION**  
**HVAC SYSTEM**

**PROJECT** : AMMONIA AND UREA PRODUCTION, KINGISEPP  
**SITE** : KINGISEPP RUSSIAN FEDERATION  
**OWNER** : LLC "EUROCHEM NORTHWEST-2"  
**TCM JOB No** : 4124  
**TCM DOC. NUMBER** : 4124-BH-SG-2000000001  
**DOC. NUMBER** :

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|      |                  |             |  |  |  |
|------|------------------|-------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 03   | Issue for final  | 6-Aug-2021  | A.Ujawane                                                                             | T.Matranga                                                                            | T.Matranga                                                                            |
| 02   | Issue for final  | 6-May-2021  | A.Ujawane                                                                             | T.Matranga                                                                            | T.Matranga                                                                            |
| 01   | Issue for review | 27-Nov-2020 | A.Ujawane                                                                             | T.Matranga                                                                            | T.Matranga                                                                            |
| Rev. | Description      | Date        | Prepared                                                                              | Checked                                                                               | Approved                                                                              |



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## INDEX

### 1. SCOPE

### 2. DEFINITIONS

### 3. APPLICABLE STANDARDS AND CODES

### 4. FACILITIES TO BE PROVIDED WITH HVAC SYSTEMS

### 5. DESIGN CONDITIONS AND GENERAL CRITERIA

### 6. HVAC SYSTEM DESCRIPTION

### APPENDIX 1 - HVAC System Design Bases

### APPENDIX 2 - HVAC Automatic Control System Architecture 1

### | APPENDIX 3 - HVAC Automatic Control System Architecture 2

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## 1. SCOPE

This document defines the minimum design requirements for heating, ventilation and air conditioning (HVAC) systems to be provided for Eurochem Northwest 2, a new Ammonia and Urea Production Plant (Kingisepp 2 Project) to be located at Kingisepp, Russian Federation.

## 2. DEFINITIONS

For terms of general use refer to the definitions provided in the General Conditions and the Special Conditions of the Subcontract.

For terms specific to this project, refer to contractor's document 4124-YZ-PC-200000026 - Project Terminology Glossary.

## 3. APPLICABLE STANDARDS AND CODES

HVAC systems shall be designed in accordance with laws, rules and regulations of Russian Federation and relevant standards and codes having jurisdiction; the list shown hereinafter includes, but is not limited to, the applicable standards and codes.

Should each of the below listed standards and codes have been superseded, the applicable one shall apply.

|                      |                                                                                                                                                         |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| SNiP 21-01-97        | Fire safety of buildings and structures                                                                                                                 |
| SNiP 12-04-2002      | Safety in construction. Part 2: construction works                                                                                                      |
| SNiP 3.04.01-87      | Insulation and finishing coatings                                                                                                                       |
| SNiP 3.05.05-84      | Process equipment and technological pipelines                                                                                                           |
| SNiP 41-103-2003     | Design of thermal insulation of equipment and pipelines                                                                                                 |
| SNiP 3.05.07.85      | Automation systems                                                                                                                                      |
| SanPiN 2.2.4.548-96  | Hygienic requirements to microclimate of industrial facilities                                                                                          |
| SanPiN 2.2.4.3359-16 | Sanitary and epidemiological requirements to physical factors at working places                                                                         |
| GOST 12.1.005-88     | General sanitary and hygienic requirements for the microclimate of working areas                                                                        |
| GOST 12.1.003-83     | Noise. General safety requirements                                                                                                                      |
| GOST 3262-75         | Steel pipes for gas and water supply. Technical conditions                                                                                              |
| GOST 10704-91        | Electrically steel line-welded pipes                                                                                                                    |
| GOST 19907-83        | Dielectric fabrics made of glass. Twister complex threads                                                                                               |
| GOST 19904-90        | Cold-rolled steel sheets. Dimensions                                                                                                                    |
| GOST 19903-74        | Hot-rolled steel sheets. Dimensions                                                                                                                     |
| GOST 21.404-85       | System of design documents for construction. Automation of technological processes. Instrumentation symbols for use in diagrams.                        |
| GOST 21.208-2013     | System of design documents for construction. Automation of technological processes. Designations of instruments and automation equipment in the schemes |
| GOST 9467-75         | Metal covered electrodes for manual arc welding of structural and                                                                                       |

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

|                      |                                                                                                                                                               |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      | heat-resistant steels. Types                                                                                                                                  |
| GOST R 12.3.047-2012 | Occupational safety standards system. Fire safety of technological processes. General requirements                                                            |
| GOST 17433-80        | Industrial cleanliness. Compressed air. Pollution                                                                                                             |
| GOST 9544-2015       | Pipeline isolation valves. Gate thickness classes and standards                                                                                               |
| GOST 12.1.007-76     | Occupational safety standards. Harmful substances. Classification and general safety requirements                                                             |
| GOST R 51330.11-99   | Electric equipment hardened. Part 12: classification of mixtures of gases and vapors with air on maximum experimental safe gaps and minimum igniting currents |
| GOST 30852.12-2002   | Electrical apparatus for explosive gas atmospheres. Part 13. Construction and use of rooms or buildings protected by pressurization                           |
| GOST 8239-89         | Double tees hot-rolled steel                                                                                                                                  |
| GOST 19425-74        | Special-purpose steel i-beams and channels. Dimensions                                                                                                        |
| GOST R EN 13779-2007 | Ventilation for non-residential buildings. Performance requirements for ventilation and room-conditioning systems                                             |
| GOST 617-2006        | Pipes made of copper and circular cross-section of general purpose. Specifications                                                                            |
| GOST 29322-2014      | Standard voltages                                                                                                                                             |
| GOST R 53301-2009    | Fire dampers of ventilation systems. The test method for the fire resistance                                                                                  |
| GOST 8732-78         | Seamless hot-formed steel pipes. Range of sizes                                                                                                               |
| GOST 21631           | Sheets of aluminum and aluminum alloys                                                                                                                        |
| GOST 23101-78        | The enamel KO-88 heat-resistant silicone. Specifications                                                                                                      |
| GOST R 51330.12-99   | Explosion-proof electric equipment. Part 13. Designing and operation of spaces protected by positive pressure                                                 |
| GOST 10705-80        | Electrically welded steel pipes. Specifications                                                                                                               |
| GOST 14918-80        | Continuously galvanized sheet steel. Specifications                                                                                                           |
| GOST 17375-2001      | Details of seamless welded pipelines made of carbon steel and low alloy steel. Return bends type 3D (R=1,5 DN). Design                                        |
| GOST 17376-2001      | Details of seamless welded pipelines made of carbon steel and low alloy steel. T-joints. Design                                                               |
| GOST 17378-2001      | Details of seamless welded pipelines made of carbon steel and low alloy steel. Pipe adapters. Design                                                          |
| GOST 17379-2001      | Details of seamless welded pipelines made of carbon steel and low alloy steel. Ellipsoidal plugs. Design                                                      |
| GOST 17380-2001      | Details of seamless welded pipeline made of carbon steel and low alloy steel. General specifications                                                          |
| GOST 6613-86         | Woven wire square-cell meshes. Technical specifications                                                                                                       |
| GOST 14202-69        | Pipelines for industrial plants. Identification color of warning signs and marking panels                                                                     |
| GOST 51251-99        | Air filters. Classification. Marking.                                                                                                                         |
| GOST R 54808-2011    | Armature piping. Standards hermetic closure. Pipeline valves. Leakage rates of valves                                                                         |
| GOST R 51844-2009    | Fire equipment. Fire-fighting cabinets. General technical requirements. Test methods.                                                                         |

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

|                         |                                                                                                                                                                                                    |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GOST 21.205-93          | System of design documents for construction. Elements of sanitary engineering systems-symbols                                                                                                      |
| GOST R 53302-2009       | The equipment of smoke control systems. The test method for the fire resistance                                                                                                                    |
| GOST 15150-69           | Machinery, instruments, and other technical products. Models for various climatic regions. Categories and operating, storage, and shipping conditions with particular reference to climate factors |
| SP 44.13330.2011        | Administrative and residential buildings                                                                                                                                                           |
| SP 7.13130.2013         | Heating, ventilation and air conditioning. Fire fighting standard                                                                                                                                  |
| SP 12.13130-2009        | Determination of categories of rooms, buildings and external installations for explosion and fire hazards                                                                                          |
| SP 51.13330.2011        | Noise protection                                                                                                                                                                                   |
| SP 61.13330.2012        | Thermal insulation of equipment and pipe lines                                                                                                                                                     |
| SP 60.13330.2016        | Heating, Ventilation and Air-conditioning                                                                                                                                                          |
| SP 73.13330.2016        | Internal sanitary-technical systems                                                                                                                                                                |
| SP 2.2.1.1312-03        | Hygiene requirements for the design of newly constructed and reconstructed industrial enterprises                                                                                                  |
| SP 50.13330.2012        | Thermal protection of buildings. The updated edition of SNiP 23-02-2003                                                                                                                            |
| SP 56.13330.2011        | Industrial buildings. The updated edition of SNiP 31-03-2001                                                                                                                                       |
| SP 10.13330.2009        | Fire protection systems. Internal fire water supply                                                                                                                                                |
| SP 41-101-95            | Design of heating units                                                                                                                                                                            |
| SP 88.13330.2014        | Civil defense structures                                                                                                                                                                           |
| SP 23-101-2004          | Design of thermal protection of buildings                                                                                                                                                          |
| SP 41-103-2000          | Designing of thermal insulation for equipment and pipelines                                                                                                                                        |
| SP 124.13330.2012       | Thermal networks (updated version of SNiP 41-02-2003).                                                                                                                                             |
| SP 89.13330.2012        | Combustion boiler systems of heating generation (updated version of SNiP II-35-76)                                                                                                                 |
| SP 33.13330.2012        | Strength analysis of steel pipelines (updated version of SNiP 2.04.12-86)                                                                                                                          |
| SP 5.13130.2009         | Fire protection systems. Automatic fire alarm and fire-fighting units. Design guidelines and rules                                                                                                 |
| SP 131.13330.2018       | Building climatology (updated version of SNiP 23-01-99)                                                                                                                                            |
| SP 118.13330.2012       | Public building and facility                                                                                                                                                                       |
| SN 2.2.4 / 2.1.8.562-96 | Noise at worksite, residential and public buildings, and residential areas                                                                                                                         |
| GN 2.2.5.1313-03        | Maximum permissible concentrations (MPC) of hazardous substances in the air of working area                                                                                                        |
| VSN 205-84              | Instruction for design of electrical installations of process automation systems                                                                                                                   |
| VSN 353-86              | Design and usage of unified modular air ducts                                                                                                                                                      |
| VPPB 01-04-98           | Fire prevention rules for enterprises and organizations of the gas industry                                                                                                                        |
| VUPP 88                 | Departmental instructions on fire-fighting design of plants, buildings and structures of oil refinery and petrochemical industry                                                                   |
| PUE                     | Regulations on electric installations                                                                                                                                                              |

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

|                                       |                                                                                                                                                                                                  |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RD 153-34.0-20.518-2003               | Standard instruction for external corrosion protection of heat supply network pipelines                                                                                                          |
| RD 24.032.01-91                       | Procedural guidelines for quality standards for feed water and steam, management of water chemistry and chemical control of fixed steam waste-heat recovery boilers and industrial power boilers |
| RD 34.09.102                          | Heat energy and coolant metering rules                                                                                                                                                           |
| TU 14-3-190-2004                      | Seamless steel pipes for boiler plants and pipelines                                                                                                                                             |
| NPB 105-03                            | Determination of categories of rooms, buildings and external installations on explosion and fire hazard                                                                                          |
| NPB 241-97                            | Fire dampers of ventilation systems the test method for fire resistance                                                                                                                          |
| NPB 88-2001                           | Fire-fighting and alarm systems. Design guidelines and rules                                                                                                                                     |
| ANSI/ISA-71.04-2013                   | Environmental conditions for process measurement and control systems: airborne contaminants                                                                                                      |
| ASME B73.1                            | Specification for horizontal end suction centrifugal pumps for chemical process                                                                                                                  |
| ASME B73.2                            | Specifications for vertical in-line centrifugal pumps for chemical process                                                                                                                       |
| EN 1751                               | Ventilation for buildings - Air terminal devices - Aerodynamic testing of dampers and valves                                                                                                     |
| EN 1886                               | Ventilation for buildings - Air handling units - Mechanical performance                                                                                                                          |
| TEMA                                  | Tubular exchanger manufacturers association                                                                                                                                                      |
| IEC                                   | International electrotechnical committee                                                                                                                                                         |
| ISO                                   | International standard organization                                                                                                                                                              |
| FNiP                                  | (FNiP "Industrial safety rules for hazardous production facilities using excess pressure equipment", Order of Rostekhnadzor dated March 25, 2014 No. 116                                         |
| RF Federal law#123-FZ 22/07/2008      | Technical regulations on fire safety requirements                                                                                                                                                |
| RF Federal law#384-FZ 30/12/2009      | Technical regulations on the safety of buildings and structures                                                                                                                                  |
| Rostekhnadzor order #96 of 11/03/2003 | General codes of explosion protection for fire- and explosion-hazardous chemical/petrochemical plants and oil-refineries                                                                         |

#### 4. FACILITIES TO BE PROVIDED WITH HVAC SYSTEMS

HVAC systems shall be provided for the following facilities of Ammonia Production Plant:

- A.10.001 - Main Substation;
- A.10.002 - Control Room Building;
- A.11.101 - Compressor House;
- A.11.104.2 - Feed Water Pump House;
- A.17.704 - Chemical Storage Warehouse;
- A.17.707 - Circulating Water Supply Pumping Station;



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

- A.17.710.2 - Nitrogen Plant and Demineralized Water Unit Building;
- A.17.715.1 - Water Preparation Unit Building 1;
- A.17.715.2 - Water Preparation Unit Building 2 (Biological Unit);
- A.17.710.1 - Central Heating Station Building;
- A.17.717.1 - Glycol Water Treatment Plant Building.

HVAC systems shall be provided for the following facilities of Urea Production Plant:

- U20.001 - Main Substation;
- U20.002 - Control Room and Laboratory Building (*two areas*);
- U22.201 - Urea Melt - Synthesis plant;
- U22.204 - Urea Melt - HP Ammonia Pump House;
- U22.205 - Urea Melt - CO2 Compressor;
- U23.301 - Urea Granulation;
- U24.401 - Granulated Urea storage;
- U24.402.1 & U24.402.2 - Urea Train Loading Station and Loading Control Room Building (*two separate buildings*);
- U24.406 - Secondary Electrical Substation and Rack Room;
- U27.707 - Circulating Water Supply Pumping Station;
- U27.717 - Central Heating Station.

## 5. DESIGN CONDITIONS AND GENERAL CRITERIA

### 5.1 Location of Site

Eurochem Northwest - 2 Ammonia and Urea Production Plant is located at Kingisepp, Russian Federation, 59°22' N and 28°36' E respectively as latitude and longitude coordinates; 1010 hPa is the barometric pressure.

### 5.2 Outdoor Design Conditions

The HVAC systems shall be designed to the following outdoor climatic conditions, in accordance with SP 131.13330.2018:

- Design summer outdoor air temperature for air conditioning: +25.0°C DB
- Design summer outdoor relative humidity for air conditioning: 72%
- Design summer outdoor air temperature for ventilation: +22.0°C DB
- Design winter outdoor air temperature: -24.0°C DB
- Design winter outdoor relative humidity: 86%

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

### 5.3 Indoor Design Conditions

Indoor design air temperature and relative humidity shall be as specified in Appendix 1 (HVAC System Design Bases) of this specification. In case there are spaces not encompassed in the above mentioned Appendix 1, specific requirements from SP 60.13330.2016, GOST 12.1.005-88, SP 117.13330.2011, SP 44.13330.2011 and SanPiN 2.2.4.548-96 shall apply.

### 5.4 Outdoor Air Ventilation Rates

The minimum requirements for outdoor air ventilation rates shall be as specified in Appendix 1 (HVAC System Design Bases) of this specification. In case there are spaces not encompassed in the above mentioned Appendix 1, specific requirements from SP 60.13330.2016, GOST 12.1.005-88, SP 117.13330.2011 and SP 44.13330.2011 shall apply.

### 5.5 Exhaust Air Ventilation Rates

The minimum requirements for exhaust air ventilation rates shall be as specified in Appendix 1 (HVAC System Design Bases) of this specification. In case there are spaces not encompassed in the above mentioned Appendix 1, specific requirements from SP 60.13330.2016, GOST 12.1.005-88, SP 117.13330.2011 and SP 44.13330.2011 shall apply.

### 5.6 Space Pressurization

Space pressurization shall be as specified in Appendix 1 (HVAC System Design Bases) of this specification. In case there are spaces not encompassed in the above mentioned Appendix 1, specific requirements from SP 60.13330.2016 and GOST 12.1.005-88 shall apply.

With specific reference to the amount of pressurization, requirements from SP 60.13330.2016, clause 7.5.4, shall be taken, wherever applicable.

### 5.7 Internal Heat Gains

Heat gains from occupancy and heat gains from lighting and from power-driven equipment or other miscellaneous sources, except solar radiation, shall be as specified in the following table. In case there are spaces not encompassed in the table, specific recommended values shall be taken from SP 60.13330.2016 and GOST 12.1.005-88.

#### AMMONIA PRODUCTION PLANT

| Buildings / Rooms |                                   | Equipment Heat Gains | Lighting Load | Occupancy |
|-------------------|-----------------------------------|----------------------|---------------|-----------|
|                   |                                   | (kW)                 | (W/m²)        | N°        |
| A10.001           | <b>Main Substation</b>            |                      |               |           |
|                   | - Supply Ventilation Chamber 1    | 0.58                 | N/A           | N/A       |
|                   | - Supply Ventilation Chamber 2    |                      | N/A           | N/A       |
|                   | - Automatic Fire Suppression Room | 0.63                 | N/A           | N/A       |
|                   | - Cable Spreading Room            | 39.39                | N/A           | N/A       |

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

| Buildings / Rooms |                                                 | Equipment Heat Gains | Lighting Load       | Occupancy |
|-------------------|-------------------------------------------------|----------------------|---------------------|-----------|
|                   |                                                 | (kW)                 | (W/m <sup>2</sup> ) | N°        |
|                   | - Transformer Room A                            | 52.53                | N/A                 | N/A       |
|                   | - Transformer Room B                            | 52.53                | N/A                 | N/A       |
|                   | - Battery Room                                  | 0.38                 | N/A                 | N/A       |
|                   | - MV and LV Switchgear Room                     | 132.20               | N/A                 | N/A       |
|                   | - Electrical Room                               | 1.72                 | N/A                 | N/A       |
| A10.002           | <b>Control Room Building</b>                    |                      |                     |           |
|                   | - Supply Ventilation Chamber                    | 2.00                 | 5                   | N/A       |
|                   | - Electric Point                                | 0.60                 | 5                   | N/A       |
|                   | - Meeting Room                                  | 1.00                 | 5                   | 4         |
|                   | - Automatic Fire Suppression Room               | N/A                  | 5                   | N/A       |
|                   | - UPS Room                                      | 24.74                | 5                   | N/A       |
|                   | - Rack Room                                     | 69.53                | 5                   | N/A       |
|                   | - Control (Panel) Room                          | 18.19                | 5                   | 5         |
|                   | - Engineering and Technical Room                | 5.36                 | 5                   | 3         |
|                   | - Exhaust Ventilation Chamber                   | 5.60                 | 5                   | N/A       |
|                   | - Male Toilet                                   | N/A                  | 5                   | N/A       |
|                   | - Female Toilet                                 | N/A                  | 5                   | N/A       |
|                   | - Inventory Room                                | N/A                  | 5                   | N/A       |
|                   | - Shift Supervisor Room                         | 0.37                 | 5                   | 1         |
|                   | - Instrumentation Fitting Shop                  | 0.37                 | 5                   | 1         |
|                   | - Meal Room                                     | 1.42                 | 5                   | N/A       |
|                   | - Corridor                                      | N/A                  | 5                   | N/A       |
|                   | - Air Lock Lobby 1 & 2                          | N/A                  | 5                   | N/A       |
| A11.101           | <b>Compressor House</b>                         |                      |                     |           |
|                   | - Compressor Area -1 & 2                        | 682.30               | 5                   | N/A       |
|                   | - Supply Ventilation Chamber                    | 2.00                 | 5                   | N/A       |
|                   | - Toilet                                        | N/A                  | 5                   | N/A       |
|                   | - Automatic Fire Suppression Room               | 0.52                 | 5                   | N/A       |
| A11.104.2         | <b>Feed Water Pump House</b>                    |                      |                     |           |
|                   | - HP Boiler Feed Water Pump Station             | 163.80               | 5                   | N/A       |
| A17.704           | <b>Chemical Storage Warehouse</b>               |                      |                     |           |
|                   | - Chemical Storage                              | 2.52                 | 5                   | N/A       |
| A17.707           | <b>Circulating Water Supply Pumping Station</b> |                      |                     |           |
|                   | - Chemical Treatment Package Unit               | 2.36                 | 5                   | N/A       |
|                   | - Toilet                                        | N/A                  | 5                   | N/A       |

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

| Buildings / Rooms            |                                                                    | Equipment Heat Gains | Lighting Load       | Occupancy |
|------------------------------|--------------------------------------------------------------------|----------------------|---------------------|-----------|
|                              |                                                                    | (kW)                 | (W/m <sup>2</sup> ) | N°        |
| <b>A17.710.2</b>             | <b><i>Nitrogen Plant and Demineralized Water Unit Building</i></b> |                      |                     |           |
|                              | - Nitrogen Unit                                                    | 140.36               | 5                   | N/A       |
|                              | - Demi Water Unit                                                  | 77.60                | 5                   | N/A       |
|                              | - Demi Water Pump                                                  |                      | 5                   | N/A       |
| <b>A17.715.1</b>             | <b><i>Water Preparation Unit Building 1</i></b>                    |                      |                     |           |
|                              | - Filtration Hall Ground Floor (Plan at el +100.200)               | 133.53               | 5                   | N/A       |
|                              | - Transformer Room                                                 | 20.14                | 5                   | N/A       |
|                              | - Electrical Room                                                  | 49.31                | 5                   | N/A       |
|                              | - UPS Room                                                         | 6.61                 | 5                   | N/A       |
|                              | - Supply Ventilation Chamber                                       | 2.90                 | 5                   | N/A       |
|                              | - Toilet                                                           | N/A                  | 5                   | N/A       |
|                              | - Filtration Hall First Floor (Plan at el +108.250)                | 211.64               | 5                   | N/A       |
|                              | - Rack Room                                                        | 9.59                 | 5                   | N/A       |
|                              | - Exhaust Ventilation Chamber                                      | N/A                  | 5                   | N/A       |
|                              | - Ante Room                                                        | N/A                  | 5                   | N/A       |
|                              | - Sulphuric and Hydrochloric Acids Room                            | N/A                  | 5                   | N/A       |
|                              | - Caustic Soda Room                                                | N/A                  | 5                   | N/A       |
|                              | - Hypochlorite Room                                                | N/A                  | 5                   | N/A       |
|                              | - Lime Milk Station                                                | 2.10                 | 5                   | N/A       |
|                              | - Heating Room                                                     | N/A                  | 5                   | N/A       |
|                              | - Express Laboratory and Operator Room                             | 1.90                 | 5                   | N/A       |
| <b>A17.715.2</b>             | <b><i>Water Preparation Unit Building 2 (Biological Unit)</i></b>  |                      |                     |           |
|                              | - Biological Unit Room                                             | 56.60                | 5                   | N/A       |
|                              | - Supply Ventilation Chamber                                       | 2.00                 | 5                   | N/A       |
| <b>A17.710.1</b>             | <b><i>Central Heating Station Building</i></b>                     |                      |                     |           |
|                              | - Heating Station                                                  | 31.36                | 5                   | N/A       |
| <b>A17.717.1</b>             | <b><i>Glycol Water Treatment Plant Building</i></b>                |                      |                     |           |
|                              | - Glycol Water Pump Station                                        | 17.40                | 5                   | N/A       |
| <b>UREA PRODUCTION PLANT</b> |                                                                    |                      |                     |           |
| <b>U20.001</b>               | <b>Main Substation</b>                                             |                      |                     |           |

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

| Buildings / Rooms |                                             | Equipment Heat Gains | Lighting Load       | Occupancy |
|-------------------|---------------------------------------------|----------------------|---------------------|-----------|
|                   |                                             | (kW)                 | (W/m <sup>2</sup> ) | N°        |
|                   | - Supply Ventilation Chamber 1              | 0.55                 | N/A                 | N/A       |
|                   | - Supply Ventilation Chamber 2              |                      | N/A                 | N/A       |
|                   | - Automatic Fire Suppression Room           | 0.87                 | N/A                 | N/A       |
|                   | - Cable Spreading Room                      | 49.36                | N/A                 | N/A       |
|                   | - Transformer Room A                        | 50.93                | N/A                 | N/A       |
|                   | - Transformer Room B                        | 41.73                | N/A                 | N/A       |
|                   | - Battery Room                              | 0.35                 | N/A                 | N/A       |
|                   | - MV and LV Switchgear Room                 | 150.10               | N/A                 | N/A       |
| U20.002           | <b>Control Room and Laboratory Building</b> |                      |                     |           |
|                   | <b>Laboratory Area</b>                      |                      |                     |           |
|                   | - Supply Ventilation Chamber                | 2.00                 | 5                   | N/A       |
|                   | - Emission Spectrometric Room               | 5.50                 | 5                   | 2         |
|                   | - Gas Chromatographic Room                  | 6.00                 | 5                   | 3         |
|                   | - Storage Room for Control Gas Mixture      | N/A                  | 5                   | N/A       |
|                   | - Exhaust Ventilation Chamber               | 10.11                | 5                   | N/A       |
|                   | - Corridor                                  | 1.72                 | 5                   | N/A       |
|                   | - Preparation Room                          | 4.00                 | 5                   | 1         |
|                   | - Chemical Laboratory Room                  | 9.00                 | 5                   | 5         |
|                   | - Labware Room                              | N/A                  | 5                   | N/A       |
|                   | - Urea Analysis Room                        | 4.00                 | 5                   | 2         |
|                   | - Toilet                                    | N/A                  | 5                   | N/A       |
|                   | - Office                                    | 0.37                 | 5                   | 1         |
|                   | <b>Control Room Area</b>                    |                      |                     |           |
|                   | - Supply Ventilation Chamber                | 2.00                 | 5                   | N/A       |
|                   | - Electric Point                            | 0.60                 | 5                   | N/A       |
|                   | - Meeting Room                              | 1.00                 | 5                   | 4         |
|                   | - Automatic Fire Suppression Room           | N/A                  | 5                   | N/A       |
|                   | - UPS Room                                  | 14.62                | 5                   | N/A       |
|                   | - Instrument Room                           | 42.57                | 5                   | NA        |
|                   | - Control (Panel) Room                      | 6.32                 | 5                   | 5         |
|                   | - Engineering and Technical Room            | 6.01                 | 5                   | 3         |
|                   | - Exhaust Ventilation Chamber               | 5.60                 | 5                   | N/A       |
|                   | - Male Toilet                               | N/A                  | 5                   | N/A       |
|                   | - Female Toilet                             | N/A                  | 5                   | N/A       |



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

| Buildings / Rooms                                 | Equipment Heat Gains | Lighting Load       | Occupancy |
|---------------------------------------------------|----------------------|---------------------|-----------|
|                                                   | (kW)                 | (W/m <sup>2</sup> ) | N°        |
| - Inventory Room                                  | N/A                  | 5                   | N/A       |
| - Shift Supervisor Room                           | 0.37                 | 5                   | 1         |
| - Instrumentation Fitting Shop                    | 0.37                 | 5                   | 1         |
| - Meal Room                                       | 1.42                 | 5                   | N/A       |
| - Corridor                                        | N/A                  | 5                   | N/A       |
| - Air Lock Lobby 3 & 4                            | N/A                  | 5                   | N/A       |
| <b>U22.201 Urea Melt-Synthesis Plant</b>          |                      |                     |           |
| - Melt Area at El. +100.200                       | 253.30               | 5                   | N/A       |
| - <i>Melt Area at El. +100.200 grid 11-13/B-D</i> | 21.80                | 5                   | N/A       |
| - Supply Ventilation Chamber                      | 3.00                 | 5                   | NA        |
| - Exhaust Ventilation Chamber                     | 1.00                 | 5                   | NA        |
| - Elevator Machine Room                           | 14.00                | 5                   | NA        |
| - Elevator Shaft                                  | N/A                  | 5                   | N/A       |
| <b>U22.204 Urea Melt- HP Ammonia Pumps Room</b>   |                      |                     |           |
| - Pumps Room                                      | 96.36                | 5                   | N/A       |
| - Supply Ventilation Chamber                      | 2.00                 | 5                   | N/A       |
| <b>U22.205 Urea Melt- CO2 Compressor</b>          |                      |                     |           |
| - CO2 Compressor Room                             | 186.00               | 5                   | N/A       |
| - Dry Air Unit                                    | 114.50               | 5                   | N/A       |
| - Nitrogen Unit                                   | 4.50                 | 5                   | N/A       |
| <b>U23.301 Urea Granulation Unit</b>              |                      |                     |           |
| - Production Premise at El.+100.200               | 210.40               | 5                   | N/A       |
| - Production Premise at El.+107.300               | 3.24                 | 5                   | N/A       |
| - Production Premise at <i>El.+113.100</i>        | 280.00               | 5                   | N/A       |
| - Production Premise at <i>El.+122.700</i>        | 70.80                | 5                   | N/A       |
| - Production Premise at <i>El.+128.100</i>        | 0.00                 | 5                   | N/A       |
| - <i>Production Premise at El.+136.250</i>        | 18.00                | 5                   | N/A       |
| - Production Premise at <i>El.+142.900</i>        | 12.00                | 5                   | N/A       |
| - Production Premise at <i>El.+152.800</i>        | 2.20                 | 5                   | N/A       |
| - Production Premise at <i>El.+159.300</i>        | 5.00                 | 5                   | N/A       |
| - Elevator Machine Room <i>El.+166.400</i>        | 22.50                | 5                   | N/A       |
| - Elevator Shaft                                  | N/A                  | 5                   | N/A       |
| - Staircase                                       | N/A                  | 5                   | N/A       |
| - <i>Corridors</i>                                | N/A                  | 5                   | N/A       |
| - HVAC Room 1 to 4                                | 2.00                 | 5                   | N/A       |

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

| Buildings / Rooms       |                                                                     | Equipment Heat Gains | Lighting Load       | Occupancy |
|-------------------------|---------------------------------------------------------------------|----------------------|---------------------|-----------|
|                         |                                                                     | (kW)                 | (W/m <sup>2</sup> ) | N°        |
| U24.401                 | <b>Granulated Urea Storage</b>                                      |                      |                     |           |
|                         | - Urea Bulk Storage                                                 | 0.36                 | 5                   | N/A       |
| U24.402.1/<br>U24.402.2 | <b>Urea Train Loading Station and Loading Control Room Building</b> |                      |                     |           |
|                         | - Supply Ventilation Chamber                                        | 2.00                 | 5                   | N/A       |
|                         | - Fire Suppression Room                                             | N/A                  | 5                   | N/A       |
|                         | - Control Room                                                      | 3.76                 | 5                   | N/A       |
|                         | - Toilet and Lockers                                                | N/A                  | 5                   | N/A       |
|                         | - Off-spec Big Bag Unit                                             | N/A                  | 5                   | N/A       |
| U24.406                 | <b>Secondary Electrical Substation and Rack Room</b>                |                      |                     |           |
|                         | - Cable Spreading Room                                              | 6.13                 | N/A                 | N/A       |
|                         | - UPS Room                                                          | 4.12                 | N/A                 | N/A       |
|                         | - Fire Suppression Room                                             | 0.14                 | N/A                 | N/A       |
|                         | - Supply and Exhaust Ventilation Chamber                            | 2.25                 | N/A                 | N/A       |
|                         | - Transformer Room                                                  | 20.19                | N/A                 | N/A       |
|                         | - Switchgear Room                                                   | 15.00                | N/A                 | N/A       |
|                         | - Rack Room                                                         | 9.43                 | N/A                 | N/A       |
| U27.707                 | <b>Circulating Water Supply Pumping Station</b>                     |                      |                     |           |
|                         | - Chemical Treatment Package Unit                                   | 14.30                | 5                   | N/A       |
|                         | - Toilet                                                            | N/A                  | 5                   | N/A       |
| U27.717                 | <b>Central Heating Station</b>                                      |                      |                     |           |
|                         | - Heating Station                                                   | 45.00                | 5                   | N/A       |
|                         | - Safety Shower Room                                                |                      | 5                   | N/A       |
|                         | - Supply Ventilation Chamber                                        | 4.36                 | 5                   | N/A       |

*General note: the equipment heat gains estimated for the supply/exhaust ventilation chambers and both the Central Heating Stations (Ammonia and Urea), shown on the above table, shall be confirmed by HVAC Subcontractor during detailed design and engineering execution.*

## 5.8 Noise Protection Criteria

### 5.8.1 General

Noise protection requirements of Sanitary Code SN 2.2.4/2.1.8.562-96 shall apply for the design of HVAC systems and selection of main equipment, as specified in the following clauses.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

### 5.8.2 Limits in Production Permanent Working Areas

A permanent working area, in accordance with GOST 12.1.005-88, is defined as an area where a person is present for more than 50% of the time or for more than 2 hours continuously.

According to Table 2, of the above mentioned "Sanitary Code", when activities are carried out at permanent worksite in production areas, the permissible noise levels  $L_p(A)$  shall be less than 80 dB(A) at 1 meter from the noise source.

### 5.8.3 Limits in Production Non-Working Areas

When activities are carried out at non permanent worksite in production areas, the permissible noise levels  $L_p(A)$  shall be less than 85 dB(A) at 1 meter from the noise source.

### 5.8.4 Limits in Special Purpose Working Areas

The permissible noise levels  $L_p(A)$  at permanent worksite in special purpose working areas shall not exceed the values shown in the following table.

**Sanitary Code SN 2.2.4 / 2.1.8.562-96 - Table 2**

| No. | Working Areas                                         | Sound Pressure Permissible Noise Level (dBA) |
|-----|-------------------------------------------------------|----------------------------------------------|
| 1   | Engine or HVAC machinery rooms                        | 75                                           |
| 2   | Remote control room with voice communication.         | 60                                           |
| 3   | Offices and management area; generic laboratory area. | 55                                           |

The noise limits as given in table are applicable for equipment noise, which includes both noise of equipment located in or near the area involved and noise of HVAC equipment/system. Noise that does not stem from equipment but is produced by users of the various areas does not need to be considered.

The noise of HVAC equipment/system shall be less 10 dB(A) below the area limit above except the areas where HVAC equipment/system is the only source of noise.

To minimize equipment airborne noise generation and vibrations the following mitigative actions shall be taken:

- Selection of low noise generation air moving equipment;
- Installation of fans in compliance with requirements of SP 73.13330.2016;
- Application of vibration isolators between duct and fan inlet suction / outlet discharge;
- Application of common baseframes for fan and motor mounted on spring or rubber type vibration isolators;

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

- Installation of sound attenuators;
- Reduction of air speed for ducts and air distribution inlet and outlet.

## **5.9 Other Design General Concepts**

### **5.9.1 Fresh Air Intakes**

Fresh air intakes for HVAC systems shall be located at an adequate elevation above ground level, as specified in paragraph 8.4 of FZ 96 Federal Rules and Regulations of Industrial Safety "general rules on explosion safety for explosion and fire hazardous chemical petrochemical plants and oil refineries".

The fresh air intake stacks having a height not less than 15 m above ground level, consisting of self-supporting welded steel sheet pipes, shall be provided for the following buildings:

- Ammonia Control Room Building;
- Ammonia Feed Water Pump House;
- Urea Central Heating Station.

### **5.9.2 Outdoor Air Limitations**

The requirements of standards SP 60.13330.2016 and SP 7.13130.2013 define the conditions for combining the make-up air of multiple ventilation systems in a common outdoor air intake.

### **5.9.3 Ventilation System Integration Limitations**

Multiple rooms belonging to different categories are allowed to be served by a common supply ventilation system and also by a common exhaust ventilation system, provided that a proper combination of the same is performed, in compliance with the requirements of standards SP 60.13330.2016 and SP 7.13130.2013.

In particular, the requirements of SP 7.13130.2013 shall apply to fire partitions; instead, the requirements of SP 60.13330.2016 shall apply to the belonging category of the rooms.

### **5.9.4 Exhaust Air Discharge Outlets**

The requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016 shall apply to the exhaust air discharge outlets of HVAC systems.

With reference to production premises, stacks for exhaust air discharge outlets are mandatory for general exhaust ventilation systems serving:

- Building categories A and B;
- Areas containing harmful substances;
- Areas containing substances belonging to health hazard classes 1 and 2 (as per GOST 12.1.007-76);
- Areas containing foul-smelling substances.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

With reference to production premises, stacks for exhaust air discharge outlets are mandatory for local exhaust ventilation systems serving rooms containing:

- Harmful substances;
- Explosion hazardous mixtures;
- Foul-smelling substances.

Emissions of extract ventilation system containing flammable and harmful substances for the premises with categories A and B shall be separated.

Exhaust air discharge outlets, exhausting air from production premises, shall be located 10 meters faraway, on horizontal plane, from fresh air intakes; should this distance be less, exhaust air discharge outlets shall be located 6 meters faraway, on vertical plane, from fresh air intakes.

Wherever the stacks for exhaust air discharge outlets are mandatory, the same shall be located at a distance not less than 2 meters above the highest part of the roof, if the distance of its protrusion is less than 10 meters.

Exhaust air discharge outlets serving emergency ventilation systems shall be located at an elevation not less than 3 meters above ground level.

#### **5.9.5 Equipment Sparing Philosophy**

In order to ensure continuous operation of HVAC systems, 100% stand-by units shall be provided for:

- All general supply ventilation equipment;
- Hot water circulating pumps;
- Feedwater pumps;
- Exhaust fans serving vital areas or areas containing harmful substances;
- Hot water central heating coils housed inside the air handling unit serving the technical area of Control Room.

#### **5.9.6 Refrigerants**

HFC type refrigerants R407A, R134A, R410A, R744 shall be used in HVAC refrigeration equipment.

#### **5.9.7 Utilities**

##### **5.9.7.1 - Ammonia Plant**

The following utilities will be made available to HVAC systems:

- Low pressure steam at thermodynamic conditions of 4.4 bar(a) and 222°C, as primary heat-carrying medium for the production of hot water for heating system of buildings;
- Potable water for feeding of humidifiers and for filling of hot water circuit for heating of buildings, at minimum pressure of 4.4 bar(a).



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

*Note: Low pressure condensate shall be returned to Contractor's battery limit at 4.0 bar(a).*

#### **5.9.7.2 - Urea Plant**

The following utilities will be made available to HVAC systems:

- Low pressure steam at thermodynamic conditions of 3.8 bar(a) and 221°C, as primary heat-carrying medium for the production of hot water for heating system of buildings;
- Potable water for feeding of humidifiers and for filling of hot water circuit for heating of buildings, at minimum pressure of 4.4 bar(a).

*Note: Low pressure condensate shall be returned to Contractor's battery limit at 5.0 bar(a).*

#### **5.9.8 Motorized Dampers**

Motorized dampers shall be provided in correspondence of:

- Outdoor and recirculated (if any) suction air inlets and supply air discharge outlet of air handlers;
- Suction air inlet and discharge outlet of duty and stand-by ventilation fans;
- Fresh air intakes and exhaust air discharge outlets (gas-tight).

Motorized dampers electrically heat traced (for anti-freeze protection) shall be provided in case of:

- Outdoor installation;
- Outdoor air duct installation where the air is at external ambient conditions;
- Installation at fresh air intakes and exhaust air discharge outlets.

#### **5.9.9 HVAC Power Distribution Panels**

An individual dedicated HVAC power distribution panel shall be provided for each building.

HVAC power distribution panels shall be cubicle type, floor mounted, IP41 minimum enclosure protection for installation inside non-process and process buildings, and IP55 minimum enclosure protection for outdoor installation. The HVAC power distribution panel installed inside the two Main Substations shall have bottom cable entries; instead, HVAC power distribution panels installed inside the remaining buildings, shall have top cable entries.

Each HVAC power distribution panel shall be equipped with two incomings (and two corresponding distribution electrical buses) with manual or automatic transfer system and mechanical or electrical interlock. Power supply of each incoming will be taken from a dedicated independent power source coming from the upstream LV switchgears installed inside the two Main Substations. In normal conditions, each incoming will be energized by the pertinent power source. In case of loss of power of one source, the power supply of both distribution electrical buses will be entirely taken from the other source by means of the closing of the bus-tie. Once the power is restored, the return of the system to its original state is performed manually.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

HVAC electrical users are divided into 1<sup>st</sup> and the 2<sup>nd</sup> reliability categories according to clauses 1.2.18÷1.2.20 of PUE.

For each power distribution panel serving electrical users belonging to 1<sup>st</sup> reliability category, Transfer System shall actuate automatically.

For each power distribution panel serving electrical users belonging to 2<sup>nd</sup> reliability category, Transfer System shall actuate manually.

Operating and reserve electrical users shall be connected to different sections of distribution electrical buses. Remaining non redundant electrical users shall be connected indifferently to whatever section.

All the buildings will be fed 690V, 3Ph + PE without neutral except Water Preparation Unit *Building 1*, Water Preparation Unit *Building 2 (Biological Unit)*, Granulated Urea Storage, Urea Train Loading Station and Loading Control Room Building (two separate buildings) and Secondary Electrical Substation Station and Rack Room that will be fed 400V, 3Ph + PE + neutral.

All power distribution panels installed in the below listed buildings shall be equipped with autonomous fire extinguishing devices (with a generator of low-temperature separated fire-extinguishing aerosols of types 2 and 3). The number of such devices, as well as their specific placement, should be performed taking into account the recommendations of the manufacturer.

- Urea Granulation Unit;
- Granulated Urea Storage;
- Urea Train Loading Station and Loading Control Room Building (two separate buildings);
- Urea Melt Synthesis Plant;
- HP Ammonia Pumps Room.

HVAC system shall include, where required or specified, the “fire protection device panel”. The same panel, painted in red color, shall supply the electrical users relevant to fire protection (i.e. fire/smoke dampers, smoke exhaust/pressurization fans, inert gas retention dampers, evacuation lights, fire alarm panels, *fire-fighting systems panels*, fire extinguishing systems) and shall also interface with the external Fire Alarm System, as described in the sub-clause 5.9.17.3. Fire protection device panels shall be equipped with two incomings (one main and one spare) with automatic Transfer System. Power supply of the two incomings shall be taken from the relevant HVAC power distribution panel.

Electrical users fed by “fire protection device panel” shall be of 1st S category of power supply reliability.

A certificate for compliance with TR FZ №123 and GOST R 53325-2012 shall be provided for “Fire protection device panel”.

Additional functions to be performed by the “fire protection device panel” shall be in accordance with paragraph 3.48 and clause 7.4.1 of GOST R 53325-2012.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

### 5.9.10 HVAC Fire Protection

Normally open fail to close electrically driven motorized type fire dampers shall be provided at air duct penetrations and openings through fire rated walls and/or slabs in accordance with the requirements of SP 7.13330.2013.

Fire dampers shall be operated via automatic control system and by means of manual and remote activation according to the paragraph 7.20 of SP 7.13330.2013 and to clause 12.2.2 of SP 60.13330.2016.

### 5.9.11 Backdraft Dampers

Backdraft dampers shall be provided in accordance with the applicable Russian rules and regulations, in order to allow airflow in one direction and to prevent reverse airflow.

In particular, explosion-proof backdraft dampers shall be installed in correspondence of:

- Supply air duct penetrations through wall/slab partitioning room of category A;
- Exhaust air discharge outlets serving rooms of category A;
- Exhaust air duct penetrations through wall/slab partitioning rooms provided with emergency ventilation system;
- Exhaust air discharge outlets serving rooms provided with emergency ventilation system.

### 5.9.12 Gas-tight Dampers

Motorized gas-tight dampers shall be provided for HVAC systems at all outdoor air intakes and exhaust air discharge outlets, in order to shut-off and protect the buildings from gas infiltrations.

### 5.9.13 Gas Extinguishing Agent Retention Dampers

Motorized gas-tight dampers shall be installed at ductwork and building's envelope openings in the following areas protected by gas extinguishing agent suppression systems, for gas extinguishing agent retention purposes:

- Rack Room of Control Room Building;
- Control (Panel) Room of Control Room Building;
- Rack Room of Water Preparation Unit.
- Instrument Room of Control Room and Laboratory Building;
- Control (Panel) Room of Control Room and Laboratory Building;
- Rack Room of Secondary Electrical Substation Station and Rack Room;
- Control Room of *Urea Train Loading Station and Loading Control Room Building*.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

#### 5.9.14 Smoke Ventilation Systems

In accordance with the requirements of SP 7.13130.2013, further to an event of fire, two different smoke ventilation systems might apply, each having the following purposes:

- Ensuring personnel safe evacuation and the subsequent fire brigade operation;
- Removal of products of combustion and gas extinguishing agent for the areas protected by gas extinguishing system.

The necessary amount of smoke ventilation/pressurization airflow capacity for personnel safe evacuation shall be calculated according to the requirements of SP 7.13130.2013 (paragraphs 7.4 and 7.12).

Ventilation for pressurization purposes (20 / 70 Pa) shall be envisaged in case of fire alarm for the following spaces:

- Elevator hoistway of Urea Granulation Unit;
- ~~Elevator hoistway of Urea Melt Synthesis Plant;~~
- Stairs shafts of Urea Granulation Unit.

*Smoke extraction shall be envisaged for Corridors of Urea Granulation Unit.*

~~In addition to the above, an adequate number of louvres fitted with motorized dampers shall be envisaged for smoke natural ventilation purposes at upper level of both façades of Granulated Urea Storage for the activation of stack effect in conjunction with doors kept open.~~

*Smoke ventilation is not applicable to Granulated Urea Storage, since such building is not classified as a permanent working area but as intermittent that means, in accordance with GOST 12.1.005-88, that the workers are therein present for less than 2 hours continuously.*

Smoke ventilation system for removal of products of combustion and gas extinguishing agent shall be performed manually, after the operations of fire extinguishing, by means of mobile smoke exhaust fans, for the following areas:

- Rack Room of Control Room Building;
- Control (Panel) Room of Control Room Building;
- Rack Room of Water Preparation Unit.
- Instrument Room of Control Room and Laboratory Building;
- Control (Panel) Room of Control Room and Laboratory Building;
- Rack Room of Secondary Electrical Substation Station and Rack Room;
- Control Room of Urea Train Loading Station and Loading Control Room Building.

The necessary amount of smoke ventilation airflow capacity for removal of products of combustion and gas extinguishing agent shall be not less than 4 air changes per hour as outdoor ventilation rate. The smoke ventilation shall be provided at upper and lower portion of the concerned room.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

### 5.9.15 Emergency Ventilation System

The emergency ventilation system will be activated after generation of proper interlock signals from Emergency Shutdown System.

Purpose of the above mentioned emergency ventilation system is the increasing of the air dilution of hazardous, toxic or harmful substances, such as hydrocarbon gases, ammonia vapors, carbon dioxide and nitrogen (individually or at their combination) according to SP 60.13330.2016.

The emergency ventilation system shall be provided for the following buildings in the amount of 8 air changes per hour as outdoor ventilation rate with respect to the whole actual internal volume of the concerned spaces:

- Compressor Room of Compressor House;
- Nitrogen Generation Unit of *Nitrogen Plant and Demineralized Water Unit Building*;
- Urea Melt Area of Urea Melt - Synthesis Plant;
- Pumping Station of Urea Melt - HP Ammonia Pump House;
- CO2 Compressor of Urea Melt - CO2 Compressor;
- HP Nitrogen Unit of Urea Melt - CO2 Compressor.

The emergency ventilation system provided for the compressors and pumps areas shall be entirely additional to the basic ventilation, and both ventilation systems shall operate simultaneously.

### 5.9.16 Equipment Change-Over

Equipment change-over from duty to stand-by, in case of failure of the duty unit, shall be fully automatic.

In addition, automatic change-over shall be provided to switch, on weekly basis, the duty and the stand-by equipment, in order to ensure an even number of running hours for each unit.

### 5.9.17 Control System

#### 5.9.17.1 General

A stand-alone automatic control system shall be provided for each building.

Each automatic control system shall consist of a control panel (equipped with operator interface device), field sensors and actuators, and shall interface with HVAC equipment, power distribution panel and with external systems, such as:

- Distributed Control System (DCS);
- Fire Alarm System (FAP);
- Emergency Shutdown System (ESD).



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The control panel shall be capable of receiving and processing via controller/interface modules all signals (and alarms) originated by HVAC equipment/devices (included status signal of motors and feeders, through HVAC power distribution panel), field instruments, and all the interlock commands exchanged with above listed external systems; the control panel shall also be capable of performing the logic sequences expected for the operation of the various HVAC equipment/devices, directly a) controlling field actuators and HVAC equipment, b) interfacing with HVAC power distribution panel for command signals of motors, and c) interfacing also with external systems by means of status signals.

The controls shall be designed to permit both the automatic operation mode (normal operation) and the manual operation mode.

The automatic control system shall also have the required interfacing/networking connectivity with other equipment/systems.

The automatic control systems shall perform at least the following functions:

- Monitoring and control of space and supply air temperature and humidity;
- Monitoring and control airflow capacity (for VAV systems);
- Monitoring and control of space pressurization (where specified);
- Monitoring and control of hot water flow rate;
- Monitoring and control of temperature and pressure for hydronic systems;
- Monitoring and control of HVAC equipment;
- Monitoring and control of all types of actuated dampers and valves;
- Automatic sequence of operation of HVAC systems;
- Automatic activation of sequence of operation for anti-freezing system;
- Automatic change-over of duty and stand-by equipment;
- Automatic seasonal change-over of the control setpoint;
- Monitoring and control of signal exchanged with HVAC power distribution panels;
- Interface with other instrumentation system of the plant;
- Selection of the function modes (manual/automatic, on/off, etc);
- Interfacing with external systems;
- Modification of setpoints and working parameters for all control loops;
- Diagnostic checks for all the equipment and devices of the automatic control system;
- Record and display, on the operator interface device, of all the statuses, alarms, measurements and function parameters of the automatic control system.

The automatic control system shall provide record and display at least for the following alarms:

- High pressure differential alarm (dirty filter) for pre-filters and final filters housed inside air handlers;
- Low pressure differential alarm (airflow failure) for air handler fans;

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

- Access door safety alarm (door open) for fan sections of air handlers;
- Low pressure differential alarm (airflow failure) for ventilation fans;
- Anti-freezing alarm for air handler central heating coils and hot water radiators, if any;
- Low pressure differential alarm (pump failure) for hot water pumps;
- Failure alarm from other individual equipment;
- Space low pressure alarm for all rooms where positive pressurization control is specified;
- Low temperature alarm for all process buildings;
- High temperature alarm for hot water heating system;
- Low pressure alarm for hot water heating system;
- Emergency ventilation alarm, where applicable;
- Fire alarm;
- Outdoor gas detection alarm.

Control panels must comply with the requirements of Contractor's documents 4124-JK-SE-200000050 - Technical Specifications for Control System Cabinets and Auxiliary Cabinets and 4124-JK-SE-200000130 - Technical Specifications for PLC System.

The PLC manufactured by SIEMENS, model S7-1500, are to be considered as preferred by Contractor.

The Subcontractor's scope of supply shall include 2 HVAC PLC engineering stations:

- 1 engineering station PLC HVAC unit for Ammonia Plant;
- 1 engineering station PLC HVAC unit for Urea Plant.

Mentioned two Workstations (each including desk and chair) shall be accommodated inside both Supply Ventilation Chambers of Control Room Buildings.

Engineering stations shall comply with the requirements of clauses 5.5 and 6.2 of document 4124-JK-SE-200000130 - Technical Specifications for PLC System.

In case of lack of power supply, the automatic control systems shall be capable to retain for an unlimited time the operating software, together with the relevant configuration and record data, either by means of non-volatile memory or reliable back-up battery system suitable for the operating conditions.

The control systems together with the relevant controlled equipment shall automatically reset to normal operation after power failure.

For the equipment fed by means of motor feeders, the following interface signals shall be exchanged between automatic control system and HVAC power distribution panel, for the managing of start/stop commands of the motors and for the acquisition of their statuses:

- Motor running status;
- Motor fault;

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

- Motor in hand/remote control;
- Motor start command;
- Motor stop command to be interlocked (hard-wired) with the shutdown commands, as applicable.

For the equipment/devices fed by means of line feeders, a trip fault status signal only shall be exchanged between automatic control system and HVAC power distribution panel.

### 5.9.17.2 Interface with DCS

All HVAC PLCs must integrate ammonia and urea plants into DCSs to perform control functions over Modbus TCP/IP network. All HVAC PLCs must be connected also to a separate PLC Engineering network to provide access to PLC program from the engineer workstation in the engineering room for troubleshooting and program changes.

The implementation and development of serial interfaces between HVAC PLC and DCS must comply with the requirements of Contractor's document 4124-JK-SE-2000000001 - Instructions for the Implementation of Serial Interfaces.

The list of commands and signals that the HVAC automatic control system must exchange with the DCS system using the Modbus TCP/IP protocol:

- analog measured parameters (temperature, humidity, flow rate, pressure, etc.);
- condition of fans;
- condition of air-cooled condensing units;
- condition of humidifiers;
- condition of drive flaps and valves;
- status of ventilation system (running/stopped/tripped);
- assignment to the regulator and output to the air temperature regulator valve;
- diagnostic signals of hardware and software of the HVAC control system;
- alarms.

For further description of the architecture of the concerned HVAC network control system, reference shall be made to the follows:

1. Dedicated Modbus TCP/IP network (daisy chain configuration) in order to receive information from HVAC PLCs (DCS-Master, HVAC PLC-Slave).

All data shall be available in Read-Only mode (only for monitoring from DCS side).

This external single-mode fiber optic is referred as path 1.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

2. Dedicated PLC-engineering network (daisy chain configuration) for connection to each PLC of the HVAC Control Panels for debugging or program modification (HVAC Workstation-Master, HVAC PLC-Slave)

This external single-mode bidirectional (TX / RX) fiber optic is referred as path 2.

For each area, Ammonia and Urea Plants, the two fiber optic path shall be independent.

Each building will be equipped with an HVAC Panel equipped with a PLC with Input / Output cards and terminal blocks for connecting the field devices and a switch equipped with:

- Fiber Optic ports (SC type) in order to allow implementation of the two networks fiber optic path 1/2;
- RJ45 port for Ethernet cable in order to make maintenance and / or local data detection possible by means of a portable PC.

Inside Ammonia Control Room Building and Urea Control Room and Laboratory Building, the fiber optic port (SC type) for connection with panel in the same building shall be substituted with RJ45 ports.

### 5.9.17.3 Interface with Fire Alarm System

In case of event of fire, the sequence of command signals enabling the closing of fire dampers, shutdown of HVAC equipment, closing of the gas extinguishing agent retention dampers, where required or specified, and activation of the smoke/pressurization ventilation (for safe evacuation of personnel), where required or specified, shall be originated directly from fire protection section of the HVAC power distribution panel, further to one of the following interlock inputs:

- Command signal from Fire Alarm System after manual actuation of dedicated push buttons installed nearby each emergency exit;
- Command signal from Fire Alarm System after detection/activation of smoke detectors or flame detectors.

In addition to the above, fire protection section of HVAC power distribution panel shall be fitted with dedicated push buttons for manual remote closing of each fire damper and for manual remote activation of each smoke/pressurization fan (if any).

Fire protection section of HVAC power distribution panel shall also be fitted with dedicated control lamps (green/red) for indication of the status (open/closed) of each fire/smoke damper.

The following outputs shall be originated from HVAC control panel and sent to Fire Alarm System:

- Status signal of HVAC system shutdown;
- Status signal of fire dampers closed;
- Status signal (room-wise) of gas extinguishing agent retention dampers closed;
- Status signal of activation of smoke/pressurization ventilation (if any).

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

*Push-button stations shall be envisaged for remote HVAC shutdown outside the building in case of fire (not in the scope of HVAC Subcontractor).*

#### **5.9.17.4 Interface with ESD System for Emergency Ventilation System Activation**

In accordance with the description provided in the clause 5.9.15 of this specification, the command signal for the activation of emergency ventilation system, where required or specified, shall be originated from HVAC control panel, further to one of the following interlock inputs:

- Command signal from Emergency Shutdown System after manual actuation of dedicated push buttons installed nearby the entrance of the building;
- Command signal from Emergency Shutdown System after activation/detection of flammable and toxic gases monitoring devices, located inside the building.

An output status signal of activation of the emergency ventilation system shall be originated from HVAC control panel and sent to Emergency Shutdown System.

#### **5.9.17.5 Interface with ESD System for Outdoor Gas Detection**

In case of release of hydrocarbon gases and ammonia vapors, the command signal of shutdown of HVAC equipment shall be originated from HVAC control panel, further to the interlock input command signal coming from Emergency Shutdown System after activation/detection of flammable and toxic gases monitoring devices, located at fresh air intakes.

An output status signal of HVAC shutdown shall be originated from HVAC control panel and sent to Emergency Shutdown System.

#### **5.9.18 Electrical Hazardous Area Classification**

Whenever HVAC systems are provided in hazardous classified area, any equipment and electrical component shall be suitable and certified for that classification.

#### **5.9.19 HVAC Blast Protection**

Blast protection devices and expansion chambers (either masonry or metal), if required or necessary, shall be provided for Control Room Building (A10.002) of Ammonia Plant at all HVAC duct penetrations/openings through the walls and slab; the same walls and slab will also be provided with MCT (Multi-Cable Transit) for any cable entry and with sleeves for pipelines passes.

#### **5.9.20 Anti-freezing Protection for Central Heating Coils**

Automatic protection against freezing shall be provided for central heating coils housed inside air handling units and heating and ventilating units.

In case the air temperature upstream the heating coil is above +3°C, the heating coil will not freeze at any return hot water temperature. Instead, in case the air temperature upstream the heating coil is below +3°C, the heating coil might freeze, if the relevant return hot water temperature drops to 30°C.

As a result of the simultaneity of the above described conditions leading to freezing hazard of air handler heating coil, upon receiving air and water low temperature feedbacks from field



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

instrumentation, HVAC automatic control system shall generate a freezing alarm signal specific for the concerned heating coil.

According to the logic sequences implemented in the same HVAC automatic control system in case of air handler heating coil freezing alarm, the following command signals shall be sent to air handler equipment/devices: switch-off of the supply fan, closing of the relevant motorized dampers, 100% opening, within 15 seconds, of the heating coil control valve, and enabling of the recycling pump installed at the by-pass pipeline of the same heating coil (interconnecting hot water supply and return pipelines). Upon aborting of freezing alarm signal, the original configuration of the air handler shall be reset.

### 5.9.21 Air Recirculation Limitations

Limitations in the air recirculation shall be in accordance with the requirements of SP 60.13330.2016.

### 5.9.22 Central Heating Plants

#### 5.9.22.1 - Ammonia Plant

The central heating plant shall be located inside the Central Heating Station *Building*.

Purpose of central heating plant is the production of low temperature hot water to be provided as heat-carrying medium for the heating of each of the following buildings of Ammonia Plant:

- A.10.002 - Control Room Building;
- A.11.101 - Compressor House;
- A.11.104.2 - Feed Water Pump House;
- A.17.704 - Chemical Storage Warehouse;
- A.17.707 - Circulating Water Supply Pumping Station;
- A.17.710.2 - *Nitrogen Plant and Demineralized Water Unit Building*;
- A.17.715.1 - *Water Preparation Unit Building 1*;
- A.17.715.2 - *Water Preparation Unit Building 2 (Biological Unit)*;
- A.17.710.1 - *Central Heating Station Building*;
- A.17.717.1 - *Glycol Water Treatment Plant Building*.

Low temperature hot water shall be distributed to each of above mentioned buildings with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C;
- Supply hot water pressure: 5.5 bar (a).

The central heating plant shall consist of the following units:

- Hot water production unit;

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

- Hot water circulating pumps unit;
- Water treatment and injection unit;
- Steam unit;
- Condensate unit.

The hot water production unit shall consist of two heat exchangers (plate or shell & tube type) steam/hot water, each sized with a heating capacity equal to 50% of the total thermal load demand.

The heat exchangers (plate or shell & tube type) shall be fed, as primary heat-carrying medium, by low pressure steam at thermodynamic conditions of 4.4 bar(a).

If needed, desuperheating and pressure reducing system will be provided for purpose of reducing the pressure and temperature of superheated steam.

The hot water circulating pumps unit shall consist of two centrifugal pumps (one 100% duty and one 100% stand-by, driven by variable frequency drive) having the purpose of circulating the hot water in a closed circuit for its distribution from central heating plant up to each of the above listed buildings.

The Subcontractor shall carry out the sizing/selection of hot water circulating pumps by determining the relevant total differential head, based also on frictional head losses along pipelines in Contractor's scope of work (supply and return hot water pipelines interconnecting Central Heating Station to the buildings).

The calculation of additional head losses (frictional, for fittings and in-line components) along pipelines in Subcontractor's scope of work shall be carried out by the same Subcontractor.

The maximum elevation of the hot water closed circuit is 16 meters above ground level.

The water treatment and injection unit shall consist of the necessary equipment/devices having the purpose of filling and pressurizing the hot water closed circuit with treated potable water. Such unit shall be equipped with a magnetic water treatment unit, a heat exchanger for preheating of the potable water, two feedwater pumps (one 100% duty and one 100% stand-by), a water softening package unit and a chemical degassing package unit.

The steam unit shall consist of pipework and relevant inline devices and fittings upstream heat exchangers' steam supply inlet connections. Two control valves, two-way type, one for each heat exchanger, shall be installed at the steam supply pipelines to allow automatic control of heat exchanger capacity in response to thermal load demand.

The condensate unit shall consist of two pumps, pipework and relevant inline devices and fittings downstream heat exchangers' condensate discharge outlet connections; mentioned pumps (one 100% duty and one 100% stand-by) shall have the purpose to return the condensate in correspondence to Contractor's battery limit at 4 bar(a).

#### **5.9.22.2 - Urea Plant**

The central heating plant shall be located inside the Central Heating Station.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

Purpose of central heating plant is the production of low temperature hot water to be provided as heat-carrying medium for the heating of each of the following buildings of Urea Plant:

- U20.002 - Control Room and Laboratory Building;
- U22.201 - Urea Melt - Synthesis plant;
- U22.204 - Urea Melt - HP Ammonia Pump House;
- U22.205 - Urea Melt - CO2 Compressor;
- U23.301 - Urea Granulation Unit;
- U24.401 - Granulated Urea Storage;
- *U24.402.1 & U24.402.2 - Urea Train Loading Station and Loading Control Room Building;*
- U27.707 - Circulating Water Supply Pumping Station;
- U27.717 - Central Heating Station.

Low temperature hot water shall be distributed to each of above mentioned buildings with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C;
- Supply hot water pressure: 5.5 bar (a).

The central heating plant shall consist of the following units:

- Hot water production unit;
- Hot water circulating pumps unit;
- Water treatment and injection unit;
- Steam unit;
- Condensate unit.

The hot water production unit shall consist of two heat exchangers (plate or shell & tube type) steam/hot water, each sized with a heating capacity equal to 50% of the total thermal load demand.

The heat exchangers shall be fed, as primary heat-carrying medium, by low pressure steam at thermodynamic conditions of 3.8 bar(a) and 221°C.

If needed, desuperheating and pressure reducing system will be provided for the purpose of reducing the pressure and temperature of superheated steam.

The hot water circulating pumps unit shall consist of two centrifugal pumps (one 100% duty and one 100% stand-by, driven by variable frequency drive) having the purpose of circulating the hot water in a closed circuit for its distribution from Central Heating Station up to each of the above listed buildings.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The Subcontractor shall carry out the sizing/selection of hot water circulating pumps by determining the relevant total differential head, based also on frictional head losses along pipelines in Contractor's scope of work (supply and return hot water pipelines interconnecting Central Heating Station to the buildings).

The calculation of additional head losses (frictional, for fittings and in-line components) along pipelines in Subcontractor's scope of work shall be carried out by the same Subcontractor.

The maximum elevation of the hot water closed circuit is 45 meters above ground level.

The water treatment and injection unit shall consist of the necessary equipment/devices having the purpose of filling and pressurizing the hot water closed circuit with treated potable water. Such unit shall be equipped with a magnetic water treatment unit, a heat exchanger for preheating of the potable water, two feedwater pumps (one 100% duty and one 100% stand-by), a water softening package unit and a chemical degassing package unit.

The steam unit shall consist of pipework and relevant inline devices and fittings upstream heat exchangers' steam supply inlet connections. Two control valves, two-way type, one for each heat exchanger, shall be installed at the steam supply pipelines to allow automatic control of heat exchanger capacity in response to thermal load demand.

The condensate unit shall consist of two pumps, pipework and relevant inline devices and fittings downstream heat exchangers' condensate discharge outlet connections; mentioned pumps (one 100% duty and one 100% stand-by) shall have the purpose to return the condensate in correspondence to Contractor's battery limit at 5 bar(a).

### 5.10 Equipment and Material General Requirement

- All equipment and material shall be fully suitable for the environmental conditions of installation and for their intended application. In particular, the Materials shall be preserved from ammonia atmosphere and ammonium hydroxide (solution of ammonia in water); in addition, the Material used, in particular for the buildings Granulated Urea Storage and Urea Granulation, shall be preserved from urea dust for all the design life period (25 years).
- All equipment and material shall normally be commercially available as catalogued products in current satisfactory use for HVAC applications. However, where required in the Subcontract Technical Documentation, the Subcontractor shall provide air handling units fabricated to custom-made dimensions, in order to meet the space constraints in the installation.
- The air-cooled condenser coils shall have copper tubes with mechanically bonded aluminum fins. The coils shall be provided with heresite corrosion protection coating. The direct-expansion cooling coil shall have copper tubes with aluminum fins. The coils shall be provided with heresite corrosion protection coating.
- Hot water pipework shall be made up of carbon steel and the refrigerant pipes interconnecting air handling unit cooling coils and relevant air-cooled condensing units (and those ones interconnecting indoor and outdoor units of mini-split type room air

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

conditioners and close control air conditioning units) shall be insulated and made up of copper.

- The galvanised steel sheet metal exhaust ductwork shall be suitable for avoiding corrosion from laboratory fumes.

## 6. HVAC SYSTEM DESCRIPTION

### 6.1 Control Room Building (A10.002)

#### 6.1.1 General

The building shall be provided with three HVAC systems, as described below, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification.

The three HVAC systems shall serve respectively the following building areas:

- Control Room Area (air-conditioned);
- Rack Room and UPS Room Area (air-conditioned);
- Service area (air-conditioned).

Additional dedicated smoke ventilation system shall be provided for the following rooms, for removal of product of combustion and gas extinguishing agent:

- Rack Room;
- Control (Panel) Room.

With the intent to ensure to personnel acceptable thermal conditions of surrounding air during process equipment shutdown, a portable heater of 4.5 kW as thermal capacity, normally stored in the Supply Ventilation Chamber, shall be provided.

*Smoke ventilation shall also be provided for Shift Supervisor Room.*

#### 6.1.2 Control Room Area

The area includes the following spaces:

- Control (Panel) Room;
- Engineering and Technical Room.

The area shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one air handling unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by), direct-expansion type cooling coils and humidifier for humidity control of the served spaces.



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The air handling unit shall be also equipped with two hot water type central heating coils (one 100% duty and one 100% stand-by).

The cooling coils of the air handling unit shall be served by two air-cooled condensing units. The two air-cooled condensing units, each sized 1/2 of the total cooling load demand, shall be located on the roof of the same building.

In addition to above, depending on the indoor design conditions to be maintained, as defined in Appendix 1 of this specification, Engineering and Technical Room might need to be equipped with additional electrical convectors (with capacity step regulator).

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same room.

With the purpose of temperature control inside the Control (Panel) Room, the air heating system shall be fitted with room temperature detector.

Sound attenuators, if required, shall be provided in the main supply and exhaust ducts for noise control purposes.

### **6.1.3 Rack Room and UPS Room Area**

The area includes the following spaces:

- Rack Room;
- Electric Point;
- UPS Room.

The area shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one air handling unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by), direct-expansion type cooling coils and humidifier for humidity control of the served spaces.

The air handling unit shall be also equipped with two hot water type central heating coils (one 100% duty and one 100% stand-by).

The cooling coils of the air handling unit shall be served by two air-cooled condensing units. The two air-cooled condensing units, each sized 1/2 of the total cooling load demand, shall be located on the roof of the same building.

In addition to above, depending on the indoor design conditions to be maintained, as defined in Appendix 1 of this specification, Electric Point might need to be equipped with additional electrical convectors (with capacity step regulator).

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same room.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

A common exhaust ventilation system, consisting of two extract fans (100% duty and 100% stand-by), shall be provided for Electric Point, Rack Room, Supply Ventilation Chamber and Exhaust Ventilation Chamber to relief the air supplied to the same. The extract fans shall be located in the Exhaust Ventilation Chamber.

A common exhaust ventilation system, consisting of one extract fan, shall be provided for Male Toilet and Female Toilet, to relief the air transferred to the same from the adjacent corridor. The extract fan shall be located in the Exhaust Ventilation Chamber.

Dedicated exhaust ventilation system, consisting of two extract fans (100% duty and 100% stand-by), shall be provided for UPS Room, to relief the air supplied to the same. The air shall be extracted form upper and lower level of the room. The extract fans shall be located in the Exhaust Ventilation Chamber.

Sound attenuators, if required, shall be provided in the main supply and exhaust ducts for noise control purposes.

#### **6.1.4 Service Area**

The area includes the following spaces:

- Meeting Room;
- Automatic Fire Suppression Room;
- Inventory Room;
- Shift Supervisor Room;
- Instrumentation Fitting Shop;
- Meal Room;
- Corridor;
- Supply Ventilation Chamber;
- Exhaust Ventilation Chamber.

The area shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one air handling unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by) and with direct-expansion type cooling coils.

The air handling unit shall be also equipped with hot water type central heating coil.

The cooling coils of the air handling unit shall be served by two air-cooled condensing units. The two air-cooled condensing units, each sized 1/2 of the total cooling load demand, shall be located on the roof of the same building.

In addition to above, depending on the indoor design conditions to be maintained, as defined in Appendix 1 of this specification, some of above listed spaces might need to be equipped with additional electrical convectors (with capacity step regulator).

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same room.

A common exhaust ventilation system, consisting of two extract fans (100% duty and 100% stand-by), shall be provided for Corridor, Instrumentation Fitting Shop, Shift Supervisor Room, Inventory Room, Automatic Fire Suppression Room, Meeting Room, Control (Panel) Room and Engineering and Technical Room to relief the air supplied to the same. The extract fans shall be located in the Exhaust Ventilation Chamber.

Dedicated exhaust ventilation system consisting of one extract fan shall be provided for Meal Room, to relief the air supplied to the same. The extract fan shall be located in the Exhaust Ventilation Chamber.

Sound attenuators, if required, shall be provided in the main supply and exhaust ducts for noise control purposes.

#### **6.1.5 Smoke Ventilation System**

Two individual dedicated smoke ventilation systems shall be provided for Rack Room and Control (Panel) Room for removal of products of combustion and gas extinguishing agent, after the operations of fire extinguishing. The smoke extraction shall be provided at upper and lower level of each concerned room in the amount of 4 air changes per hour, as outdoor air ventilation capacity, in compliance with the requirements of SP 7.13130.2013.

For each of the above mentioned room, the smoke ventilation system shall be enabled by means of a mobile smoke extract fan, complete with flexible duct (connected to its suction inlet and rolled over a horse reel), and docking units, consisting of two cutouts, at upper and lower level of the respective internal room wall, normally plugged by removable inspection hatches or louvres.

In normal operating conditions, the configuration of the docking units foresees each cutout covered; instead, the mobile smoke extract fans (two units, one of which as a backup unit) are stored inside the Exhaust Ventilation Chamber.

After the operation of fire extinguishing of one of the above mentioned rooms, the inspection hatches or louvres of both the relevant wall cutouts are removed, the mobile smoke extract fan is moved to the corridor adjacent to the same room (or outdoors), linked to the power supply, and connected (by means of flexible ducts) to the lower cutout. After the manual opening of both fire dampers (one for the upper, one for the lower cutout), the same smoke extract fan is switched on with the consequent removal and discharge to outdoors of product of combustion and gas extinguishing agents; meanwhile a simultaneous equivalent amount of clean air is transferred, through the upper cutout, to the same room, from the adjacent corridor (or outdoors), to compensate the extraction.

The smoke extraction from the upper and lower level of the concerned room shall be provided by means of a proper ducting system, equipped with exhaust air inlets at upper and lower elevation of the same room and connected to the lower docking unit.

#### **6.1.6 Common Requirements**

One common fresh air intake stack located outdoors with a minimum height of 15 meters above ground level shall be provided for air handling units.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetration and opening through fire rated walls and or slabs in accordance with the requirements of SP 7.13130.2013.

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

All HVAC equipment shall be fed by power supply system of the first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

Air handling units, humidifiers, portable heater, electrical power distribution panel and automatic control panel shall be located in the Supply Ventilation Chamber.

Common extract ventilation fans and mobile smoke exhaust fans shall be located in the Exhaust Ventilation Chamber.

This building is designed to withstand at a shock overpressure wave of 2.5 KPa, therefore blast protection devices, if necessary, and expansion chambers (either masonry or metal) shall be provided at all HVAC duct penetrations/openings through the building external walls and roof slab.

## **6.2 Main Substation (A10.001)**

### **6.2.1 General**

The building shall be provided with four HVAC systems, as described below, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification.

The four HVAC systems shall serve respectively the following building areas:

- Cable Spreading Room (heated and ventilated);
- Transformer rooms A & B and Automatic Fire Suppression Room (heated and ventilated);
- Battery Room (air-conditioned);
- MV & LV Switchgear rooms and Electrical Room (heated and ventilated).

With the intent to ensure to personnel acceptable thermal conditions of surrounding air during process equipment shutdown, a portable heater of 4.5 kW as thermal capacity, normally stored in the Supply Ventilation Chamber, shall be provided.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

### 6.2.2 Cable Spreading Room

The Cable Spreading Room shall be served by a ventilation system all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with electric type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Dedicated exhaust ventilation system, consisting of two extract fans (each sized 50% of total capacity) controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Cable Spreading Room, to relief the air supplied to the same. The extract fan shall be located in an external dedicated area at ground floor.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Heating and ventilating unit shall be located in the Supply Ventilation Chamber 1.

### 6.2.3 Transformer Rooms and Automatic Fire Suppression Room

This area includes the following spaces:

- Transformer Room A & B;
- Automatic Fire Suppression Room;
- Supply Ventilation Chamber 1 & 2.

The above rooms shall be served by a ventilation system all-air, single duct, variable air volume, outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with electric type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Electrical convectors with capacity step regulators shall also be provided for Automatic Fire Suppression Room and Supply Ventilation Chamber 1 and 2, for temperature control of the spaces.

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same rooms.



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

Dedicated exhaust ventilation system consisting of one extract fan controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for each transformer room, to relief the air supplied to the same. The extract fan shall be located in an external dedicated area at ground level.

A dedicated exhaust ventilation system consisting of one extract fan shall be provided for Automatic Fire Suppression Room, to relief the air supplied to the same. The extract fan shall be located in the same room.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Heating and ventilating unit shall be located in the Supply Ventilation Chamber 2.

#### **6.2.4 Battery Room**

The room shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one air handling unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by) and with direct-expansion type cooling coils. The air handling unit shall also be equipped with electric type central heating coil.

The cooling coils of the air handling unit shall be served by two air-cooled condensing units. The two air-cooled condensing units, each sized 1/2 of the total cooling load demand, shall be located outdoors.

Dedicated exhaust ventilation system consisting of two extract fans (100% duty and 100% stand-by), shall be provided for Battery Room, to relief the air supplied to the same. The air extraction shall be provided at upper and lower level of the same room, respectively 100 mm below the ceiling, and 300 mm above the floor, in accordance with the requirements of clause 4.4.41 of IEC. The extract fans shall be located in the same Battery Room.

The Battery Room shall also be provided with roof mounted fresh air intake penthouse louvre for partial compensation, through infiltration, of the air extracted.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Air handling unit shall be located in the Supply Ventilation Chamber 1.

#### **6.2.5 MV & LV Switchgear Rooms and Electrical Room**

MV & LV Switchgear Rooms and Electrical Room shall be served by a ventilation system all-air, single duct, variable air volume, outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by) and with electric type central heating coil.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

One dedicated fresh air intake located outdoors with a minimum height of 11 meters above ground level shall be provided for ventilating unit serving MV & LV Switchgear Rooms.

Dedicated exhaust ventilation system consisting of one extract fan controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for each Switchgear Room, to relief the air supplied to the same. The extract fans shall be located in the same MV & LV Switchgear Rooms.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Heating and ventilating unit shall be located in the Supply Ventilation Chamber 2.

#### **6.2.6 Common Requirements**

One common fresh air intake located outdoors with a minimum height of 11 meters above ground level shall be provided for the following systems:

- Heating and ventilating unit serving Cable Spreading Room;
- Heating and Ventilating unit serving Transformer rooms;
- Air handling unit serving Battery Room.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetration and opening through fire rated walls and or slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The electrical power distribution panel and automatic control panel shall be located in the Switchgear Room.

### **6.3 Compressor House (A11.101)**

#### **6.3.1 General Ventilation System**

The building shall be heated and ventilated, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification. The ventilation system shall be all-air, single duct, constant/variable air volume, 100% outdoor air type.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

The specified minimum outdoor air ventilation rate shall be provided by means of two heating and ventilating units, constant air volume, each equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil. Both heating and ventilating units shall be located in the Supply Ventilation Chamber.

Both the above mentioned heating and ventilating units shall serve Compressor Room, Automatic Fire Suppression Room, Supply Ventilation Chamber and Toilet through an adequate air ducting system. The air distribution in Compressor Room shall be provided at upper and lower elevation.

Dedicated electric type convector shall also be provided in the Supply Ventilation Chamber and Toilet, for temperature control of the same room.

A suitable number of heating devices shall be installed in order to ensure an appropriate heat distribution in the same room.

The heat-carrying medium used in the HVAC system shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

A dedicated exhaust ventilation system shall be provided at upper and lower portion of the Compressor Room to relief the air supplied to the same (60% of total amount of airflow ventilation capacity at upper elevation and 40% of total amount of airflow ventilation capacity at lower elevation).

The exhaust ventilation system shall consist of a suitable number of roof mounted exhaust air discharge outlet penthouse louvers to ensure the specified air changes requirements at the upper portion of Compressor Room through air exfiltration, and four extract fans, in-line centrifugal, boxed type, ducted, installed outdoors, to ensure the specified air changes requirements at the lower portion of the same Compressor Room (each fan, along with relevant outdoor duct branch, shall relief the air from the room through individual wall mounted exhaust air inlet). In case of failure of one out of four of the above mentioned extract fans, the total airflow ventilation capacity of the remaining three fans shall meet the specified minimum exhaust air quantity requirements for the lower portion of Compressor Room. All four duct branches shall be connected to a common outdoor duct plenum box, which, in turn, is connected to a common outdoor exhaust air stack.

The common exhaust air discharge stack, collecting the air exhausted from the above mentioned four extract fans, shall be provided flare type, in order to relief the air to the atmosphere at a speed of not less than 20 m/s.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Dedicated exhaust ventilation system each consisting of one extract ventilation fan shall be provided for Toilet and Automatic Fire Suppression Room, to relief the air transferred to the same from the adjacent Compressor area. The extract fan shall be located in the same room.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The air supplied to the Supply Ventilation Chamber shall be exfiltrated to outdoors, if necessary, through a dedicated wall mounted pressure relief damper.

The excess of space heat gains shall be removed from the Compressor Room by means of an additional dedicated ventilation system, variable air volume, consisting of one ventilating unit (located in the Supply Ventilation Chamber), equipped with variable frequency drive, pre-filter, and supply air fan (that shall supply the air by means of a proper outdoor ducting system through wall mounted supply air outlets), serving the lower portion of the Compressor Room, and three wall mounted extract ventilation fans, equipped with variable frequency drive (that shall relief the air through exhaust air louvres), serving the upper portion of the same room. The supply air ducting system shall have an outdoor routing interconnecting the same Supply Ventilation Chamber to the above mentioned wall mounted supply air outlets.

One common fresh air intake stack located on the roof of the Supply Ventilation Chamber with a minimum elevation of 15 meters above ground level shall be provided for both heating and ventilating units and ventilating unit.

### 6.3.2 Emergency Ventilation System

The Compressor Room shall also be provided with emergency ventilation system, according to the requirements of SP 60.13330.2016. The emergency ventilation is an additional ventilation system with the specific purpose of increasing the dilution of hydrocarbon gases and ammonia vapors inside the building. The emergency ventilation is activated upon generation of the following signals from indoor detectors:

- Indoor hydrogen and methane pre-explosive concentration;
- Indoor excess of ammonia vapor concentration.

The emergency ventilation shall be provided in the amount of 8 air changes per hour as outdoor air ventilation capacity with respect to the whole actual internal volume of the concerned space.

In case of detection of hydrogen and methane pre-explosive concentration, the required airflow ventilation capacity shall be provided at the upper portion of the Compressor Room by the emergency ventilation system, consisting of a suitable number of roof extract ventilation fans (that shall relief the 40% of the total amount of airflow capacity) and a suitable number of wall mounted extract ventilation fans (that shall relief the 60% of the total amount of airflow capacity through wall mounted exhaust air louvers).

In case of detection of excess of ammonia vapor concentration, the required airflow ventilation capacity shall be provided at the upper portion and at the lower portion of the Compressor Room by the emergency ventilation system, consisting of a suitable number of wall mounted extract ventilation fans (that shall relief the 60% of the total amount of airflow capacity through wall mounted exhaust air louvres at the upper portion of the same room) and four extract ventilation fans, in-line centrifugal, boxed type, ducted, installed outdoors (that shall relief from the room the 40% of the total amount of airflow capacity through wall mounted exhaust air inlets, at the lower portion of the same room).

Each of the above mentioned in-line centrifugal, boxed type, extract ventilation fan, shall be provided with a dedicated ducting system and exhaust air discharge outlet.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

The air exhausted by means of the emergency ventilation system shall be compensated by an equal amount of make-up air that infiltrates into the building by means of the same roof mounted exhaust air discharge outlet penthouse louvres, normally used for the partial exfiltration of the air supplied by the general supply ventilation system, as described in the clause 6.3.1 of this specification.

The ventilating unit described in the clause 6.3.1 of this specification (for removing of the excess of space heat gains) shall operate at its maximum airflow capacity in case of emergency ventilation, in order to increase the air supplied for partial compensation of the air exhausted.

### **6.3.3 Common Requirements**

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be suitable for installation in zone 2, IIC, T1 except those located inside the Supply Ventilation Chamber, Toilet and Automatic Fire Suppression Room that shall be in standard execution.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

Both heating and ventilating units, ventilating unit, the electrical power distribution panel and the automatic control panel shall be installed inside the Supply Ventilation Chamber.

### **6.4 Feed Water Pump House (A11.104.2)**

The building shall be heated and ventilated, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification. The ventilation system shall be all-air, single duct, variable air volume, 100% outdoor air type.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The heating and ventilating unit shall be located outdoors at ground floor.



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

One fresh air intake stack with a minimum elevation of 15 meters above ground level shall be provided for heating and ventilating unit.

A dedicated exhaust ventilation system, consisting of suitable number roof extract ventilation fans controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for HP Boiler Feed Water Pump Station, to relief the air supplied to the same.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The electrical power distribution panel and automatic control panel shall be located in the HP Boiler Feed Water Pumping Station.

## **6.5 Chemical Storage Warehouse (A17.704)**

The building shall be heated and ventilated, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification. The ventilation system shall be all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

The heating and ventilating unit shall be located outdoors at ground floor.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

One fresh air intake with a minimum elevation of 7 meters above ground level shall be provided for heating and ventilating unit.

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

A dedicated exhaust ventilation system, consisting of a suitable number of roof extract ventilation fans, shall be provided for Chemical Storage to relief the air supplied to the same. The extraction of the air shall be provided at upper level of the same room.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The electrical power distribution panel and automatic control panel shall be located inside the Chemical Storage.

#### **6.6 Circulating Water Supply Pumping Station (A17.707)**

The Chemical Treatment Package Unit shall be heated and ventilated, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification. The ventilation system shall be all-air, single duct, constant air volume, 100% outdoor air type.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

The heating and ventilating unit shall be located outdoors at ground floor.

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

One fresh air intake with a minimum elevation of 6 meters above ground level shall be provided for heating and ventilating unit.

A suitable number of roof mounted exhaust air discharge outlet penthouse louvres shall be provided for Chemical Treatment Package Unit, for exfiltration to outdoors of the supply air.

Dedicated exhaust ventilation system consisting of one extract fan shall be provided for Toilet, to relief the air transferred to the same from the adjacent area. The extract fan shall be located in the same room.

Dedicated electric type convactor shall also be provided in Toilet, for temperature control of the same room.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The electrical power distribution panel and automatic control panel shall be located inside the Chemical Treatment Package Unit.

## **6.7 Nitrogen Plant and Demineralized Water Unit Building (A17.710.2)**

### **6.7.1 General**

The building shall be provided with two HVAC systems, as described below, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification.

The two HVAC systems shall serve respectively the following building areas:

- Nitrogen Generation Unit (heated and ventilated);
- Demineralized Water Unit Area (heated and ventilated).

Additional dedicated Emergency Ventilation System shall be provided for Nitrogen Generation Unit.

### **6.7.2 Nitrogen Generation Unit**

The Nitrogen Generation Unit shall be served by a ventilation system all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

The heating and ventilating unit shall be located outdoors at ground floor.

A dedicated exhaust ventilation system, consisting of two roof extract ventilation fans controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Nitrogen Generation Unit, to relief the air supplied to the same.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

### 6.7.3 Demineralized Water Unit Area

This area includes the following spaces:

- Demi Water Unit;
- Demi Water Pump.

The above rooms shall be served by a ventilation system all-air, single duct, constant air volume, outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

The heating and ventilating unit shall be located outdoors at ground floor.

A dedicated exhaust ventilation system, consisting of four roof extract ventilation fans, shall be provided for the Demi Water Unit and Demi Water Pump to relief the air supplied to the same.

### 6.7.4 Emergency Ventilation System

The Nitrogen Unit shall also be provided with emergency ventilation system, according to the requirements of SP 60.13330.2016. The emergency ventilation is an additional ventilation system with the specific purpose of avoiding abnormal harmful concentration of nitrogen (and therefore with the purpose of maintaining the balance of gases composing breathable atmosphere) by increasing the oxygen volume concentration inside the building. The emergency ventilation is activated upon generation of a signal of low indoor oxygen concentration from indoor oxygen detectors.

Volume ratio of oxygen in the air of nitrogen plant room must not be less than 19% and exceed 23%; the volume ratio of oxygen must be sustained by continuous operation of general and emergency ventilation.

The emergency ventilation shall be provided in the amount of 8 air changes per hour as outdoor air ventilation capacity with respect to the whole actual internal volume of the building.

Upon the detection of low oxygen concentration, the required airflow ventilation capacity shall be provided by the emergency ventilation system, push-pull type, consisting of two ducted wall mounted outdoor supply ventilation fans (that shall drag outdoor air inside the building through wall mounted supply air outlets) and two centrifugal type extract ventilation fans, ducted, installed outdoors at ground floor (that shall relief the air from the building through wall mounted exhaust air inlets). Supply fans shall be interlocked with the respective extract fans.

Each of the above mentioned centrifugal type extract ventilation fans shall be provided with dedicated ducting system and exhaust air discharge outlet.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

### 6.7.5 Common Requirements

One common fresh air intake located outdoors with a minimum height of 11 meters above ground level shall be provided for both the heating and ventilating units and for the emergency supply ventilation fans.

A common outdoor ducting system interconnecting the same fresh air intake stack to the above mentioned equipment shall be provided, for the distribution of outdoor air from the intake up to the supply ventilation systems.

The heat-carrying medium used in the HVAC system shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The electrical power distribution panel and automatic control panel shall be located inside the Nitrogen Unit.

### 6.8 Glycol Water Treatment Plant Building (A17.717.1)

The *Glycol Water Treatment Plant Building* shall be heated and ventilated, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification. The ventilation system shall be all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

One fresh air intake located outdoors with a minimum height of 5 meters above ground level shall be provided for heating and ventilating unit.

The heating and ventilating unit shall be located outdoors at ground floor.



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The heat-carrying medium used in the HVAC system shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

A dedicated exhaust ventilation system, consisting of a suitable number of roof extract ventilation fans controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Glycol Water Pump Station, to relief the air supplied to the same.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The electrical power distribution panel and automatic control panel shall be located inside the Glycol Water Pump Station.

### **6.9 Central Heating Station Building (A17.710.1)**

The building shall be heated and ventilated, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification. The ventilation system shall be all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

One fresh air intake located outdoors with a minimum height of 6 meters above ground level shall be provided for heating and ventilating unit.

The heating and ventilating unit shall be located outdoors at ground floor.

The heat-carrying medium used in the HVAC system shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

A dedicated exhaust ventilation system, consisting of a suitable number of roof extract ventilation fans controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Heating Station, to relief the air supplied to the same.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The electrical power distribution panel and automatic control panel shall be located inside the building.

## **6.10 Water Preparation Unit Building 1 (A17.715.1)**

### **6.10.1 General**

The building shall be provided with four HVAC systems, as described below, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification.

The four HVAC systems shall serve respectively the following building areas:

- Filtration Hall First Floor (heated and ventilated);
- Electrical Room and Transformer Room (heated and ventilated);
- Filtration Hall Ground Floor (heated and ventilated);
- Rack/UPS Room, Express Laboratory and Operator Room (air-conditioned).

Additional dedicated smoke ventilation system shall be provided for the Rack Room, for removal of product of combustion and gas extinguishing agent.

### **6.10.2 Filtration Hall First Floor**

The area shall be served by a heating and ventilation system all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The heating and ventilating unit shall be located inside the Supply Ventilation Chamber.

Dedicated exhaust ventilation system, consisting of one extract fan controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Filtration Hall First Floor, to relief the air supplied to the same. The extract fan shall be located inside the Exhaust Ventilation Chamber.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

### **6.10.3 Electrical Room and Transformer Room**

The system includes the following spaces:

- Transformer Room;
- Electrical Room;
- Supply Ventilation Chamber;
- Exhaust Ventilation Chamber.

The above listed spaces shall be served by a heating and ventilation system all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

The heating and ventilating unit shall be located inside the Supply Ventilation Chamber.

Electrical convectors with capacity step regulators shall also be provided for Supply Ventilation Chamber and Exhaust Ventilation Chamber, for temperature control of the spaces.

A suitable number of heating devices shall be installed in order to ensure an appropriated heat distribution in the same building.

Dedicated exhaust ventilation system, consisting of one extract fan, controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Transformer Room, to relief the air supplied to the same. The extract fan shall be located inside the Exhaust Ventilation Chamber.

Dedicated exhaust ventilation system, consisting of one extract fan, controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Electrical Room, to relief the air supplied to the same. The extract fan shall be located inside the Exhaust Ventilation Chamber.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

Two dedicated exhaust ventilation systems, each consisting of one extract fan, shall be provided for Supply Ventilation Chamber and Exhaust Ventilation Chamber, to relief the air supplied to the same. The extract fan shall be located inside the respective room.

Dedicated exhaust ventilation system consisting of one extract fan shall be provided for Toilet, to relief the air transferred to the same from the adjacent area. The extract fan shall be located in the same Toilet.

Electrical convector with capacity step regulators shall also be provided for Toilet, for temperature control of the space.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

#### **6.10.4 Filtration Hall Ground Floor**

The system includes the following spaces:

- Filtration Hall Ground Floor;
- Hypochlorite Room;
- Caustic Soda Room;
- Sulfuric and Hydrochloric Acid Room;
- Lime Milk Station;
- Heating Room.

The above listed spaces shall be served by a heating and ventilation system all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

The heating and ventilating unit shall be located inside the Supply Ventilation Chamber.

Dedicated exhaust ventilation system, consisting of one extract fan, controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Filtration Hall Ground Floor, to relief the air supplied to the same. The extract fan shall be located inside the Exhaust Ventilation Chamber.

Four dedicated exhaust ventilation systems, each consisting of one extract fan, shall be provided for Hypochlorite Room, Heating Room, Caustic Soda Room, Sulfuric and Hydrochloric Acid Room and Lime Milk Station, to relief the air supplied to the same. The extract fans shall be located inside the respective room.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

#### **6.10.5 Rack/UPS Room, Express Laboratory and Operator Room**

The system includes the following spaces:

- Express Laboratory;
- Operator Room;
- *UPS Room*;
- Rack Room.

The above listed spaces shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one air handling unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by) and with direct-expansion type cooling coil.

The air handling unit shall be also equipped with hot water type central heating coil.

A humidifier shall be provided at the supply air duct for humidity control of the served spaces.

The air handling unit shall be located inside the Supply Ventilation Chamber.

The cooling coils of the air handling unit shall be served by two air-cooled condensing units. The two air-cooled condensing units, each sized 1/2 of the total cooling load demand, shall be located on the roof of the same building.

Electrical convectors with capacity step regulator shall be provided for Express Laboratory and Operator Room for temperature control of the spaces.

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same room.

One common exhaust ventilation system, consisting of one extract fan, shall be provided for Express Laboratory and Operator Room, to relief the air supplied to the same. The extract fan shall be located inside the Exhaust Ventilation Chamber.

One dedicated exhaust ventilation system, consisting of one extract fan, shall be provided for Rack Room, to relief the air supplied to the same. The extract fan shall be located inside the Exhaust Ventilation Chamber.

*Dedicated exhaust ventilation system, consisting of two extract fans (100% duty and 100% stand-by), shall be provided for UPS Room, to relief the air supplied to the same. The air shall be extracted from upper and lower level of the room. The extract fans shall be located in the Exhaust Ventilation Chamber.*

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

### 6.10.6 Smoke Ventilation System

Dedicated smoke ventilation system shall be provided for Rack Room for removal of products of combustion and gas extinguishing agent, after the operations of fire extinguishing. The smoke extraction shall be provided at upper and lower level of each concerned room in the amount of 4 air changes per hour, as outdoor air ventilation capacity, in compliance with the requirements of SP 7.13130.2013.

For the above mentioned room, the smoke ventilation system shall be enabled by means of a mobile smoke extract fan, complete with flexible duct (connected to its suction inlet and rolled over a horse reel), and docking units, consisting of two cutouts, at upper and lower level of the respective internal room wall, normally plugged by removable inspection hatches or louvres.

In normal operating conditions, the configuration of the docking units foresees each cutout covered; instead, the mobile smoke extract fans (two units, one of which as a backup unit) are stored inside the Supply Ventilation Chamber.

After the operation of fire extinguishing of the above mentioned room, the inspection hatches or louvres of both the relevant wall cutouts are removed, the mobile smoke extract fan is moved to the corridor adjacent to the same room (or outdoors), linked to the power supply, and connected (by means of flexible ducts) to the lower cutout. After the manual opening of both fire dampers (one for the upper, one for the lower cutout), the same smoke extract fan is switched on with the consequent removal and discharge to outdoors of product of combustion and gas extinguishing agents; meanwhile a simultaneous equivalent amount of clean air is transferred, through the upper cutout, to the same room, from the adjacent corridor (or outdoors), to compensate the extraction.

The smoke extraction from the upper and lower level of the concerned room shall be provided by means of a proper ducting system, equipped with exhaust air inlets at upper and lower elevation of the same room and connected to the lower docking unit

### 6.10.7 Common Requirements

Dedicated fresh air intakes located outdoors with a minimum height of 7 meters above ground level shall be provided for each of the following systems:

- Filtration Hall First Floor (heated and ventilated);
- Electrical Room and Transformer Room (heated and ventilated);
- Filtration Hall Ground Floor (heated and ventilated);
- Rack/UPS Room, Express Laboratory and Operator Room (air-conditioned).

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetration and opening through fire rated walls and or slabs in accordance with the requirements of SP 7.13130.2013.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The electrical power distribution panel, humidifier and automatic control panel shall be located inside Supply Ventilation Chamber.

#### **6.11 Water Preparation Unit Building 2 (Biological Unit) (A17.715.2)**

The building shall be heated and ventilated, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification. The ventilation system shall be all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

One fresh air intake located outdoors with a minimum height of 7 meters above ground level shall be provided for the heating and ventilating unit.

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 105°C;
- Return hot water temperature: 70°C.

A dedicated exhaust ventilation system, consisting of a suitable number of roof extract ventilation fans, shall be provided for Biological Unit Room, to relief the air supplied to the same.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The heating and ventilating unit, the electrical power distribution panel and automatic control panel shall be located in the Supply Ventilation Chamber.

## **6.12 Control Room and Laboratory Building (U20.002)**

### **6.12.1 General Ventilation for Laboratory Area**

The area shall be air-conditioned by a HVAC system, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification. The HVAC system shall be all-air, single duct, variable air volume, multiple zone, 100% outdoor type, with zone air terminal units.

The system shall be provided with one air handling unit, equipped with pre-filter and final filter, dual supply fan (100% duty and 100% stand-by) and with direct-expansion type cooling coil. The air handling unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The air handling unit shall be also equipped with hot water type central heating coil.

The cooling coil of the air handling unit shall be served by an air-cooled condensing unit.

The air-cooled condensing unit shall be located on the roof of the same building.

A humidifier shall be provided at the supply air duct for humidity control of the served spaces.

One fresh air intake located outdoors with a minimum height of 5 meters above ground level shall be provided for the air handling unit.

Dedicated variable air volume terminal units, or constant air volume terminal units where necessary, shall be provided in the supply air ducts to each zone, in order to control the supply air quantity and the temperature of the individual conditioned zones. The maximum supply airflow capacity of the variable air volume terminal units shall meet the relevant space peak cooling load demand, or compensate the maximum air quantity extracted from the laboratory furniture, or meet the space specified minimum outdoor air requirement (whichever is higher); the minimum supply airflow delivered by the terminal units shall not however fall below the relevant minimum outdoor air requirement defined in Appendix 1 (HVAC System Design Bases) of this specification.

Above mentioned air volume terminal unit shall also equipped, if necessary, with electrical re-heating coil.

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

Laboratory furniture, as below listed, is not included in the Subcontractor's scope of work.

- Fume hoods (variable flow, as described below);
- Ventilated cabinets (constant flow, as described below);

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

- ICP ventilation extractors (constant flow, as described below);
- Spot extractors (constant flow, on/off, as described below).

Local exhaust air ventilation fans, serving the above listed laboratory furniture, are instead included in Subcontractor's scope of work and shall be plastic type.

In particular, each exhaust air ventilation system (variable or constant air volume, as required), as below described in detail, might be equipped with one or double extract fan, suitable for installation in safe area (standard execution), for local air exhaust from laboratory furniture.

- Roomwise dedicated exhaust air systems (variable air volume) will be provided for the groups of fume hoods. The fume hoods will be supplied with flow control set and flow control valve or equivalent, which will vary the exhaust air quantity in order to maintain a constant face air velocity at the sash opening.
- Roomwise dedicated exhaust air systems (constant air volume) will be provided for the groups of ventilated cabinets.
- Roomwise dedicated exhaust air systems (constant air volume) will be provided for the groups of ICP ventilation extractors.
- Roomwise dedicated exhaust air systems (constant air volume, on/off) will be provided for the groups of spot extractors. The extract fans serving these systems will be run, when necessary, by the laboratory operators via local switches placed in proximity to the spot extractors.

The implementation of functioning logics' interactions between laboratory exhaust devices and associated fans (i.e.: associated VSD, where applicable) falls in Subcontractor's scope of work that includes, but it is not necessary limited to, the following items:

- Wall mounted local PLC panels (in case two or more fume hoods are interconnected to a single VSD and, consequently, multiple signals need to be processed and converted into a single signal);
- Power supply to the same local PLC panels;
- Interconnection cables between laboratory exhaust devices and mentioned local PLC panels;
- Interconnection cables between mentioned local PLC panels and the associated VSD;
- Direct interconnection cables between laboratory exhaust devices and associated fan (i.e.: associated VSD, where applicable);
- All VSD;
- All exhaust fans.

A common exhaust ventilation systems, consisting of one extract fan, suitable for installation in safe area (standard execution), controlled by variable frequency drive, in order to adjust the variable airflow, shall be provided, for Laboratory to compensate the air supplied to the served rooms (from which the air is not exhausted from the local extract air systems) and to allow their pressurization (positive or negative pressure, as specified).

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

All the exhaust fans shall be located in a dedicated Exhaust Ventilation Chamber.

The laboratory exhaust air ductwork shall be made up of non-combustible materials (PVC) resistant to chemical corrosion, as suitable for the kind of fumes and vapours airborne.

An individual dedicated exhaust ventilation system consisting of one extract fan shall be provided for Toilet, to relief the air supplied to the same. The extract fan shall be located in the same served room.

Electrical convectors with capacity step regulators shall be provided for Toilets, for temperature control of the space.

Dedicated variable air volume terminal units, or constant air volume terminal units where necessary, shall be provided in the exhaust air ducts to each zone, in order to control the air quantity extracted from the individual conditioned zones. The exhaust airflow capacity of the variable air volume terminal units shall compensate the variability of the local air quantity extracted from laboratory furniture and shall ensure that the laboratory spaces will be maintained at negative pressure with respect to adjacent non-laboratory spaces. Each exhaust air terminal unit shall be controlled by a dedicated space pressure differential controller.

Sound attenuators, if required, shall be provided in the main supply and exhaust ducts for noise control purposes.

#### **6.12.2 Common Requirements for Laboratory Area**

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The air handling unit, the humidifier, the electrical power distribution panel and the automatic control panel shall be located in the Supply Ventilation Chamber.

#### **6.12.3 General Ventilation for Control Room Area**

The building shall be provided with three HVAC systems, as described below, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification.

The three HVAC systems shall serve respectively the following building areas:

- Control Room Area (air-conditioned);



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

- UPS and Instrumentation Area (air-conditioned);
- Service area (air-conditioned).

Additional dedicated smoke ventilation system shall be provided for the following rooms, for removal of product of combustion and gas extinguishing agent:

- Instrument Room;
- Control (Panel) Room;

With the intent to ensure to personnel acceptable thermal conditions of surrounding air during process equipment shutdown, a portable heater of 4.5 kW as thermal capacity, normally stored in the Supply Ventilation Chamber, shall be provided.

#### **6.12.4 Control Room Area**

The area includes the following spaces:

- Control (Panel) Room;
- Engineering and Technical Room.

The area shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one air handling unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by), direct-expansion type cooling coils and humidifier for humidity control of the served spaces.

The air handling unit shall be also equipped with two hot water type central heating coils (one 100% duty and one 100% stand-by).

The cooling coils of the air handling unit shall be served by two air-cooled condensing units. The two air-cooled condensing units, each sized 1/2 of the total cooling load demand, shall be located on the roof of the same building.

In addition to above, depending on the indoor design conditions to be maintained, as defined in Appendix 1 of this specification, Engineering and Technical Room might need to be equipped with additional electrical convectors (with capacity step regulator).

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same room.

A common exhaust ventilation system, consisting of one extract fan, shall be provided for Male Toilet and Female Toilet, to relief the air transferred to the same from the adjacent corridor. The extract fan shall be located in the Exhaust Ventilation Chamber.

With the purpose of temperature control inside the Control (Panel) Room, the air heating system shall be fitted with room temperature detector.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

Sound attenuators, if required, shall be provided in the main supply and exhaust ducts for noise control purposes.

#### **6.12.5 UPS and Instrumentation Area**

The area includes the following spaces:

- Electric Point;
- UPS Room;
- Instrument Room.

The area shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one air handling unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by), direct-expansion type cooling coils and humidifier for humidity control of the served spaces.

The air handling unit shall be also equipped with two hot water type central heating coils (one 100% duty and one 100% stand-by).

The cooling coils of the air handling unit shall be served by two air-cooled condensing units. The two air-cooled condensing units, each sized 1/2 of the total cooling load demand, shall be located on the roof of the same building.

In addition to above, depending on the indoor design conditions to be maintained, as defined in Appendix 1 of this specification, the Electric Point might need to be equipped with additional electrical convectors (with capacity step regulator).

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same room.

A common exhaust ventilation system, consisting of two extract fans (100% duty and 100% stand-by), shall be provided for Electric Point, Instrument Room, Supply Ventilation Chamber and Exhaust Ventilation Chamber to relief the air supplied to the same. The extract fans shall be located in the Exhaust Ventilation Chamber.

Dedicated exhaust ventilation system, consisting of two extract fans (100% duty and 100% stand-by), shall be provided for UPS Room, to relief the air supplied to the same. The air shall be extracted form upper and lower level of the room. The extract fans shall be located in Exhaust Ventilation Chamber.

Sound attenuators, if required, shall be provided in the main supply and exhaust ducts for noise control purposes.

#### **6.12.6 Service Area**

The area includes the following spaces:

- Meeting Room;

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

- Automatic Fire Suppression Room;
- Inventory Room;
- Shift Supervisor Room;
- Instrumentation Fitting Shop;
- Meal Room;
- Corridor;
- Supply Ventilation Chamber;
- Exhaust Ventilation Chamber.

The area shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one air handling unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by) and with direct-expansion type cooling coils.

The air handling unit shall be also equipped with hot water type central heating coil.

The cooling coils of the air handling unit shall be served by two air-cooled condensing units. The two air-cooled condensing units, each sized 1/2 of the total cooling load demand, shall be located on the roof of the same building.

In addition to above, depending on the indoor design conditions to be maintained, as defined in Appendix 1 of this specification, some of the above listed spaces might need to be equipped with additional electrical convectors (with capacity step regulator).

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same room.

A common exhaust ventilation system, consisting of two extract fans (100% duty and 100% stand-by), shall be provided for Shift Supervisor Room, Meeting Room, Instrumentation Fitting Shop, Automatic Fire Suppression Room, Inventory Room, Control (Panel) Room and Engineering and Technical Room to relief the air supplied to the same. The extract fans shall be located in the Exhaust Ventilation Chamber.

Individual dedicated exhaust ventilation system consisting of one extract fan shall be provided for Meal Room, to relief the air supplied to the same. The extract fan shall be located in the Exhaust Ventilation Chamber.

Sound attenuators, if required, shall be provided in the main supply and exhaust ducts for noise control purposes.

#### **6.12.7 Smoke Ventilation System**

Two individual dedicated smoke ventilation systems shall be provided for Instrument Room and Control (Panel) Room for removal of products of combustion and gas extinguishing agent, after the operations of fire extinguishing. The smoke extraction shall be provided at upper and lower

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

level of each concerned room in the amount of 4 air changes per hour, as outdoor air ventilation capacity, in compliance with the requirements of SP 7.13130.2013.

For each of the above mentioned room, the smoke ventilation system shall be enabled by means of a mobile smoke extract fan, complete with flexible duct (connected to its suction inlet and rolled over a horse reel), and docking units, consisting of two cutouts, at upper and lower level of the respective internal room wall, normally plugged by removable inspection hatches or louvres.

In normal operating conditions, the configuration of the docking units foresees each cutout covered; instead, the mobile smoke extract fans (two units, one of which as a backup unit) are stored inside the Exhaust Ventilation Chamber.

After the operation of fire extinguishing of one of the above mentioned rooms, the inspection hatches or louvres of both the relevant wall cutouts are removed, the mobile smoke extract fan is moved to the corridor adjacent to the same room (or outdoors), linked to the power supply, and connected (by means of flexible ducts) to the lower cutout. After the manual opening of both fire dampers (one for the upper, one for the lower cutout), the same smoke extract fan is switched on with the consequent removal and discharge to outdoors of product of combustion and gas extinguishing agents; meanwhile a simultaneous equivalent amount of clean air is transferred, through the upper cutout, to the same room, from the adjacent corridor (or outdoors), to compensate the extraction.

The smoke extraction from the upper and lower level of the concerned room shall be provided by means of a proper ducting system, equipped with exhaust air inlets at upper and lower elevation of the same room and connected to the lower docking unit.

#### **6.12.8 Common Requirements**

One common fresh air intake located outdoors with a minimum height of 5 meters above ground level shall be provided for air handling units.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetration and opening through fire rated walls and or slabs in accordance with the requirements of SP 7.13130.2013.

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

All HVAC equipment shall be fed by power supply system of the first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

Air handling units, mobile smoke exhaust fans, portable heater, electrical power distribution panel and automatic control panel shall be located in the Supply Ventilation Chamber.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## **6.13 Main Substation (U20.001)**

### **6.13.1 General**

The building shall be provided with four HVAC systems, as described below, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification.

The four HVAC systems shall serve respectively the following building areas:

- Cable Spreading Room (heated and ventilated);
- Transformer rooms A & B and Automatic Fire Suppression Room (heated and ventilated);
- Battery Room (air-conditioned);
- MV & LV Switchgear rooms (heated and ventilated).

With the intent to ensure to personnel acceptable thermal conditions of surrounding air during process equipment shutdown, a portable heater of 4.5 kW as thermal capacity, normally stored in the Supply Ventilation Chamber, shall be provided.

### **6.13.2 Cable Spreading Room**

The Cable Spreading Room shall be served by a ventilation system all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with electric type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Dedicated exhaust ventilation system, consisting of two extract fans (each sized 50% of total capacity) controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Cable Spreading Room, to relief the air supplied to the same. The extract fan shall be located in an external dedicated area at ground floor.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Heating and ventilating unit shall be located in the Supply Ventilation Chamber 1.

### **6.13.3 Transformer Rooms and Automatic Fire Suppression Room**

This area includes the following spaces:

- Transformer Room A & B
- Automatic Fire Suppression Room;



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

- Supply Ventilation Chamber 1 & 2.

The above rooms shall be served by a ventilation system all-air, single duct, variable air volume, outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with electric type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Electrical convectors with capacity step regulators shall also be provided for Automatic Fire Suppression Room and Supply Ventilation Chamber 1 and 2, for temperature control of the spaces.

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same rooms.

Dedicated exhaust ventilation system consisting of one extract fan controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for each transformer room, to relief the air supplied to the same. The extract fan shall be located in an external dedicated area at ground level.

A dedicated exhaust ventilation system consisting of one extract fan shall be provided for Automatic Fire Suppression Room, to relief the air supplied to the same. The extract fan shall be located in the same room.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Heating and ventilating unit shall be located in the Supply Ventilation Chamber 2.

#### **6.13.4 Battery Room**

The room shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one air handling unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by) and with direct-expansion type cooling coils. The air handling unit shall also be equipped with electric type central heating coil.

The cooling coils of the air handling unit shall be served by two air-cooled condensing units. The two air-cooled condensing units, each sized 1/2 of the total cooling load demand, shall be located outdoors.

Dedicated exhaust ventilation system consisting of two extract fans (100% duty and 100% stand-by), shall be provided for Battery Room, to relief the air supplied to the same. The air extraction shall be provided at upper and lower level of the same room, respectively 100 mm below the

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

ceiling, and 300 mm above the floor, in accordance with the requirements of clause 4.4.41 of IEC. The extract fans shall be located in the same Battery Room.

The Battery Room shall also be provided with roof mounted fresh air intake penthouse louvre for partial compensation, through infiltration, of the air extracted.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Air handling unit shall be located in the Supply Ventilation Chamber 1.

### **6.13.5 MV & LV Switchgear Rooms**

MV & LV Switchgear Rooms shall be served by a ventilation system all-air, single duct, variable air volume, outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by) and with electric type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

One dedicated fresh air intake located outdoors with a minimum height of 11 meters above ground level shall be provided for ventilating unit serving MV & LV Switchgear Rooms.

Dedicated exhaust ventilation system consisting of one extract fan controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for each Switchgear Room, to relief the air supplied to the same. The extract fans shall be located in the same MV & LV Switchgear Rooms.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Heating and ventilating unit shall be located in the Supply Ventilation Chamber 2.

### **6.13.6 Common Requirements**

One common fresh air intake located outdoors with a minimum height of 11 meters above ground level shall be provided for the following systems:

- Heating and ventilating unit serving Cable Spreading Room;
- Heating and Ventilating unit serving Transformer rooms;
- Air handling unit serving Battery Room.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

Motorized fire dampers shall be provided at duct penetration and opening through fire rated walls and or slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The electrical power distribution panel and automatic control panel shall be located in the Switchgear Room.

## **6.14 Urea Melt - Synthesis Plant (U22.201)**

### **6.14.1 General**

The building shall be provided with two HVAC systems, as described below, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification.

The two HVAC systems shall serve respectively the following building areas:

- Melt Area (heated & ventilated);
- Elevator Machine Room (heated & ventilated).

Additional dedicated Emergency Ventilation System shall be provided for Melt Area.

~~Ventilation for pressurization purposes shall be envisaged in case of fire alarm for the elevator hoistway, for personnel safe evacuation and fire brigade operation.~~

### **6.14.2 General Ventilation System for Melt Area**

The Melt Area shall be served by a ventilation system all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with two heating and ventilating units, each equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Above mentioned heating and ventilating units shall serve Melt Area, Supply Ventilation Chamber, Exhaust Ventilation Chamber and Elevator Machine Room through an adequate air ducting system.

Electric type convector shall also be provided in Supply Ventilation Chamber and Exhaust Ventilation Chamber.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same rooms.

The general exhaust ventilation system, consisting of three ducted centrifugal type exhaust fans, constant air volume, located in the Exhaust Ventilation Chamber, and three wall mounted extract fans (one fan in stand-by), constant air volume, shall be provided for Melt Area, to relief the specified minimum outdoor air ventilation rate supplied to the same.

Additional dedicated exhaust ventilation system, consisting of one wall mounted extract fan, controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Melt Area to compensate the variability of airflow supplied by heating and ventilating unit supply fans.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

All HVAC equipment shall be in standard execution.

#### **6.14.3 Emergency Ventilation System for Urea Melt Area**

Melt Area shall also be provided with emergency ventilation system, according to the requirements of SP 60.13330.2016. The emergency ventilation is an additional ventilation system with the specific purpose of increasing the dilution of ammonia vapors inside the building. The emergency ventilation is activated upon generation of the signal of indoor excess of ammonia vapor concentration.

The emergency ventilation shall be provided in the amount of 8 air changes per hour as outdoor air ventilation capacity with respect to the whole actual internal volume of the building.

Upon the detection of excess of ammonia vapor concentration, the required airflow ventilation capacity shall be provided at the upper portion and at the lower portion of the Melt Area by the emergency ventilation system, consisting of two wall mounted extract ventilation fans (that shall relief the 50% of the total amount of airflow capacity), serving the upper portion of the same space, and two centrifugal type extract ventilation fans, ducted, installed outdoors at ground floor (that shall relief the 50% of the total amount of airflow capacity through exhaust air inlets), serving the lower portion of the same space.

The centrifugal type extract ventilation fans shall be provided with a dedicated ducting system and exhaust air discharge outlet.

The Melt Area shall also be provided with roof mounted fresh air intake penthouse louvres for compensation, through infiltration, of the air extracted for emergency ventilation purposes.

#### **6.14.4 Elevator Machine Room**

The excess of space heat gains shall be removed from the Elevator Machine Room by means of an additional dedicated ventilation system, variable air volume, consisting of one ventilating unit (located in the same served room), equipped with variable frequency drive, pre-filter, and supply air fan.

The air supplied shall be exfiltrated to outdoors by means of wall mounted exhaust air louvres.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

#### **6.14.5 Smoke/Pressurization Ventilation System**

~~To ensure personnel safe evacuation in case of fire and the subsequent fire brigade operation, smoke ventilation system for pressurization purposes shall be provided for elevator shaft in compliance with requirements of SP 7.13130.2013.~~

~~The system shall be all-air, single duct, constant air volume, 100% outdoor air type.~~

~~The smoke ventilation system for elevator shaft shall consist of one smoke supply fan that shall draw outdoor air. The same fan shall be located on the roof of the mentioned Elevator Machine Room.~~

#### **6.14.5 Common Requirements**

One common fresh air intake located outdoors with a minimum height of *not less than 13* meters above ground floor shall be provided for both heating and ventilating units.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One common electrical power distribution panel and one common automatic control panel shall be provided to feed and control all HVAC equipment.

Heating and ventilating units, electrical power distribution panel and automatic control panel shall be located inside the Supply Ventilation Chamber.

#### **6.15 Urea Melt - HP Ammonia Pumps Room (U22.204)**

##### **6.15.1 General Ventilation System**

The building shall be heated and ventilated, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification. The ventilation system shall be all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

Above mentioned heating and ventilating unit shall serve Pumps Room and Supply Ventilation Chamber through an adequate air ducting system. The air distribution in Pumps Room shall be provided at working area.

Electric convector, if necessary, shall be provided in Supply Ventilation Chamber.

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same building.

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

The exhaust ventilation system shall consist of a suitable number of roof mounted exhaust air discharge outlet penthouse louvres to ensure the specified air changes requirements at the upper portion (60%) of Pumps Room through air exfiltration, and two number of extract fans (100% duty and 100% stand-by), centrifugal, boxed type, ducted, installed outdoors, to ensure the specified air changes requirements at the lower portion (40%) of the same Pumps Room.

Each outdoor centrifugal type exhaust fan, along with relevant outdoor duct branch, shall relief the air through a dedicated outdoor exhaust air discharge stack, flare type, in order to relief the air to the atmosphere at a speed of not less than 20 m/s.

The excess of space heat gains shall be removed from the Pumps Room by means of the heating and ventilating unit, through of an automatic increase of air flow capacity, and a wall mounted extract ventilation fan controlled by variable frequency drive (that shall relief the air), serving the upper portion of the same space. Supply fan shall be interlocked with the respective extract fan.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

#### **6.15.2 Emergency Ventilation System**

The Pumps Room shall also be provided with emergency ventilation system, according to the requirements of SP 60.13330.2016. The emergency ventilation is an additional ventilation system with the specific purpose of increasing the dilution of ammonia vapors inside the building. The emergency ventilation is activated upon generation of the signal of indoor excess of ammonia vapor concentration.

The emergency ventilation shall be provided in the amount of 8 air changes per hour as outdoor air ventilation capacity with respect to the whole actual internal volume of the building.



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

Upon the detection of excess of ammonia vapor concentration, the required airflow ventilation capacity shall be provided at the upper portion and at the lower portion of the Pumps Room by an emergency ventilation system, push-pull type, consisting of one ventilating unit (located in the Supply Ventilation Chamber), equipped with supply air fan (that shall supply the air by means of a proper ducting system through supply air outlets), one wall mounted extract ventilation fan (that shall relief the 60% of the total amount of airflow capacity), serving the upper portion of the same space, and one centrifugal type extract ventilation fan, ducted, installed outdoors at ground floor (that shall relief the 40% of the total amount of airflow capacity through exhaust air inlets), serving the lower portion of the same room. Supply fans shall be interlocked with the respective extract fans.

Each outdoor centrifugal type exhaust fan, along with relevant outdoor duct branch, shall relief the air through a dedicated outdoor exhaust air discharge stack, flare type, in order to relief the air to the atmosphere at a speed of not less than 20 m/s.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

### 6.15.3 Common Requirements

One common fresh air intake located outdoors with a minimum height of 15 meters above ground level shall be provided for heating and ventilating unit and for the emergency supply ventilation fans.

A proper outdoor ducting system interconnecting the same fresh air intake to the Supply Ventilation Chamber shall be provided for the distribution of outdoor air to the above mentioned supply ventilation systems.

All HVAC equipment shall be suitable for installation in zone 2, IIA, T1 except those located inside the Supply Ventilation Chamber that shall be in standard execution.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

Heating and ventilating unit, emergency supply fan, electrical power distribution panel and automatic control panel shall be located inside the inside the Supply Ventilation Chamber.

### 6.16 Urea Melt - CO2 Compressor (U22.205)

#### 6.16.1 General Ventilation System

The building shall be heated and ventilated, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification. The ventilation system shall be

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

all-air, single duct, constant air volume, 100% outdoor air type and shall serve the following spaces:

- CO2 Compressor Room;
- Dry Air Unit;
- Nitrogen Unit.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

The specified minimum outdoor air ventilation rate shall be provided by means of one heating and ventilating unit, constant air volume, each equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil. Heating and ventilating unit shall be located outdoors.

The above mentioned heating and ventilating unit shall serve CO2 Compressor Room, Dry Air Unit and Nitrogen Unit through an adequate air ducting system. The air distribution in CO2 Compressor Room shall be provided at upper and lower elevation.

The heat-carrying medium used in the HVAC system shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

A dedicated exhaust ventilation system shall be provided for CO2 Compressor Room to relief the air supplied to the same.

The exhaust ventilation system shall consist of a suitable number of roof mounted exhaust air discharge outlet penthouse louvers, three roof mounted extract fans and three wall mounted extract fans, to ensure the specified air changes requirements at the upper portion of the same CO2 Compressor Room through air exfiltration and mechanical ventilation. In case of failure of one out of three of the above mentioned extract fans (roof mounted or wall mounted), the total airflow ventilation capacity of the remaining two fans shall meet the specified minimum exhaust air quantity requirements.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

The excess of space heat gains shall be removed from the CO2 Compressor Room by means of an additional dedicated ventilation system, consisting of one wall mounted supply air fan and one wall mounted extract ventilation fans, serving the upper portion of the same CO2 Compressor Room, to relief the air supplied to the same.

A dedicated exhaust ventilation system, consisting of a suitable number of roof extract ventilation fans, shall be provided for Dry Air Unit, to relief the air supplied to the same.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The excess of space heat gains shall be removed from the Dry Air Unit by means of an additional dedicated ventilation system, consisting of two wall mounted supply ventilation fans, and two wall mounted exhaust ventilation fans, to relief the air supplied to the same.

A dedicated exhaust ventilation system, consisting of a suitable number of roof extract ventilation fans, shall be provided for Nitrogen Unit, to relief the air supplied to the same.

One common fresh air intake with a minimum elevation of 8 meters above ground level shall be provided for heating and ventilating unit.

## **6.16.2 Emergency Ventilation System**

### **6.16.2.1 CO2 Compressor Room**

The CO2 Compressor Room shall also be provided with emergency ventilation system, according to the requirements of SP 60.13330.2016. The emergency ventilation is an additional ventilation system with the specific purpose of avoiding abnormal harmful concentration of oxygen (and therefore with the purpose of maintaining the balance of gases composing breathable atmosphere) by increasing the oxygen volume concentration inside the building. The emergency ventilation is activated upon generation of signals from oxygen detector due to oxygen depletion.

The emergency ventilation shall be provided in the amount of 8 air changes per hour as outdoor air ventilation capacity with respect to the whole actual internal volume of the concerned space.

Upon the detection of low oxygen concentration, the required airflow ventilation capacity shall be provided by the emergency ventilation system, push-pull type, consisting of a suitable number of wall mounted indoor supply ventilation fans (that shall drag outdoor air inside the building) and a suitable number of centrifugal type extract ventilation fans, ducted, installed outdoors at ground floor, and a suitable number of wall mounted exhaust ventilation fans (that shall relief the air supplied to the same). Supply fans shall be interlocked with the respective extract fans.

Each of the above mentioned centrifugal type extract ventilation fans shall be provided with a dedicated ducting system and exhaust air discharge outlet.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

### **6.16.2.2 Nitrogen Unit**

The Nitrogen Unit shall also be provided with emergency ventilation system, according to the requirements of SP 60.13330.2016. The emergency ventilation is an additional ventilation system with the specific purpose of avoiding abnormal harmful concentration of nitrogen (and therefore with the purpose of maintaining the balance of gases composing breathable atmosphere) by increasing the oxygen volume concentration inside the building. The emergency ventilation is activated upon generation of a signal of low indoor oxygen concentration from indoor oxygen detectors.

Volume ratio of oxygen in the air of nitrogen plant room must not be less than 19% and exceed 23%; the volume ratio of oxygen must be sustained by continuous operation of general and emergency ventilation.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The emergency ventilation shall be provided in the amount of 8 air changes per hour as outdoor air ventilation capacity with respect to the whole actual internal volume of the building.

Upon the detection of low oxygen concentration, the required airflow ventilation capacity shall be provided by the emergency ventilation system, push-pull type, consisting of two wall mounted indoor supply ventilation fans (that shall drag outdoor air inside the building) and two centrifugal type extract ventilation fans, ducted, installed outdoors at ground floor (that shall relief the air supplied to the same). Supply fans shall be interlocked with the respective extract fans.

Each of the above mentioned centrifugal type extract ventilation fans shall be provided with dedicated ducting system and exhaust air discharge outlet.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

### **6.16.3 Common Requirements**

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be installed in standard execution.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

Electrical power distribution panel and the automatic control panel shall be installed inside the building.

## **6.17 Urea Granulation Unit (U23.301)**

### **6.17.1 General**

The building shall be provided with seven HVAC systems, as described below, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification.

The seven HVAC systems shall serve respectively the following building areas:

- Production Premise at el +100.200 (heated and ventilated);
- Production Premise at el +107.300 (heated and ventilated);
- Production Premise at el +113.100 (heated and ventilated);
- Production Premise at el +122.700 (heated and ventilated);
- Production Premise at el +128.100 and +136.250 (heated and ventilated);

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

- Production Premise at el +142.900, +152.800, +159.300 (heated and ventilated);
- Elevator Machine Room (heated and ventilated).

In addition to the above, smoke ventilation for pressurization purposes shall be provided for the following spaces for personnel safe evacuation and fire brigade operation in case of fire event:

- Smokeproof stairways of H2 type in accordance with paragraph 7.14B of SP 7.13130.2013;
- Elevator shafts with function “emergency fireman service” in accordance with paragraph 7.146 of SP 7.13130.2013.

*Smoke ventilation shall also be provided for all corridors’ areas (except for corridor at ground floor, for which no smoke ventilation is required).*

#### **6.17.2 Production Premise at el +100.200**

This Production Premise shall be served by a ventilation system, all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Above mentioned heating and ventilating unit shall serve Production Premise and HVAC Room-1 through an adequate air ducting system.

Electrical convectors shall also be provided for HVAC Room-1.

A suitable number of heating devices shall be installed in order to ensure an appropriated heat distribution in the same building.

Dedicated exhaust ventilation system shall be provided for Production Premise, consisting of a suitable number of extract fans controlled by variable frequency drive (in order to adjust the variable airflow), to relief the air supplied to the same. Each extract fan shall be located in the same served room.

The heating and ventilating unit shall be located in the HVAC Room-1.

Fresh air intake of heating and ventilating unit shall be provided at an adequate elevation on the external wall of HVAC Room-1.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

### **6.17.3 Production Premise at el +107.300**

This Production Premise shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Above mentioned heating and ventilating unit shall serve Production Premise and HVAC Room-1 through an adequate air ducting system.

Dedicated exhaust ventilation system shall be provided for Production Premise, consisting of a suitable number of extract fans, to relief the air supplied to the same. Each extract fan shall be located in the same served room.

The heating and ventilating unit shall be located in the HVAC Room-1.

Fresh air intake of heating and ventilating unit shall be provided at an adequate elevation on the external wall of HVAC Room-1.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

### **6.17.4 Production Premise at el +113.100**

This Production Premise shall be served by a ventilation system, all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Above mentioned heating and ventilating unit shall serve Production Premise and HVAC Room-2 through an adequate air ducting system.

Electrical convectors shall also be provided for HVAC Room-2.

A suitable number of heating devices shall be installed in order to ensure an appropriated heat distribution in the same building.

Dedicated exhaust ventilation system shall be provided for Production Premise, consisting of a suitable number of extract fans controlled by variable frequency drive (in order to adjust the



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

variable airflow), to relief the air supplied to the same. Each extract fan shall be located in the same served room.

The heating and ventilating unit shall be located in the HVAC Room-2.

Fresh air intake of heating and ventilating unit shall be provided at an adequate elevation on the external wall of HVAC Room-2.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

#### **6.17.5 Production Premise at el +122.700**

This Production Premise shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Above mentioned heating and ventilating unit shall serve Production Premise and HVAC Room-2 through an adequate air ducting system.

Dedicated exhaust ventilation system shall be provided for Production Premise, consisting of a suitable number of extract fans, to relief the air supplied to the same. Each extract fan shall be located in the same served room.

The heating and ventilating unit shall be located in the HVAC Room-2.

Fresh air intake of heating and ventilating unit shall be provided at an adequate elevation on the external wall of HVAC Room-2.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

#### **6.17.6 Production Premise at el +128.100 and +136.250**

This Production Premise shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Above mentioned heating and ventilating unit shall serve Production Premise and HVAC Room-3 through an adequate air ducting system.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

Electrical convectors shall also be provided for HVAC Room-3.

A suitable number of heating devices shall be installed in order to ensure an appropriated heat distribution in the same building.

Dedicated exhaust ventilation system shall be provided for Production Premise, consisting of a suitable number of extract fans, to relief the air supplied to the same. Each extract fan shall be located in the same served room.

The heating and ventilating unit shall be located in the HVAC Room-3.

Fresh air intake of heating and ventilating unit shall be provided at an adequate elevation on the external wall of HVAC Room-3.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

#### **6.17.7 Production Premise at el +142.900, +152.800, +159.300**

The area includes the following spaces:

- Production Premise at el +142.900;
- Production Premise at el +152.800;
- Production Premise at el +159.300;
- HVAC Room-4;
- Elevator Machine Room.

All above-mentioned spaces shall be served by ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Above mentioned heating and ventilating unit shall serve above mentioned listed spaces through an adequate air ducting system.

Electrical convectors shall also be provided for HVAC Room-4.

A suitable number of heating devices shall be installed in order to ensure an appropriated heat distribution in the same building.

Dedicated exhaust ventilation systems shall be provided for all above listed spaces, each consisting of a suitable number of extract fans, to relief the air supplied to the same. Each extract fan shall be located in the same served room.

The heating and ventilating unit shall be located in the HVAC Room-4.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

Fresh air intake of heating and ventilating unit shall be provided at an adequate elevation on the external wall of HVAC Room-4.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

#### **6.17.8 Elevator Machine Room**

The excess of space heat gains shall be removed from the Elevator Machine Room by means of an additional dedicated ventilation system, variable air volume, consisting of one ventilating unit (located in the same served room), equipped with variable frequency drive, pre-filter, and supply air fan.

The air supplied shall be exfiltrated to outdoors by means of wall mounted exhaust air louvres.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

#### **6.17.9 Smoke/Pressurization Ventilation Systems**

##### **6.17.9.1 Elevator Shaft**

To ensure personnel safe evacuation in case of fire and the subsequent fire brigade operation, smoke ventilation system for pressurization purposes shall be provided for elevator shaft in compliance with requirements of SP 7.13130.2013.

The system shall be all-air, single duct, constant air volume, 100% outdoor air type.

The smoke ventilation system for elevator shaft shall consist of one smoke supply fan that shall draw outdoor air. The same fan shall be located on the roof of the mentioned Elevator Machine Room.

##### **6.17.9.2 Staircases**

To ensure personnel safe evacuation in case of fire and the subsequent fire brigade operation, smoke ventilation system for pressurization purposes shall be provided for Smoke Proof Stairways Type H2 in compliance with requirements of SP 7.13130.2013.

The system shall be all-air, single duct, constant air volume, 100% outdoor air type.

The smoke ventilation system for Staircases shall consist of three smoke supply fan that shall draw outdoor air respectively at upper, intermediate and lower level. Mentioned three fans shall be located on the roof of the Staircases, inside the HVAC Room-3 and inside the HVAC Room-1.

##### **6.17.9.3 Corridors**

*To ensure personnel safe evacuation in case of fire and the subsequent fire brigade operation, smoke extraction system shall be provided for all corridors (except for corridor at ground floor) in compliance with requirements of SP 7.13130.2013.*

*The system shall be all-air, single duct, constant air volume, 100% outdoor air type.*

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

*The smoke extraction system for corridors shall consist of one smoke extract fan and associated exhaust ducting system that shall relieve the air that infiltrates to the same by means of a supply ducting system that drags fresh air from outdoors through one intake located at high level. The same fan shall be located on the roof of the mentioned Elevator Machine Room.*

#### **6.17.10 Common Requirements**

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

The heat-carrying medium used in the HVAC system shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The electrical power distribution panel and automatic control panel shall be located inside the HVAC Room-3.

#### **6.18 Granulated Urea Storage (U24.401)**

The Granulated Urea Storage shall be heated, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification.

The heating system shall consist of a suitable number of hot water unit heaters to ensure an appropriated heat distribution in the same building.

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

At least four temperature transmitters and four moisture transmitters shall be provided for automatic control of the heating system.

One hygrometer shall also be provided for allowing humidity measuring to operators.

An adequate number of louvres fitted with motorized dampers shall be envisaged for smoke natural ventilation purposes at upper level of both façades of Granulated Urea Storage for the activation of stack effect in conjunction with doors kept open.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The electrical power distribution panel and automatic control panel shall be located inside the building.

## **6.19 Urea Train Loading Station and Loading Control Room Building (U24.402.1/U24.402.2)**

### **6.19.1 General**

The building shall be provided with two HVAC systems, as described below, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification.

The two HVAC systems shall serve respectively the following building areas:

- Control Room Area (air-conditioned);
- *Off-spec Big Bag Unit* (heated and ventilated).

Additional dedicated smoke ventilation system shall be provided for Control Room, for removal of product of combustion and gas extinguishing agent.

With the intent to ensure to personnel acceptable thermal conditions of surrounding air during process equipment shutdown, a portable heater of 4.5 kW as thermal capacity, normally stored in the Supply Ventilation Chamber, shall be provided.

### **6.19.2 Control Room Area**

The area includes the following spaces:

- Control Room;
- Fire Suppression Room;
- Toilet and Locker;
- Supply Ventilation Chamber.

The area shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

The system shall be provided with one air handling unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by), direct-expansion type cooling coils and humidifier for humidity control of the served spaces.

The air handling unit shall be also equipped with hot water type central heating coils (one 100% duty and one 100% stand-by).

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The cooling coils of the air handling unit shall be served by two air-cooled condensing units. The two air-cooled condensing units, each sized 1/2 of the total cooling load demand, shall be located outdoors at ground floor.

Dedicated fresh air intake located outdoors at a minimum height of 5 meters above ground level shall be provided for air handling units serving Control Room Area.

Electrical convectors with capacity step regulators shall also be provided for Toilet and Locker and Supply Ventilation Chamber, for temperature control of the spaces.

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same room.

Dedicated exhaust ventilation system, consisting of two extract fans (100% duty and 100% stand-by), shall be provided for Control Room, to relief the air supplied to the same. The extract fans shall be located in Supply Ventilation Chamber.

Dedicated exhaust ventilation system, consisting of one extract fan, shall be provided for Toilet and Locker, to relief the air supplied to the same. The extract fan shall be located in the same room.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

With the purpose of temperature control inside the Control Room, the air heating system shall be fitted with room temperature detector.

Sound attenuators, if required, shall be provided in the main supply and exhaust ducts for noise control purposes.

### **6.19.3 Off-spec Big Bag Unit**

The area shall be served by a ventilation system all-air, single duct, variable air volume, 100% outdoor air type.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

The heating and ventilating unit shall be located outdoors at ground floor.

Dedicated fresh air intake located outdoors at a minimum height of 8 meters above ground level shall be provided for air handling units serving *Off-spec Big Bag Unit*.

Dedicated exhaust ventilation system, consisting of one wall mounted extract fan shall be provided for *Off-spec Big Bag Unit*, to relief the air supplied to the same.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

#### 6.19.4 Smoke Ventilation System

An individual dedicated smoke ventilation systems shall be provided for Control Room for removal of products of combustion and gas extinguishing agent, after the operations of fire extinguishing. The smoke extraction shall be provided at upper and lower level of each concerned room in the amount of 4 air changes per hour, as outdoor air ventilation capacity, in compliance with the requirements of SP 7.13130.2013.

For the above mentioned room, the smoke ventilation system shall be enabled by means of a mobile smoke extract fan, complete with flexible duct (connected to its suction inlet and rolled over a horse reel), and docking units, consisting of two cutouts, at upper and lower level of the respective internal room wall, normally plugged by removable inspection hatches or louvres.

In normal operating conditions, the configuration of the docking units foresees each cutout covered; instead, the mobile smoke extract fans (two units, one of which as a backup unit) are stored inside the Supply Ventilation Chamber.

After the operation of fire extinguishing of one of the above mentioned room, the inspection hatches or louvres of both the relevant wall cutouts are removed, the mobile smoke extract fan is moved to the corridor adjacent to the same room (or outdoors), linked to the power supply, and connected (by means of flexible ducts) to the lower cutout. After the manual opening of both fire dampers (one for the upper, one for the lower cutout), the same smoke extract fan is switched on with the consequent removal and discharge to outdoors of product of combustion and gas extinguishing agents; meanwhile a simultaneous equivalent amount of clean air is transferred, through the upper cutout, to the same room, from the adjacent corridor (or outdoors), to compensate the extraction.

The smoke extraction from the upper and lower level of the concerned room shall be provided by means of a proper ducting system, equipped with exhaust air inlets at upper and lower elevation of the same room and connected to the lower docking unit.

#### 6.19.5 Common Requirements

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetration and opening through fire rated walls and or slabs in accordance with the requirements of SP 7.13130.2013.

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

All HVAC equipment shall be fed by power supply system of the first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment serving Control Room Area.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment serving Empty Big Bag Storage.

Air handling unit, mobile smoke exhaust fans, Control Room exhaust fans, portable heater, electrical power distribution panel and automatic control panel shall be located in the Supply Ventilation Chamber.

The electrical power distribution panel and automatic control panel serving Empty Big Bag Storage shall be located in the same room.

## **6.20 Secondary Electrical Substation & Rack Room (U24.406)**

### **6.20.1 General**

The building shall be provided with two HVAC systems, as described below, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification.

The two HVAC systems shall serve respectively the following building areas:

- Cable Spreading Room, Transformer Room and Switchgear Room area (heated and ventilated);
- UPS Room and Rack Room area (air-conditioned);

Additional dedicated smoke ventilation system shall be provided for Rack Room, for removal of products of combustion and gas extinguishing agent.

With the intent to ensure to personnel acceptable thermal conditions of surrounding air during process equipment shutdown, a portable heater of 4.5 kW as thermal capacity, normally stored in the HVAC Room, shall be provided.

### **6.20.2 Cable Spreading Room, Transformer Rooms and Switchgear Room Area**

This area includes the following spaces:

- Cable Spreading Room;
- Switchgear Room;
- Transformer Room;
- Fire Suppression Room;
- Supply and Exhaust Ventilation Chamber.

The spaces shall be served by a ventilation system all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, final filter, dual supply air fan (100% duty and 100% stand-by) and with electric type central heating coil.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Electrical convectors with capacity step regulators shall also be provided for Fire Suppression Room and Supply and Exhaust Ventilation Chamber, for temperature control of the spaces.

A suitable number of the heating devices shall be installed in order to ensure an appropriated heat distribution in the same rooms.

Dedicated exhaust ventilation system, consisting of one extract fan controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Cable Spreading Room, to relief the air supplied to the same. The extract fan shall be located in the same room.

Dedicated exhaust ventilation system consisting of one extract fan controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Transformer Room, to relief the air supplied to the same. The extract fans shall be located in the same room.

Dedicated exhaust ventilation system consisting of two extract fans (each sized 50% of total capacity) controlled by variable frequency drive (in order to adjust the variable airflow) shall be provided for Switchgear Room, to relief the air supplied to the same. The extract fans shall be located in Supply and Exhaust Ventilation Chamber.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

### **6.20.3 UPS and Rack Room**

The area includes the following spaces:

- UPS Room;
- Rack Room.

The spaces shall be served by a ventilation system, all-air, single duct, constant air volume, 100% outdoor air type.

The system shall be provided with one air handling unit, equipped with pre-filter and final filter, dual supply air fan (100% duty and 100% stand-by), direct-expansion type cooling coils and humidifier for humidity control of the served spaces.

The air handling unit shall also be equipped with electric type central heating coil.

The cooling coils of the air handling unit shall be served by two air-cooled condensing units. The two air-cooled condensing units, each sized 1/2 of the total cooling load demand, shall be located on the roof of the same building.

The air-cooled condensing unit shall be located outdoors.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

With the purpose of temperature control inside the UPS Room and Rack room, the air heating system shall be fitted with room temperature detectors.

Dedicated exhaust ventilation system, consisting of two extract fans (100% duty and 100% stand-by), shall be provided for Rack Room, to relief the air supplied to the same. The extract fans shall be located in same Rack Room.

Dedicated exhaust ventilation system consisting of two extract fans (100% duty and 100% stand-by), shall be provided for UPS Room, to relief the air supplied to the same. The air extraction shall be provided at upper and lower level of the same room, respectively 100 mm below the ceiling, and 300 mm above the floor, in accordance with the requirements of clause 4.4.41 of IEC. The extract fans shall be located in the same UPS Room.

Sound attenuators, if required, shall be provided in the main supply and exhaust ducts for noise control purposes.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

#### **6.20.4 Smoke Ventilation System**

Dedicated smoke ventilation system shall be provided for Rack Room for removal of products of combustion and gas extinguishing agent, after the operations of fire extinguishing. The smoke extraction shall be provided at upper and lower level of each concerned room in the amount of 4 air changes per hour, as outdoor air ventilation capacity, in compliance with the requirements of SP 7.13130.2013.

For the above mentioned room, the smoke ventilation system shall be enabled by means of a mobile smoke extract fan, complete with flexible duct (connected to its suction inlet and rolled over a horse reel), and docking units, consisting of two cutouts, at upper and lower level of the respective internal room wall, normally plugged by removable inspection hatches or louvres.

In normal operating conditions, the configuration of the docking units foresees each cutout covered; instead, the mobile smoke extract fans (two units, one of which as a backup unit) are stored inside the Supply and Exhaust Ventilation Chamber.

After the operation of fire extinguishing of the above mentioned room, the inspection hatches or louvres of both the relevant wall cutouts are removed, the mobile smoke extract fan is moved to the corridor adjacent to the same room (or outdoors), linked to the power supply, and connected (by means of flexible ducts) to the lower cutout. After the manual opening of both fire dampers (one for the upper, one for the lower cutout), the same smoke extract fan is switched on with the consequent removal and discharge to outdoors of product of combustion and gas extinguishing agents; meanwhile a simultaneous equivalent amount of clean air is transferred, through the upper cutout, to the same room, from the adjacent corridor (or outdoors), to compensate the extraction.

The smoke extraction from the upper and lower level of the concerned room shall be provided by means of a proper ducting system, equipped with exhaust air inlets at upper and lower elevation of the same room and connected to the lower docking unit

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

### 6.20.5 Common Requirements

One common fresh air intake located outdoors with a minimum height of 5 meters above ground level shall be provided for the following systems:

- Heating and ventilating unit serving Cable Spreading Room, Transformer Room and Switchgear Room area;
- Air handling unit serving UPS Room and Rack Room area.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetration and opening through fire rated walls and or slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

Heating and ventilating unit, air handling unit, the humidifier, exhaust fans serving Switchgear Room, portable heater and portable exhaust fan shall be located in the Supply and Exhaust Ventilation Chamber.

The electrical power distribution panel and automatic control panel shall be located in the Supply and Exhaust Ventilation Chamber.

### 6.21 Circulating Water Supply Pumping Station (U27 707)

The Chemical Treatment Package Unit shall be heated and ventilated, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification. The ventilation system shall be all-air, single duct, constant air volume, 100% outdoor air type.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

The heating and ventilating unit shall be located outdoors at ground floor.

The heat-carrying medium used in the HVAC systems shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

One fresh air intake with a minimum elevation of 6 meters above ground level shall be provided for heating and ventilating unit.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

A suitable number of roof mounted exhaust air discharge outlet penthouse louvers shall be provided for Chemical Treatment Package Unit, for exfiltration to outdoors of the supply air.

Dedicated exhaust ventilation system consisting of one extract fan shall be provided for Toilet, to relief the air transferred to the same from the adjacent area. The extract fan shall be located in the same room.

Dedicated electric type convector shall also be provided in Toilet, for temperature control of the same room.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The electrical power distribution panel and automatic control panel shall be located inside the Chemical Treatment Package Unit.

## **6.22 Central Heating Station (U27.717)**

The building shall be heated and ventilated, in order to meet the indoor design conditions defined in Appendix 1 (HVAC System Design Bases) of this specification. The ventilation system shall be all-air, single duct, variable air volume, 100% outdoor air type.

The system shall be provided with one heating and ventilating unit, equipped with pre-filter, dual supply air fan (100% duty and 100% stand-by) and with hot water type central heating coil.

Heating and ventilating unit supply fans shall be controlled by variable frequency drive, in order to adjust the variable airflow.

The ventilation system airflow capacity shall be sized in order to meet the space cooling load demand and to ensure the minimum outdoor air ventilation rate specified for the served areas.

Above mentioned heating and ventilating unit shall serve Heating Station, Safety Shower Room and Supply Ventilation Chamber through an adequate air ducting system.

One fresh air intake stack located outdoors with a minimum height of 15 meters above ground level shall be provided for heating and ventilating unit.

Electric convector shall also be provided for Safety Shower Room.

A suitable number of heating devices shall be installed in order to ensure an appropriated heat distribution in the same building.



| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

The heat-carrying medium used in the HVAC system shall be low temperature hot water with the following parameters:

- Supply hot water temperature: 115°C;
- Return hot water temperature: 70°C.

A dedicated exhaust ventilation system, consisting of a suitable number of roof extract ventilation fans controlled by variable frequency drive (in order to adjust the variable airflow), shall be provided for Heating Station, to relief the air supplied to the same.

A dedicated exhaust ventilation system, consisting of a suitable number of roof extract ventilation fans, shall be provided for Safety Shower Room, to relief the air supplied to the same.

With reference to type and position of exhaust air discharge outlets, the requirements of paragraphs 10.4 and 10.5 of SP 60.13330.2016, wherever applicable, are mandatory.

Motorized fire dampers shall be provided at duct penetrations and openings through fire rated walls and slabs in accordance with the requirements of SP 7.13130.2013.

All HVAC equipment shall be fed by power supply system of first category of reliability.

One electrical power distribution panel and automatic control panel shall be provided to feed and control all HVAC equipment.

The heating and ventilating unit, the electrical power distribution panel and automatic control panel shall be located in the Supply Ventilation Chamber.

| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr.        | Space                             | Room Category | Summer              |                       | Winter              |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br>Refer note (O)  | Minimum Exhaust Air Requirements |
|----------------|-----------------------------------|---------------|---------------------|-----------------------|---------------------|-----------------------|------------------|-----------------------------------------------------|----------------------------------|
|                |                                   |               | Temperature DB [°C] | Relative Humidity [%] | Temperature DB [°C] | Relative Humidity [%] |                  |                                                     |                                  |
| <b>A10.002</b> | <b>Control Room Building</b>      |               |                     |                       |                     |                       |                  |                                                     |                                  |
|                | - Supply Ventilation Chamber      | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (G)                                      | -                                |
|                | - Electric Point                  | B3            | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (D)                                      | -                                |
|                | - Meeting Room                    | N/A           | 24 ± 2              | NC                    | 21 ± 2              | NC                    | (+)              | Refer note (D) & 60 m³/h/person whichever is higher | -                                |
|                | - Automatic Fire Suppression Room | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                                | Refer note (B)                   |
|                | - UPS Room                        | B4            | 24 ± 2              | 50 ± 10               | 21 ± 2              | 40 ± 10               | (-)              | Refer note (A) & (H) whichever is higher            | Refer note (B)                   |
|                | - Rack Room                       | B3            | 24 ± 2              | 50 ± 10               | 21 ± 2              | 40 ± 10               | (+)              | Refer note (H) & 60 m³/h/person whichever is higher | Refer note (K)                   |
|                | - Control (Panel) Room            | B3            | 24 ± 2              | 50 ± 10               | 21 ± 2              | 40 ± 10               | (+)              | Refer note (H) & 60 m³/h/person whichever is higher | Refer note (K)                   |
|                | - Engineering and Technical Room  | B4            | 24 ± 2              | NC                    | 21 ± 2              | NC                    | (+)              | 60 m³/h/person                                      | -                                |
|                | - Exhaust Ventilation Chamber     | B3            | ≤ 30                | NC                    | ≥ 10                | NC                    | (-)              | Refer note (E)                                      | -                                |

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| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr.        | Space                             | Room Category | Summer              |                       | Winter              |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br>Refer note (O) | Minimum Exhaust Air Requirements    |
|----------------|-----------------------------------|---------------|---------------------|-----------------------|---------------------|-----------------------|------------------|----------------------------------------------------|-------------------------------------|
|                |                                   |               | Temperature DB [°C] | Relative Humidity [%] | Temperature DB [°C] | Relative Humidity [%] |                  |                                                    |                                     |
|                | - Male Toilet                     | N/A           | NC                  | NC                    | ≥ 16                | NC                    | (-)              | -                                                  | 50 m³/h/toilet pan & Refer note (B) |
|                | - Female Toilet                   | N/A           | NC                  | NC                    | ≥ 16                | NC                    | (-)              | -                                                  | 50 m³/h/toilet pan & Refer note (B) |
|                | - Inventory Room                  | N/A           | NC                  | NC                    | ≥ 16                | NC                    | (-)              | Refer note (D)                                     | -                                   |
|                | - Shift Supervisor Room           | N/A           | 24 ± 2              | NC                    | 21 ± 2              | NC                    | (+)              | 60 m³/h/person<br>Refer note (M)                   | Smoke Exhaust Ventilation           |
|                | - Instrumentation Fitting Shop    | N/A           | 24 ± 2              | NC                    | 21 ± 2              | NC                    | (+)              | 60 m³/h/person                                     | -                                   |
|                | - Meal Room                       | N/A           | ≤ 29                | NC                    | ≥ 21                | NC                    | (-)              | Refer note (A) & (F)                               | Refer note (G) & (B)                |
|                | - Corridor                        | N/A           | ≤ 28                | NC                    | ≥ 16                | NC                    | (+)              | -                                                  | -                                   |
|                | - Air Lock Lobby 1 & 2            | N/A           | NC                  | NC                    | NC                  | NC                    | NC               | -                                                  | -                                   |
| <b>A10.001</b> | <b>Main Substation</b>            |               |                     |                       |                     |                       |                  |                                                    |                                     |
|                | - Cable Spreading Room            | B2            | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (D)                                     | -                                   |
|                | - Automatic Fire Suppression Room | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (B)                      |
|                | - Supply Ventilation Chamber 1    | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (G)                                     | -                                   |
|                | - Supply Ventilation Chamber 2    | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (G)                                     | -                                   |

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| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr.          | Space                               | Room Category | Summer              |                       | Winter              |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br>Refer note (O) | Minimum Exhaust Air Requirements    |
|------------------|-------------------------------------|---------------|---------------------|-----------------------|---------------------|-----------------------|------------------|----------------------------------------------------|-------------------------------------|
|                  |                                     |               | Temperature DB [°C] | Relative Humidity [%] | Temperature DB [°C] | Relative Humidity [%] |                  |                                                    |                                     |
|                  | - Transformer Room A                | B3            | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (D)                                     | -                                   |
|                  | - Transformer Room B                | B3            | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (D)                                     | -                                   |
|                  | - MV & LV Switchgear Room           | B3            | ≤ 30                | NC                    | ≥ 10*               | NC                    | (+)              | Refer note (D)                                     | -                                   |
|                  | - Battery Room                      | B3            | ≤ 25                | NC                    | ≥ 10                | NC                    | (-)              | Refer note (A) & (M)                               | Refer note (J) & (C)                |
|                  | - Electrical Room                   | B4            | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (D)                                     | -                                   |
| <b>A11.101</b>   | <b>Compressor House</b>             |               |                     |                       |                     |                       |                  |                                                    |                                     |
|                  | - Compressor Area – 1 & 2           | A             | ≤ 35                | NC                    | ≥ 16*               | NC                    | (+)              | Refer note (A), (H) & (M)                          | Refer note (C) & (L)                |
|                  | - Supply Ventilation Chamber        | Д             | ≤ 31                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                      |
|                  | - Toilet                            | N/A           | NC                  | NC                    | ≥ 16                | NC                    | (-)              | -                                                  | 50 m³/h/toilet pan & Refer note (C) |
|                  | - Automatic Fire Suppression Room   | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                      |
| <b>A11.104.2</b> | <b>Feed Water Pump House</b>        |               |                     |                       |                     |                       |                  |                                                    |                                     |
|                  | - HP Boiler Feed Water Pump Station | B1            | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                      |
|                  |                                     |               |                     |                       |                     |                       |                  |                                                    |                                     |

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| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr.          | Space                                                       | Room Category | Summer              |                       | Winter              |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br>Refer note (O) | Minimum Exhaust Air Requirements    |
|------------------|-------------------------------------------------------------|---------------|---------------------|-----------------------|---------------------|-----------------------|------------------|----------------------------------------------------|-------------------------------------|
|                  |                                                             |               | Temperature DB [°C] | Relative Humidity [%] | Temperature DB [°C] | Relative Humidity [%] |                  |                                                    |                                     |
| <b>A17.704</b>   | <b>Chemical Storage Warehouse</b>                           |               |                     |                       |                     |                       |                  |                                                    |                                     |
|                  | - Chemical Storage                                          | B3            | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                      |
| <b>A17.707</b>   | <b>Circulating Water Supply Pumping Station</b>             |               |                     |                       |                     |                       |                  |                                                    |                                     |
|                  | - Chemical Treatment Package Unit                           | Д             | ≤ 35                | NC                    | ≥ 10*               | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                      |
|                  | - Toilet                                                    | N/A           | NC                  | NC                    | ≥ 16                | NC                    | (-)              | -                                                  | 50 m³/h/toilet pan & Refer note (C) |
| <b>A17.710.2</b> | <b>Nitrogen Plant and Demineralized Water Unit Building</b> |               |                     |                       |                     |                       |                  |                                                    |                                     |
|                  | - Nitrogen Unit                                             | B3            | ≤ 35                | NC                    | ≥ 10*               | NC                    | (+)              | Refer note (A), (H) & (L)                          | Refer note (C) & (L)                |
|                  | - Demi Water Unit                                           | Д             | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                      |
|                  | - Demi Water Pump                                           | Д             | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                      |
| <b>A17.717.1</b> | <b>Glycol-Water Treatment Plant Building</b>                |               |                     |                       |                     |                       |                  |                                                    |                                     |
|                  | - Glycol Water Pump Station                                 | Д             | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                      |
|                  |                                                             |               |                     |                       |                     |                       |                  |                                                    |                                     |

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| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr.          | Space                                                | Room Category | Summer                 |                       | Winter                 |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br>Refer note (O) | Minimum Exhaust Air Requirements |
|------------------|------------------------------------------------------|---------------|------------------------|-----------------------|------------------------|-----------------------|------------------|----------------------------------------------------|----------------------------------|
|                  |                                                      |               | Temperature DB<br>[°C] | Relative Humidity [%] | Temperature DB<br>[°C] | Relative Humidity [%] |                  |                                                    |                                  |
| <b>A17.710.1</b> | <b>Central Heating Station Building</b>              |               |                        |                       |                        |                       |                  |                                                    |                                  |
|                  | - Heating Station                                    | D             | ≤ 35                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                   |
| <b>A17.715.1</b> | <b>Water Preparation Unit Building 1</b>             |               |                        |                       |                        |                       |                  |                                                    |                                  |
|                  | - Sulphuric and Hydrochloric Acids Room              | D             | ≤ 35                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                   |
|                  | - Caustic Soda Room                                  | D             | ≤ 35                   | NC                    | ≥ 16                   | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                   |
|                  | - Hypochlorite Room                                  | D             | ≤ 35                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                   |
|                  | - Lime Milk Station                                  | D             | ≤ 35                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                   |
|                  | - Transformer Room                                   | B4            | ≤ 35                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (D)                                     | -                                |
|                  | - UPS Room                                           | B4            | 24 ± 2                 | 50 ± 10               | 21 ± 2                 | 40 ± 10               | (-)              | Refer note (A) & (H) whichever is higher           | Refer note (C)                   |
|                  | - Electrical Room                                    | B2            | ≤ 30                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (D)                                     | -                                |
|                  | - Rack Room                                          | B3            | 24 ± 2                 | 50 ± 10               | 21 ± 2                 | 40 ± 10               | (+)              | Refer note (H)                                     | Refer note (K)                   |
|                  | - Heating Room                                       | D             | ≤ 35                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (G)                                     | -                                |
|                  | - Filtration Hall Ground Floor (Plan at el +100.200) | D             | ≤ 35                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                   |

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| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr.           | Space                                                        | Room Category | Summer              |                       | Winter              |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br>Refer note (O) | Minimum Exhaust Air Requirements    |
|-------------------|--------------------------------------------------------------|---------------|---------------------|-----------------------|---------------------|-----------------------|------------------|----------------------------------------------------|-------------------------------------|
|                   |                                                              |               | Temperature DB [°C] | Relative Humidity [%] | Temperature DB [°C] | Relative Humidity [%] |                  |                                                    |                                     |
|                   | - Exhaust Ventilation Chamber                                | B2            | ≤ 30                | NC                    | ≥ 10                | NC                    | (-)              | Refer note (E)                                     | -                                   |
|                   | - Ante Room                                                  | N/A           | NC                  | NC                    | NC                  | NC                    | NC               | -                                                  | -                                   |
|                   | - Express Laboratory                                         | D             | 24 ± 2              | NC                    | 21 ± 2              | NC                    | (+)              | Refer note (D)                                     | -                                   |
|                   | - Operator Room                                              | B4            | 24 ± 2              | NC                    | 21 ± 2              | NC                    | (+)              | Refer note (D)                                     | -                                   |
|                   | - Supply Ventilation Chamber                                 | D             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (G)                                     | -                                   |
|                   | - Filtration Hall First Floor<br>(Plan at el +108.250)       | D             | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                      |
|                   | - Toilet                                                     | N/A           | NC                  | NC                    | ≥ 16                | NC                    | (-)              | -                                                  | 50 m³/h/toilet pan & Refer note (B) |
| A17.715.2         | - <b>Water Preparation Unit Building 2 (Biological Unit)</b> |               |                     |                       |                     |                       |                  |                                                    |                                     |
|                   | - Biological Unit Room                                       | D             | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                      |
|                   | - Supply Ventilation Chamber                                 | D             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                      |
| <b>UREA PLANT</b> |                                                              |               |                     |                       |                     |                       |                  |                                                    |                                     |
| U20.002           | - <b>Control Room and Laboratory Building</b>                |               |                     |                       |                     |                       |                  |                                                    |                                     |

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| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr. | Space                                  | Room Category | Summer                 |                       | Winter                 |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br><br>Refer note (O)        | Minimum Exhaust Air Requirements                                  |
|---------|----------------------------------------|---------------|------------------------|-----------------------|------------------------|-----------------------|------------------|---------------------------------------------------------------|-------------------------------------------------------------------|
|         |                                        |               | Temperature DB<br>[°C] | Relative Humidity [%] | Temperature DB<br>[°C] | Relative Humidity [%] |                  |                                                               |                                                                   |
|         | - <b>Laboratory Area</b>               |               |                        |                       |                        |                       |                  |                                                               |                                                                   |
|         | - Supply Ventilation Chamber           | Д             | ≤ 30                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (A) & (G)                                          | Refer note (C)                                                    |
|         | - Emission Spectrometric Room          | B4            | 24 ± 2                 | 50 ± 10               | 21 ± 2                 | 40 ± 10               | (-)              | Refer note (A), (M), (I) & 60 m³/h/person whichever is higher | Laboratory equipment exhaust: 400 ÷ 1900 m³/h also refer note (C) |
|         | - Gas Chromatographic Room             | B4            | 24 ± 2                 | 50 ± 10               | 21 ± 2                 | 40 ± 10               | (-)              | Refer note (A), (I), (M) & 60 m³/h/person whichever is higher | Laboratory equipment exhaust: 0 ÷ 1950 m³/h also refer note (C)   |
|         | - Storage Room for Control Gas Mixture | B4            | ≤ 26                   | NC                    | ≥ 16                   | NC                    | (-)              | Refer note (A), (M) & (I)                                     | Laboratory equipment exhaust: 260 m³/h also refer note (C)        |
|         | - Exhaust Ventilation Chamber          | B4            | ≤ 30                   | NC                    | ≥ 10                   | NC                    | (-)              | Refer note (A) & (E)                                          | Refer note (C)                                                    |
|         | - Corridor                             | N/A           | ≤ 28                   | NC                    | ≥ 16                   | NC                    | (+)              | Refer note (A)                                                | Refer note (C)                                                    |
|         | - Preparation Room                     | B4            | 24 ± 2                 | 50 ± 10               | 21 ± 2                 | 40 ± 10               | (-)              | Refer note (A), (M), (I) & 60 m³/h/person whichever is higher | Laboratory equipment exhaust: 160 ÷ 1660 m³/h also refer note (C) |
|         | - Chemical Laboratory Room             | B4            | 24 ± 2                 | 50 ± 10               | 21 ± 2                 | 40 ± 10               | (-)              | Refer note (A), (I), (M) & 60 m³/h/person whichever is higher | Laboratory equipment exhaust: 0 ÷ 8700 m³/h also refer note (C)   |
|         | - Office                               | B4            | 24 ± 2                 | 50 ± 10               | 21 ± 2                 | 40 ± 10               | (+)              | Refer note (A), (I) & 60 m³/h/person whichever is higher      | Refer note (C)                                                    |

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| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr. | Space                             | Room Category | Summer              |                       | Winter              |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br><br>Refer note (O)        | Minimum Exhaust Air Requirements                                      |
|---------|-----------------------------------|---------------|---------------------|-----------------------|---------------------|-----------------------|------------------|---------------------------------------------------------------|-----------------------------------------------------------------------|
|         |                                   |               | Temperature DB [°C] | Relative Humidity [%] | Temperature DB [°C] | Relative Humidity [%] |                  |                                                               |                                                                       |
|         | - Labware Room                    | Д             | 24 ± 2              | 50 ± 10               | 21 ± 2              | 40 ± 10               | (-)              | Refer note (A) & (G)                                          | Refer note (C)                                                        |
|         | - Urea Analysis Room              | B4            | 24 ± 2              | 50 ± 10               | 21 ± 2              | 40 ± 10               | (-)              | Refer note (A), (I), (M) & 60 m³/h/person whichever is higher | Laboratory equipment exhaust: 0 ÷ 1500 m³/h also refer note (C) & (N) |
|         | - Toilet                          | N/A           | NC                  | NC                    | ≥16                 | NC                    | (-)              | -                                                             | 50 m³/h/toilet pan & Refer note (C)                                   |
|         | - <b>Control Room Area</b>        |               |                     |                       |                     |                       |                  |                                                               |                                                                       |
|         | - Supply Ventilation Chamber      | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (G)                                                | -                                                                     |
|         | - Electric Point                  | B3            | ≤ 30                | NC                    | ≥10                 | NC                    | (+)              | Refer note (D)                                                | -                                                                     |
|         | - Meeting Room                    | N/A           | 24 ± 2              | NC                    | 21 ± 2              | NC                    | (+)              | Refer note (D) & 60 m³/h/person whichever is higher           | -                                                                     |
|         | - Automatic Fire Suppression Room | Д             | ≤30                 | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                                          | Refer note (B)                                                        |
|         | - UPS Room                        | B4            | 24 ± 2              | 50 ± 10               | 21 ± 2              | 40 ± 10               | (-)              | Refer note (A) & (H) whichever is higher                      | Refer note (B)                                                        |
|         | - Instrument Room                 | B3            | 24 ± 2              | 50 ± 10               | 21 ± 2              | 40 ± 10               | (+)              | Refer note (H) & 60 m³/h/person whichever is higher           | Refer note (K)                                                        |

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## Appendix 1 - HVAC System Design Bases

| Sr. Nr. | Space                            | Room Category | Summer                 |                       | Winter                 |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br>Refer note (O)  | Minimum Exhaust Air Requirements    |
|---------|----------------------------------|---------------|------------------------|-----------------------|------------------------|-----------------------|------------------|-----------------------------------------------------|-------------------------------------|
|         |                                  |               | Temperature DB<br>[°C] | Relative Humidity [%] | Temperature DB<br>[°C] | Relative Humidity [%] |                  |                                                     |                                     |
|         | - Control (Panel) Room           | B3            | 24 ± 2                 | 50 ± 10               | 21 ± 2                 | 40 ± 10               | (+)              | Refer note (H) & 60 m³/h/person whichever is higher | Refer note (K)                      |
|         | - Engineering and Technical Room | B4            | 24 ± 2                 | NC                    | 21 ± 2                 | NC                    | (+)              | 60 m³/h/person                                      | -                                   |
|         | - Exhaust Ventilation Chamber    | B3            | ≤ 30                   | NC                    | ≥ 10                   | NC                    | (-)              | Refer note (E)                                      | -                                   |
|         | - Male Toilet                    | N/A           | NC                     | NC                    | ≥ 16                   | NC                    | (-)              | -                                                   | 50 m³/h/toilet pan & Refer note (B) |
|         | - Female Toilet                  | N/A           | NC                     | NC                    | ≥ 16                   | NC                    | (-)              | -                                                   | 50 m³/h/toilet pan & Refer note (B) |
|         | - Inventory Room                 | N/A           | NC                     | NC                    | ≥ 16                   | NC                    | (-)              | Refer note (D)                                      | -                                   |
|         | - Shift Supervisor Room          | N/A           | 24 ± 2                 | NC                    | 21 ± 2                 | NC                    | (+)              | 60 m³/h/person                                      | -                                   |
|         | - Instrumentation Fitting Shop   | N/A           | 24 ± 2                 | NC                    | 21 ± 2                 | NC                    | (+)              | 60 m³/h/person                                      | -                                   |
|         | - Meal Room                      | N/A           | ≤ 29                   | NC                    | ≥ 21                   | NC                    | (-)              | Refer note (A) & (F)                                | Refer note (G) & (B)                |
|         | - Corridor                       | N/A           | ≤ 28                   | NC                    | ≥ 16                   | NC                    | (+)              | -                                                   | -                                   |
|         | - Air Lock Lobby 3 & 4           | N/A           | NC                     | NC                    | NC                     | NC                    | NC               | -                                                   | -                                   |
|         |                                  |               |                        |                       |                        |                       |                  |                                                     |                                     |

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|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr.        | Space                                             | Room Category | Summer              |                       | Winter              |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br>Refer note (O) | Minimum Exhaust Air Requirements |
|----------------|---------------------------------------------------|---------------|---------------------|-----------------------|---------------------|-----------------------|------------------|----------------------------------------------------|----------------------------------|
|                |                                                   |               | Temperature DB [°C] | Relative Humidity [%] | Temperature DB [°C] | Relative Humidity [%] |                  |                                                    |                                  |
| <b>U20.001</b> | - <b>Main Substation</b>                          |               |                     |                       |                     |                       |                  |                                                    |                                  |
|                | - Cable Spreading Room                            | B2            | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (D)                                     | -                                |
|                | - Automatic Fire Suppression Room                 | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (B)                   |
|                | - Supply Ventilation Chamber 1                    | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (G)                                     | -                                |
|                | - Supply Ventilation Chamber 2                    | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (G)                                     | -                                |
|                | - Transformer Room A                              | B3            | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (D)                                     | -                                |
|                | - Transformer Room B                              | B3            | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (D)                                     | -                                |
|                | - MV & LV Switchgear Room                         | B3            | ≤ 30                | NC                    | ≥ 10*               | NC                    | (+)              | Refer note (D)                                     | -                                |
|                | - Battery Room                                    | B3            | ≤ 25                | NC                    | ≥ 10                | NC                    | (-)              | Refer note (A) & (M)                               | Refer note (J) & (C)             |
| <b>U22.201</b> | - <b>Urea Melt-Synthesis Plant</b>                |               |                     |                       |                     |                       |                  |                                                    |                                  |
|                | - Melt Area at El. +100.200                       | B3            | ≤ 35                | NC                    | ≥ 10*               | NC                    | (+)              | Refer note (A), (H) & (L)                          | Refer note (C) & (L)             |
|                | - Elevator Machine Room                           | N/A           | ≤ 35                | NC                    | ≥ 5                 | NC                    | (+)              | Refer note (A) & (D)                               | Refer note (C)                   |
|                | - <i>Melt Area at El. +100.200 grid 11-13/B-D</i> | <i>B3</i>     | <i>≤ 35</i>         | <i>NC</i>             | <i>≥ 10*</i>        | <i>NC</i>             | <i>(+)</i>       | <i>Refer note (A), (H) &amp; (L)</i>               | <i>Refer note (C) &amp; (L)</i>  |

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| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr.        | Space                                     | Room Category | Summer              |                       | Winter              |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br>Refer note (O) | Minimum Exhaust Air Requirements |
|----------------|-------------------------------------------|---------------|---------------------|-----------------------|---------------------|-----------------------|------------------|----------------------------------------------------|----------------------------------|
|                |                                           |               | Temperature DB [°C] | Relative Humidity [%] | Temperature DB [°C] | Relative Humidity [%] |                  |                                                    |                                  |
|                | - Elevator Shaft                          | N/A           | NC                  | NC                    | NC                  | NC                    | NC               | <del>Refer note (N)</del>                          | <del>Refer note (B)</del>        |
|                | - Supply Ventilation Chamber              | Д             | ≤ 32                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                   |
|                | - Exhaust Ventilation Chamber             | B3            | ≤ 32                | NC                    | ≥ 10                | NC                    | (-)              | Refer note (A) & (E)                               | Refer note (C)                   |
| <b>U22.204</b> | - <b>Urea Melt- HP Ammonia Pumps Room</b> |               |                     |                       |                     |                       |                  |                                                    |                                  |
|                | - Pumps Room                              | A             | ≤ 35                | NC                    | ≥ 5                 | NC                    | (+)              | Refer note (A), (H) & (L)                          | Refer note (C) & (L)             |
|                | - Supply Ventilation Chamber              | Д             | ≤ 32                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                   |
| <b>U22.205</b> | - <b>Urea Melt- CO2 Compressor</b>        |               |                     |                       |                     |                       |                  |                                                    |                                  |
|                | - CO2 Compressor Room                     | B3            | ≤ 35                | NC                    | ≥ 10*               | NC                    | (+)              | Refer note (A), (H) & (L)                          | Refer note (C) & (L)             |
|                | - Dry Air Unit                            | B3            | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                   |
|                | - Nitrogen Unit                           | B3            | ≤ 35                | NC                    | ≥ 10*               | NC                    | (+)              | Refer note (A), (H) & (L)                          | Refer note (C) & (L)             |
| <b>U23.301</b> | - <b>Urea Granulation Unit</b>            |               |                     |                       |                     |                       |                  |                                                    |                                  |
|                | - Production Premise at El. +100.200      | B1            | ≤ 35                | NC                    | ≥ 5                 | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                   |

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| Document Title                       | TCM Document No.      | Rev. |
|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr. | Space                                   | Room Category | Summer              |                       | Winter              |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br>Refer note (O) | Minimum Exhaust Air Requirements |
|---------|-----------------------------------------|---------------|---------------------|-----------------------|---------------------|-----------------------|------------------|----------------------------------------------------|----------------------------------|
|         |                                         |               | Temperature DB [°C] | Relative Humidity [%] | Temperature DB [°C] | Relative Humidity [%] |                  |                                                    |                                  |
|         | - Production Premise at El. +107.300    | B1            | ≤ 35                | NC                    | ≥ 5                 | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                   |
|         | - Production Premise at El. +113.100    | B1            | ≤ 35                | NC                    | ≥ 5                 | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                   |
|         | - Production Premise at El. +122.700    | B1            | ≤ 35                | NC                    | ≥ 5                 | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                   |
|         | - Production Premise at El. +128.100    | B1            | ≤ 35                | NC                    | ≥ 5                 | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                   |
|         | - Production Premise at El. +136.250    | B1            | ≤ 35                | NC                    | ≥ 5                 | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                   |
|         | - Production Premise at El. +142.900    | B1            | ≤ 35                | NC                    | ≥ 5                 | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                   |
|         | - Production Premise at El. +152.800    | B1            | ≤ 35                | NC                    | ≥ 5                 | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                   |
|         | - Production Premise at El. +159.300    | B1            | ≤ 35                | NC                    | ≥ 5                 | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                   |
|         | - Elevator Machine Room at El. +166.400 | N/A           | ≤ 35                | NC                    | ≥ 5                 | NC                    | (+)              | Refer note (A) & (D)                               | Refer note (C)                   |
|         | - Elevator Shaft                        | N/A           | NC                  | NC                    | NC                  | NC                    | NC               | Refer note (N)                                     | Refer note (B)                   |

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| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr.                         | Space                                                                                                       | Room Category | Summer              |                       | Winter              |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br>Refer note (O) | Minimum Exhaust Air Requirements     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------|---------------|---------------------|-----------------------|---------------------|-----------------------|------------------|----------------------------------------------------|--------------------------------------|
|                                 |                                                                                                             |               | Temperature DB [°C] | Relative Humidity [%] | Temperature DB [°C] | Relative Humidity [%] |                  |                                                    |                                      |
|                                 | - Staircase                                                                                                 | N/A           | NC                  | NC                    | NC                  | NC                    | NC               | Refer note (N)                                     | Refer note (B)                       |
|                                 | - Corridors at el. +107.300, +113.100, +122.700, +128.100, +131.630, +136.250, +142.900, +152.800, 159.300. | N/A           | NC                  | NC                    | NC                  | NC                    | NC               | Refer note (M)                                     | Smoke Exhaust Ventilation            |
|                                 | - HVAC Room 1 to 4                                                                                          | Д             | ≤ 31                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                       |
| <b>U24.401</b>                  | - <b>Granulated Urea Storage</b>                                                                            |               |                     |                       |                     |                       |                  |                                                    |                                      |
|                                 | - Urea Bulk Storage                                                                                         | B1            | NC                  | NC                    | ≥ 25                | NC                    | (+)              | -                                                  | Natural ventilation smoke extraction |
| <b>U24.402.1/<br/>U24.402.2</b> | - <b>Urea Train Loading Station and Loading Control Room Building</b>                                       |               |                     |                       |                     |                       |                  |                                                    |                                      |
|                                 | - Supply Ventilation Chamber                                                                                | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (G)                                     | -                                    |
|                                 | - Fire Suppression Room                                                                                     | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (B)                       |
|                                 | - Control Room                                                                                              | B4            | 24 ± 2              | 50 ± 10               | 21 ± 2              | 40 ± 10               | (+)              | Refer note (H)                                     | Refer note (K)                       |
|                                 | - Toilet and Lockers                                                                                        | N/A           | NC                  | NC                    | ≥ 16                | NC                    | (-)              | -                                                  | 50 m³/h/toilet pan & Refer note (B)  |
|                                 | - Off-spec Big Bag Unit                                                                                     | B1            | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (H)                               | Refer note (C)                       |

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|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

## Appendix 1 - HVAC System Design Bases

| Sr. Nr.        | Space                                                  | Room Category | Summer                 |                       | Winter                 |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br><br>Refer note (O) | Minimum Exhaust Air Requirements |
|----------------|--------------------------------------------------------|---------------|------------------------|-----------------------|------------------------|-----------------------|------------------|--------------------------------------------------------|----------------------------------|
|                |                                                        |               | Temperature DB<br>[°C] | Relative Humidity [%] | Temperature DB<br>[°C] | Relative Humidity [%] |                  |                                                        |                                  |
| <b>U24.406</b> | - <b>Secondary Electrical Substation and Rack Room</b> |               |                        |                       |                        |                       |                  |                                                        |                                  |
|                | - Cable Spreading Room                                 | B2            | ≤ 35                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (D)                                         | -                                |
|                | - UPS Room                                             | B4            | 24 ± 2                 | 50 ± 10               | 21 ± 2                 | 40 ± 10               | (-)              | Refer note (A) & (H) whichever is higher               | Refer note (B)                   |
|                | - Fire Suppression Room                                | Д             | ≤ 30                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (A) & (G)                                   | Refer note (B)                   |
|                | - Supply and Exhaust Ventilation Chamber               | Д             | ≤ 30                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (G)                                         | -                                |
|                | - Transformer Room                                     | B4            | ≤ 35                   | NC                    | ≥ 10                   | NC                    | (+)              | Refer note (D)                                         | -                                |
|                | - Switchgear Room                                      | B3            | ≤ 30                   | NC                    | ≥ 10*                  | NC                    | (+)              | Refer note (D)                                         | -                                |
|                | - Rack Room                                            | B3            | 24 ± 2                 | 50 ± 10               | 21 ± 2                 | 40 ± 10               | (+)              | Refer note (H)                                         | Refer note (K)                   |
|                |                                                        |               |                        |                       |                        |                       |                  |                                                        |                                  |
| <b>U27.707</b> | - <b>Circulating Water Supply Pumping Station</b>      |               |                        |                       |                        |                       |                  |                                                        |                                  |
|                | - Chemical Treatment Package Unit                      | Д             | ≤ 35                   | NC                    | ≥ 10*                  | NC                    | (+)              | Refer note (A) & (H)                                   | Refer note (C)                   |
|                | - Toilet                                               | N/A           | NC                     | NC                    | ≥ 16                   | NC                    | (-)              | -                                                      | 50 m³/h/toilet pan               |

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## Appendix 1 - HVAC System Design Bases

| Sr. Nr. | Space                        | Room Category | Summer              |                       | Winter              |                       | Pressure<br>[Pa] | Minimum Outdoor Air Requirements<br>Refer note (O) | Minimum Exhaust Air Requirements |
|---------|------------------------------|---------------|---------------------|-----------------------|---------------------|-----------------------|------------------|----------------------------------------------------|----------------------------------|
|         |                              |               | Temperature DB [°C] | Relative Humidity [%] | Temperature DB [°C] | Relative Humidity [%] |                  |                                                    |                                  |
| U27.717 | - Central Heating Station    |               |                     |                       |                     |                       |                  |                                                    |                                  |
|         | - Heating Station            | Д             | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                   |
|         | - Safety Shower Room         | Д             | ≤ 35                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                   |
|         | - Supply Ventilation Chamber | Д             | ≤ 30                | NC                    | ≥ 10                | NC                    | (+)              | Refer note (A) & (G)                               | Refer note (C)                   |

### Legend:

- N/A : Not applicable.  
 NC : Not controlled.  
 (+) : Space in positive pressure with respect to outdoors.  
 (-) : Space in negative pressure with respect adjacent spaces, but in positive pressure with respect to outdoors.  
 \* : While technologies are shutdown, the minimum acceptable temperature shall be 5°C.

### Notes:

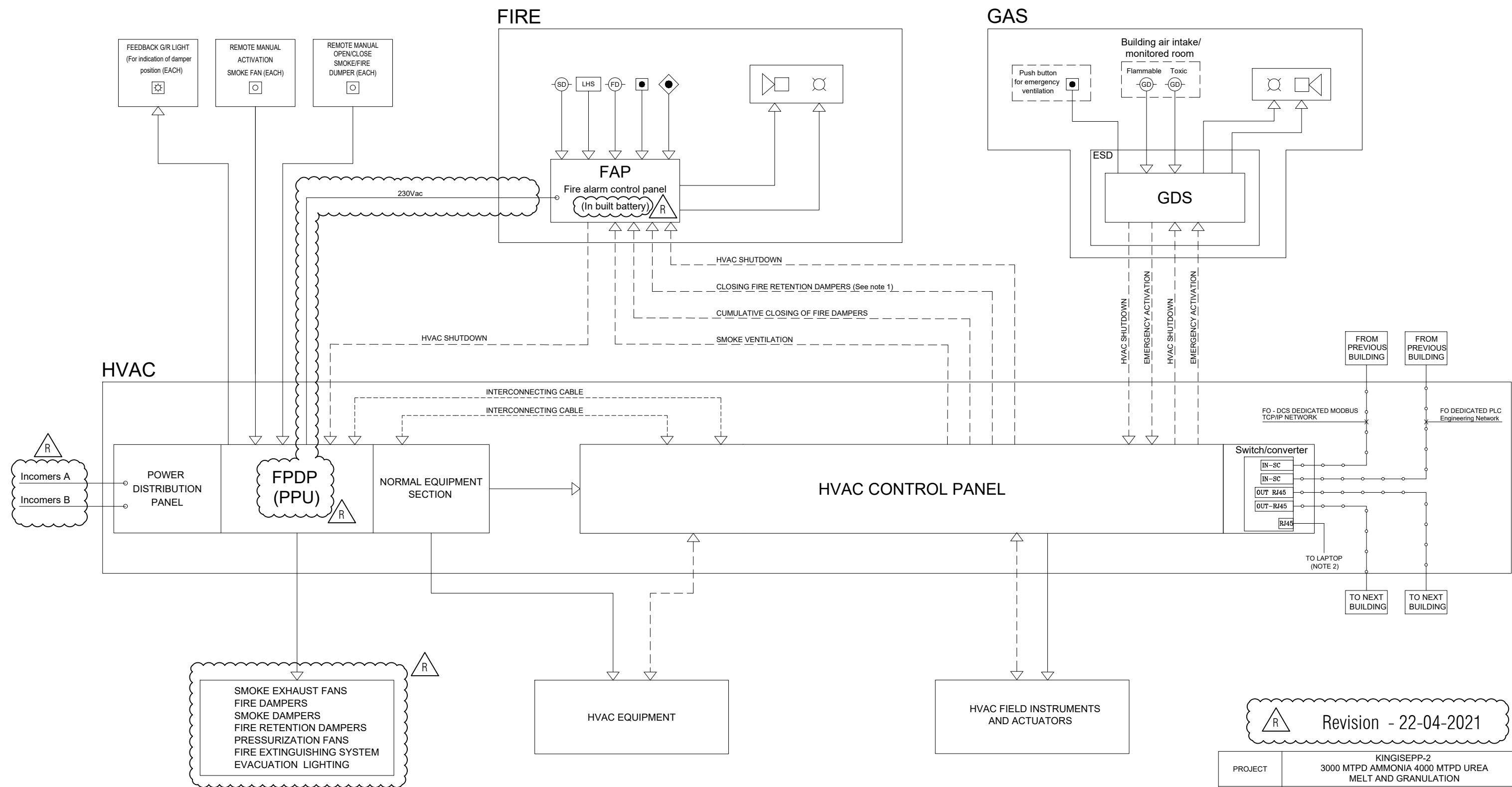
- (A) : As necessary to meet the space thermal load demand.  
 (B) : Supply air to be totally exhausted/exfiltrated.  
 (C) : Air handling system 100% outdoor air type; supply air to be totally exhausted/exfiltrated.

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|--------------------------------------|-----------------------|------|
| DESIGN SPECIFICATION FOR HVAC SYSTEM | 4124-BH-SG-2000000001 | 03   |

- (D) : As per Russian standard & codes.
- (E) : Not less than 1 ACH.
- (F) : Not less than 2 ACH.
- (G) : Not less than 3 ACH.
- (H) : Not less than 5 ACH.
- (I) : Not less than 8 ACH.
- (J) : Not less than 10 ACH.
- (K) : Smoke extraction not less than 4 ACH.
- (L) : Emergency ventilation not less than 8 ACH (with respect to the actual volume of the building).
- (M) : As necessary to compensate the air exhausted.
- (N) : Room provided with pressurization in case of fire alarm.
- (O) : The air changes per hour (ACH) shall be calculated with respect to the “ventilation volume”, in accordance with the attachment II of SP 60.13330.2016, where it is specified that, for rooms higher than 6m, the volume shall be equal to 6A, where A is the surface of the room.

# APPENDIX2 - HVAC Automatic Control System Architecture 1

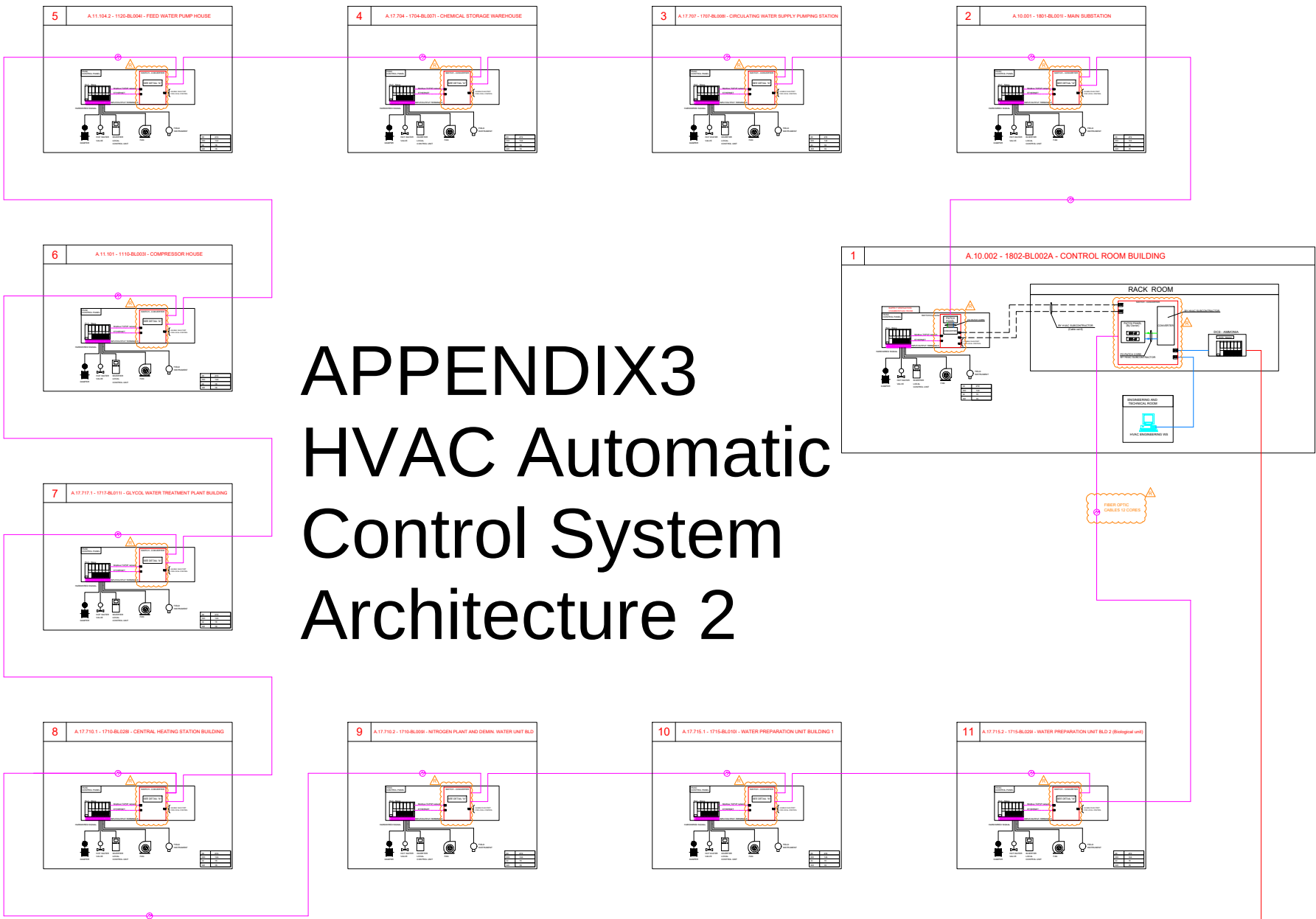


NOTE 1: ONE SIGNAL FOR EACH ROOM PROTECTED BY CLEAN AGENT  
NOTE 1: • RJ45 PORT FOR ETHERNET CABLE IN ORDER TO MAKE MAINTENANCE AND / OR LOCAL DATA DETECTION POSSIBLE BY MEANS OF A PORTABLE PC.

|                    |                                                                         |            |
|--------------------|-------------------------------------------------------------------------|------------|
| PROJECT            | KINGISEPP-2<br>3000 MTPD AMMONIA 4000 MTPD UREA<br>MELT AND GRANULATION |            |
| DOCUMENT<br>TITLE  | HVAC AUTOMATIC CONTROL SYSTEM ARCHITECTURE                              |            |
| DOCUMENT<br>NUMBER | -                                                                       | 22-04-2021 |



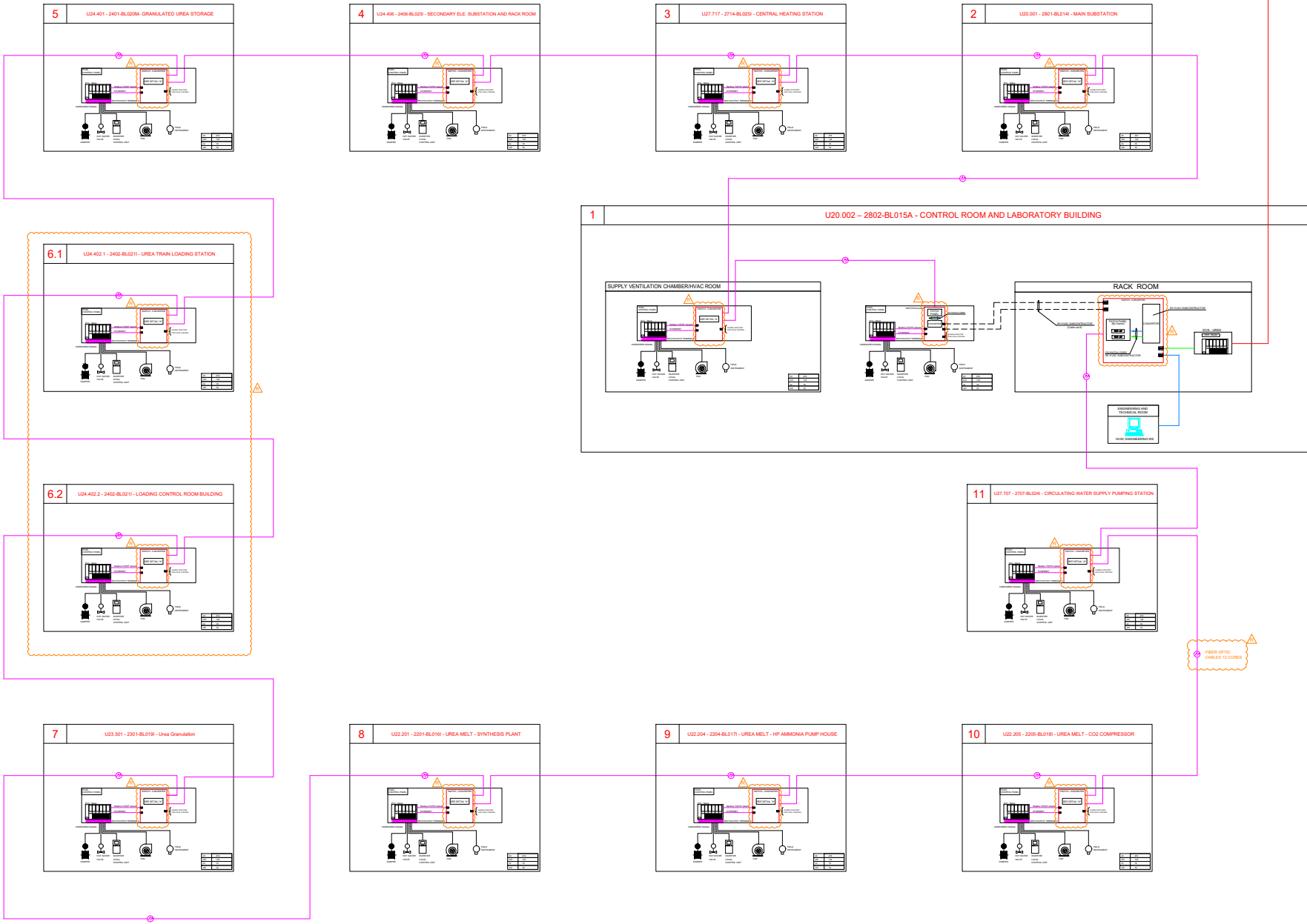
AMMONIA PLANT



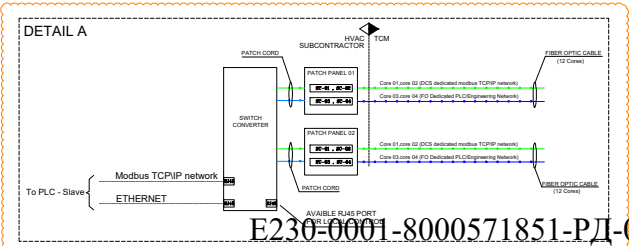
APPENDIX3  
HVAC Automatic  
Control System  
Architecture 2

FIBER OPTIC CABLE CONNECTION BETWEEN AMMONIA AND UREA DCS

UREA PLANT



| LEGEND                                                                                                                  |                                             |
|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
|                                                                                                                         | FIBER OPTIC CORES - DCS                     |
|                                                                                                                         | FIBER OPTIC CORES - PLC/Engineering Network |
|                                                                                                                         | HARDWIRED SIGNAL CABLE                      |
|                                                                                                                         | FIBER OPTIC CABLES 12 CORES                 |
|                                                                                                                         | CABLE - Cat.6                               |
| NOTE                                                                                                                    |                                             |
| For all building sequences and connection refer to document:<br>4124-KK-DD-20000003 - FIBER OPTIC GENERAL BLOCK DIAGRAM |                                             |



Revision 4 Aug 2021

HVAC SYSTEM - AUTOMATIC CONTROL  
SYSTEM ARCHITECTURE

**УСТАНОВКА ПО ПРОИЗВОДСТВУ АММИАКА  
ПРОИЗВОДИТЕЛЬНОСТЬЮ 3000 ТОНН/СУТКИ**

**УСТАНОВКА ПЛАВА И ГРАНУЛЯЦИИ КАРБАМИДА  
ПРОИЗВОДИТЕЛЬНОСТЬЮ 4000 Т/СУТКИ**

**ТЕХНИЧЕСКИЕ УСЛОВИЯ  
ПРОИЗВОДСТВО АММИАКА И КАРБАМИДА  
СИСТЕМА ОВКВ**

**ПРОЕКТ** : ПРОИЗВОДСТВО АММИАКА И КАРБАМИДА, КИНГИСЕПП

**ПЛОЩАДКА** : КИНГИСЕПП, РОССИЙСКАЯ ФЕДЕРАЦИЯ

**ВЛАДЕЛЕЦ** : ООО «ЕВРОХИМ - СЕВЕРО-ЗАПАД-2»

**ЗАКАЗ ТСМ №** : 4124

**ДОК. ТСМ №** : 4124-BH-SG-2000000001

**ДОК. №** :

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|             |                         |               |                                                                                       |                                                                                       |                                                                                       |
|-------------|-------------------------|---------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|             |                         |               |  |  |  |
| 03          | Окончательная редакция  | 6 авг. 2021   | А. Уджаване<br>(A.Ujawane)                                                            | Т. Матранга<br>(T.Matranga)                                                           | Т. Матранга<br>(T.Matranga)                                                           |
| 02          | Окончательная редакция  | 6 мая 2021    | А. Уджаване<br>(A.Ujawane)                                                            | Т. Матранга<br>(T.Matranga)                                                           | Т. Матранга<br>(T.Matranga)                                                           |
| 01          | Выпуск для рассмотрения | 27 нояб. 2020 | А. Уджаване<br>(A.Ujawane)                                                            | Т. Матранга<br>(T.Matranga)                                                           | Т. Матранга<br>(T.Matranga)                                                           |
| <b>Ред.</b> | <b>Описание</b>         | <b>Дата</b>   | <b>Подготовил</b>                                                                     | <b>Проверил</b>                                                                       | <b>Утвердил</b>                                                                       |

## **СОДЕРЖАНИЕ**

**1. ОБЛАСТЬ ПРИМЕНЕНИЯ**

**2. ОПРЕДЕЛЕНИЯ**

**3. ПРИМЕНИМЫЕ НОРМЫ И СТАНДАРТЫ**

**4. ОБЪЕКТЫ, ОСНАЩАЕМЫЕ СИСТЕМАМИ ОВКВ**

**5. РАСЧЕТНЫЕ УСЛОВИЯ И ОБЩИЕ КРИТЕРИИ**

**6. ОПИСАНИЕ СИСТЕМЫ ОВКВ**

**ПРИЛОЖЕНИЕ 1 – Исходные данные для проектирования систем ОВКВ**

**ПРИЛОЖЕНИЕ 2 - Архитектура системы автоматического управления ОВКВ 1**

**| ПРИЛОЖЕНИЕ 3 - Архитектура системы автоматического управления ОВКВ 2**

## 1. ОБЛАСТЬ ПРИМЕНЕНИЯ

Настоящим документом определяются основные требования к проектированию систем отопления, вентиляции и кондиционирования воздуха (ОВКВ), для новых установок по производству аммиака и карбамида (проект Кингисепп-2), расположенных в г. Кингисепп, Российская Федерация, которые выполняются по заказу ООО «Еврохим – Северо-Запад-2».

## 2. ОПРЕДЕЛЕНИЯ

Определения общеупотребительных терминов приведены в документе «Общие и специальные условия Субподряда».

Термины, которые относятся к данному проекту, приведены в документе подрячика 4124-YZ-PC-200000026 — Глоссарий терминологии проекта.

## 3. ПРИМЕНИМЫЕ НОРМЫ И СТАНДАРТЫ

Системы ОВКВ должны разрабатываться в соответствии с законами, нормативными документами и правилами Российской Федерации, а также применимыми нормами и стандартами. Приведенный ниже список включает основные применимые стандарты и нормы.

В случае замены какого-либо из перечисленных ниже стандартов и норм, применяется соответствующий стандарт или норма.

|                      |                                                                                  |
|----------------------|----------------------------------------------------------------------------------|
| СНиП 21-01-97        | Пожарная безопасность зданий и сооружений                                        |
| СНиП 12-04-2002      | Безопасность труда в строительстве. Часть 2. Строительные работы                 |
| СНиП 3.04.01-87      | Изоляционные и отделочные покрытия                                               |
| СНиП 3.05.05-84      | Технологическое оборудование и технологические трубопроводы                      |
| СНиП 41-103-2003     | Проектирование тепловой изоляции оборудования и трубопроводов                    |
| СНиП 3.05.07.85      | Системы автоматизации                                                            |
| СанПиН 2.2.4.548-96  | Гигиенические требования к микроклимату производственных помещений               |
| СанПиН 2.2.4.3359-16 | Санитарно-эпидемиологические требования к физическим факторам на рабочих местах. |
| ГОСТ 12.1.005-88     | Общие санитарно-гигиенические требования к воздуху рабочей зоны                  |
| ГОСТ 12.1.003-83     | Шум. Общие требования безопасности.                                              |
| ГОСТ 3262-75         | Трубы стальные водогазопроводные. Технические условия                            |
| ГОСТ 10704-91        | Трубы стальные электросварные прямошовные                                        |
| ГОСТ 19907-83        | Ткани электроизоляционные из стеклянных крученых комплексных нитей               |
| ГОСТ 19904-90        | Прокат листовой холоднокатаный. Сортамент                                        |

|                      |                                                                                                                                                                                       |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ГОСТ 19903-74        | Прокат листовой горячекатаный. Сортамент                                                                                                                                              |
| ГОСТ 21.404-85       | Система проектной документации для строительства (СПДС). Автоматизация технологических процессов. Обозначения условные приборов и средств автоматизации в схемах.                     |
| ГОСТ 21.208-2013     | Система проектной документации для строительства (СПДС). Автоматизация технологических процессов. Обозначения условные приборов и средств автоматизации в схемах                      |
| ГОСТ 9467-75         | Электроды покрытые металлические для ручной дуговой сварки конструкционных и теплоустойчивых сталей. Типы                                                                             |
| ГОСТ Р 12.3.047-2012 | Система стандартов безопасности труда (ССБТ). Пожарная безопасность технологических процессов. Общие требования.                                                                      |
| ГОСТ 17433-80        | Промышленная чистота. Сжатый воздух. Классы загрязненности                                                                                                                            |
| ГОСТ 9544-2015       | Арматура трубопроводная. Нормы герметичности затворов                                                                                                                                 |
| ГОСТ 12.1.007-76     | Система стандартов безопасности труда (ССБТ). Вредные вещества. Классификация и общие требования безопасности.                                                                        |
| ГОСТ Р 51330.11-99   | Электрооборудование взрывозащищенное. Часть 12. Классификация смесей газов и паров с воздухом по безопасным экспериментальным максимальным зазорам и минимальным воспламеняющим токам |
| ГОСТ 30852.12-2002   | Электрооборудование взрывозащищенное. Часть 13. Проектирование и эксплуатация помещений, защищенных избыточным давлением                                                              |
| ГОСТ 8239-89         | Двутавры стальные горячекатаные                                                                                                                                                       |
| ГОСТ 19425-74        | Балки двутавровые и швеллеры стальные специальные. Сортамент                                                                                                                          |
| ГОСТ Р ЕН 13779-2007 | Вентиляция в нежилых зданиях. Технические требования к системам вентиляции и кондиционирования                                                                                        |
| ГОСТ 617-2006        | Трубы медные и латунные круглого сечения общего назначения. Технические условия                                                                                                       |
| ГОСТ 29322-2014      | Напряжения стандартные                                                                                                                                                                |
| ГОСТ Р 53301-2009    | Клапаны противопожарные вентиляционных систем. Метод испытаний на огнестойкость                                                                                                       |
| ГОСТ 8732-78         | Трубы стальные бесшовные горячедеформированные. Сортамент                                                                                                                             |
| ГОСТ 21631           | Листы из алюминия и алюминиевых сплавов                                                                                                                                               |
| ГОСТ 23101-78        | Эмаль КО-88 кремнийорганическая термостойкая. Технические условия                                                                                                                     |
| ГОСТ Р 51330,12-99   | Электрооборудование взрывозащищенное. Часть 13. Проектирование и эксплуатация помещений, защищенных избыточным давлением                                                              |
| ГОСТ 10705-80        | Трубы стальные электросварные. Технические условия                                                                                                                                    |
| ГОСТ 14918-80        | Сталь тонколистовая оцинкованная с непрерывных линий. Технические условия                                                                                                             |
| ГОСТ 17375-2001      | Детали трубопроводов бесшовные приварные из углеродистой и низколегированной стали. Отводы крутоизогнутые типа 3D (R=1,5 DN). Конструкция                                             |
| ГОСТ 17376-2001      | Детали трубопроводов бесшовные приварные из углеродистой и низколегированной стали. Тройники. Конструкция                                                                             |

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| ГОСТ 17378-2001   | Детали трубопроводов бесшовные приварные из углеродистой и низколегированной стали. Переходы. Конструкция                                                                                                            |
| ГОСТ 17379-2001   | Детали трубопроводов бесшовные приварные из углеродистой и низколегированной стали. Заглушки эллиптические. Конструкция                                                                                              |
| ГОСТ 17380-2001   | Детали трубопроводов бесшовные приварные из углеродистой и низколегированной стали. Общие технические условия                                                                                                        |
| ГОСТ 6613-86      | Сетки проволочные тканые с квадратными ячейками. Технические условия                                                                                                                                                 |
| ГОСТ 14202-69     | Трубопроводы промышленных предприятий. Опознавательная окраска, предупреждающие знаки и маркировочные щитки                                                                                                          |
| ГОСТ 51251-99     | Фильтры очистки воздуха. Классификация. Маркировка                                                                                                                                                                   |
| ГОСТ Р 54808-2011 | Арматура трубопроводная. Нормы герметичности затворов. Арматура трубопроводная. Нормы герметичности затворов                                                                                                         |
| ГОСТ Р 51844-2009 | Техника пожарная. Шкафы пожарные. Общие технические требования. Методы испытаний.                                                                                                                                    |
| ГОСТ 21.205-93    | Система проектной документации для строительства (СПДС). Условные обозначения элементов санитарно-технических систем                                                                                                 |
| ГОСТ Р 53302-2009 | Оборудование противодымной защиты зданий и сооружений. Вентиляторы. Метод испытаний на огнестойкость                                                                                                                 |
| ГОСТ 15150-69     | Машины, приборы и другие технические изделия. Исполнения для различных климатических районов. Категории, условия эксплуатации, хранения и транспортирования в части воздействия климатических факторов внешней среды |
| СП 44.13330.2011  | Административные и бытовые здания                                                                                                                                                                                    |
| СП 7.13130.2013   | Отопление, вентиляция и кондиционирование. Требования пожарной безопасности                                                                                                                                          |
| СП 12.13130-2009  | Определение категорий помещений, зданий и наружных установок по взрывопожарной и пожарной опасности                                                                                                                  |
| СП 51.13330.2011  | Защита от шума                                                                                                                                                                                                       |
| СП 61.13330.2012  | Тепловая изоляция оборудования и трубопроводов                                                                                                                                                                       |
| СП 60.13330.2016  | Отопление, вентиляция и кондиционирование воздуха                                                                                                                                                                    |
| СП 73.13330.2016  | Внутренние санитарно-технические системы зданий                                                                                                                                                                      |
| СП 2.2.1.1312-03  | Гигиенические требования к проектированию вновь строящихся и реконструируемых промышленных предприятий                                                                                                               |
| СП 50.13330.2012  | Тепловая защита зданий. Актуализированная редакция СНиП 23-02-2003                                                                                                                                                   |
| СП 56.13330.2011  | Производственные здания. Актуализированная редакция СНиП 31-03-2001                                                                                                                                                  |
| СП 10.13330.2009  | Системы противопожарной защиты. Внутренний противопожарный водопровод                                                                                                                                                |
| СП 41-101-95      | Проектирование тепловых пунктов                                                                                                                                                                                      |
| СП 88.13330.2014  | Защитные сооружения гражданской обороны                                                                                                                                                                              |
| СП 23-101-2004    | Проектирование тепловой защиты зданий                                                                                                                                                                                |
| СП 41-103-2000    | Проектирование тепловой изоляции оборудования и трубопроводов                                                                                                                                                        |



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| СП 124.13330.2012       | Тепловые сети (актуализированная редакция СНиП 41-02-2003)                                                                                                                                         |
| СП 89.13330.2012        | Котельные установки (актуализированная редакция СНиП II-35-76)                                                                                                                                     |
| СП 33.13330.2012        | Расчет на прочность стальных трубопроводов (актуализированная редакция СНиП 2.04.12-86)                                                                                                            |
| СП 5.13130.2009         | Системы противопожарной защиты. Установки пожарной сигнализации и пожаротушения автоматические. Нормы и правила проектирования                                                                     |
| СП 131.13330.2018       | Строительная климатология (актуализированная редакция СНиП 23-01-99)                                                                                                                               |
| СП 118.13330.2012       | Общественные здания и сооружения                                                                                                                                                                   |
| СН 2.2.4 / 2.1.8.562-96 | Шум на рабочих местах, в помещениях жилых, общественных зданий и на территории жилой застройки                                                                                                     |
| ГН 2.2.5.1313-03        | Предельно допустимые концентрации (ПДК) вредных веществ в воздухе рабочей зоны                                                                                                                     |
| ВСН 205-84              | Инструкция по проектированию электроустановок систем автоматизации технологических процессов                                                                                                       |
| ВСН 353-86              | Проектирование и применение воздуховодов из унифицированных деталей                                                                                                                                |
| ВППБ 01-04-98           | Правила пожарной безопасности для предприятий и организаций газовой промышленности                                                                                                                 |
| ВУПП 88                 | Ведомственные указания по противопожарному проектированию предприятий, зданий и сооружений нефтеперерабатывающей и нефтехимической промышленности                                                  |
| ПУЭ                     | Правила устройства электроустановок                                                                                                                                                                |
| РД 153-34.0-20.518-2003 | Типовая инструкция по защите трубопроводов тепловых сетей от наружной коррозии                                                                                                                     |
| РД 24.032.01-91         | Методические указания. Нормы качества питательной воды и пара, организация водно-химического режима и химического контроля паровых стационарных котлов-утилизаторов и энерготехнологических котлов |
| РД 34.09.102            | Правила учета тепловой энергии и теплоносителя                                                                                                                                                     |
| ТУ 14-3-190-2004        | Трубы стальные бесшовные для котельных установок и трубопроводов                                                                                                                                   |
| НПБ 105-03              | Определение категорий помещений, зданий и наружных установок по взрывопожарной и пожарной опасности                                                                                                |
| НПБ 241-97              | Клапаны противопожарные вентиляционных систем. Метод испытания на огнестойкость                                                                                                                    |
| НПБ 88-2001             | Установки пожаротушения и сигнализации. Нормы и правила проектирования                                                                                                                             |
| ANSI/ISA-71.04-2013     | Условия окружающей среды для систем измерения технологических показателей и управления технологическим процессом: загрязняющие вещества в воздухе                                                  |
| ASME B73.1              | Технические условия на горизонтальные центробежные насосы с торцевым всасыванием для химической промышленности                                                                                     |
| ASME B73.2              | Технические условия на вертикальные центробежные насосы трубного монтажа для химической промышленности                                                                                             |
| EN 1751                 | Вентиляция зданий. Воздухораспределительные устройства.                                                                                                                                            |

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|                                             | Аэродинамические испытания регистров и клапанов                                                                                                                                                  |
| EN 1886                                     | Вентиляция зданий. Приборы для очистки воздуха. Механические свойства и методы измерений                                                                                                         |
| ТЕМА                                        | Ассоциация производителей трубчатых теплообменников                                                                                                                                              |
| IEC                                         | Международная электротехническая комиссия (МЭК)                                                                                                                                                  |
| ISO                                         | Международная организация по стандартизации                                                                                                                                                      |
| ФНиП                                        | (ФНиП «Правила промышленной безопасности опасных производственных объектов, на которых используется оборудование, работающее под избыточным давлением», Приказ Ростехнадзора № 116 от 25.03.2014 |
| Федеральный закон РФ № 123-ФЗ от 22/07/2008 | Технический регламент о требованиях пожарной безопасности"                                                                                                                                       |
| Федеральный закон РФ № 384-ФЗ от 30/12/2009 | Технический регламент о безопасности зданий и сооружений                                                                                                                                         |
| Приказ Ростехнадзора № 96 of 11/03/2003     | Общие правила взрывобезопасности для взрывопожароопасных химических, нефтехимических и нефтеперерабатывающих производств                                                                         |

#### 4. ОБЪЕКТЫ, ОСНАЩАЕМЫЕ СИСТЕМАМИ ОВКВ

Системами ОВКВ оснащаются следующие объекты установки по производству аммиака:

- А.10.001 — Главная подстанция;
- А.10.002 — Здание пульта управления;
- А.11.101 — Компрессорная;
- А.11.104.2 — Насосная станция питательной воды;
- А.17.704 — Склад химреагентов;
- А.17.707 — Насосная станция оборотного водоснабжения;
- А.17.710.2 - Здание азотной установки и установки деминерализованной воды;
- А.17.715.1 - Здание установки водоподготовки 1;
- А.17.715.2 - Здание установки водоподготовки 2 (блок биологической очистки);
- А.17.710.1 - Здание центрального теплового пункта;
- А.17.717.1 - Здание установки подготовки водно-гликолевой смеси.

Системами ОВКВ оснащаются следующие объекты установки по производству карбамида:

- U20.001 — Главная подстанция;
- U20.002 — Здание пульта управления и лабораторный корпус (две зоны);
- U22.201 — Узел получения плава карбамида — Установка синтеза карбамида;
- U22.204 — Узел получения плава карбамида — Насосная аммиака ВД;

- U22.205 — Узел получения плава карбамида — Компрессор CO<sub>2</sub>;
- U23.301 — Узел грануляции карбамида;
- U24.401 — Склад гранулированного карбамида;
- U24.402.1 и U24.402.2 - Узел погрузки карбамида в ж/д вагоны и здание пульта управления погрузкой (два отдельных здания);
- U24.406 — Вспомогательная подстанция и контроллерная;
- U27.707 — Насосная станция оборотного водоснабжения;
- U27.717 — Центральный тепловой пункт.

## 5. РАСЧЕТНЫЕ УСЛОВИЯ И ОБЩИЕ КРИТЕРИИ

### 5.1 Расположение площадки

Установки по производству аммиака и карбамида ООО «Еврохим – Северо-Запад-2» расположены в г.Кингисепп, Российская Федерация, координаты 59°22' северной широты и 28°36' восточной долготы; барометрическое давление 1010 гПа.

### 5.2 Расчетные условия внешней окружающей среды

Системы ОВКВ проектируются в соответствии со СНиП 131.13330.2018 для следующих климатических условий:

- Расчетная летняя температура наружного воздуха для кондиционирования: +25,0°C (сухой термометр)
- Расчетная относительная влажность для кондиционирования: 72%
- Расчетная летняя температура наружного воздуха для вентиляции: +22,0°C (сухой термометр)
- Расчетная зимняя температура наружного воздуха: -24,0°C (сухой термометр)
- Расчетная зимняя относительная влажность: 86%

### 5.3 Расчетные условия внутри помещений

Расчетная температура и относительная влажность воздуха в помещении должны соответствовать требованиям, указанным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Для помещений, не включенных в вышеупомянутое Приложение 1, применяются особые требования согласно СП 60.13330.2016, ГОСТ 12.1.005-88, СП 117.13330.2011, СП 44.13330.2011 и СанПиН 2.2.4.548-96.

### 5.4 Производительность приточной вентиляции

Минимальная производительность приточной вентиляции должна соответствовать требованиям, указанным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Для помещений, не включенных в вышеупомянутое Приложение 1, применяются особые требования согласно СП 60.13330.2016, ГОСТ 12.1.005-88, СП 117.13330.2011 и СП 44.13330.2011.

## 5.5 Производительность вытяжной вентиляции

Минимальная производительность вытяжной вентиляции должна соответствовать требованиям, указанным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Для помещений, не включенных в вышеупомянутое Приложение 1, применяются особые требования согласно СП 60.13330.2016, ГОСТ 12.1.005-88, СП 117.13330.2011 и СП 44.13330.2011.

## 5.6 Подпор воздуха в помещениях

Подпор воздуха в помещениях должен соответствовать требованиям, указанным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Для помещений, не включенных в вышеупомянутое Приложение 1, применяются особые требования согласно СП 60.13330.2016 и ГОСТ 12.1.005-88.

В соответствующих случаях в отношении величины подпора воздуха следует применять требования СП 60.13330.2016, п. 7.5.4.

## 5.7 Теплопоступления в помещения

Теплопоступления от людей, источников освещения, механического оборудования и других источников, за исключением солнечного излучения, должны соответствовать значениям, указанным в следующей таблице. Для помещений, не включенных в таблицу, применяются особые значения согласно рекомендациям СП 60.13330.2016 и ГОСТ 12.1.005-88.

### УСТАНОВКА ПО ПРОИЗВОДСТВУ АММИАКА

| Здания и помещения |                                                     | Теплопоступления от оборудования | Теплопоступления от освещения | Кол. персонала |
|--------------------|-----------------------------------------------------|----------------------------------|-------------------------------|----------------|
|                    |                                                     | (кВт)                            | (Вт/м²)                       | чел.           |
| A10.001            | <b>Главная подстанция</b>                           |                                  |                               |                |
|                    | - Приточная вентиляционная камера 1                 | 0,58                             | Н/П                           | Н/П            |
|                    | - Приточная вентиляционная камера 2                 |                                  | Н/П                           | Н/П            |
|                    | - Помещение установки автоматического пожаротушения | 0,63                             | Н/П                           | Н/П            |
|                    | - Помещение для разводки кабелей                    | 39,39                            | Н/П                           | Н/П            |
|                    | - Трансформаторная А                                | 52,53                            | Н/П                           | Н/П            |

| Здания и помещения |                                                              | Теплопоступлени<br>я от<br>оборудования | Теплопоступлени<br>я от освещения | Кол.<br>персонал<br>а |
|--------------------|--------------------------------------------------------------|-----------------------------------------|-----------------------------------|-----------------------|
|                    |                                                              | (кВт)                                   | (Вт/м²)                           | чел.                  |
|                    | - Трансформаторная В                                         | 52,53                                   | Н/П                               | Н/П                   |
|                    | - Аккумуляторная                                             | 0,38                                    | Н/П                               | Н/П                   |
|                    | - Помещение РУ СН и НН                                       | 132,20                                  | Н/П                               | Н/П                   |
|                    | - Электрощитовая                                             | 1,72                                    | Н/П                               | Н/П                   |
| A10.002            | <b>Здание пульт<br/>управления</b>                           |                                         |                                   |                       |
|                    | - Приточная<br>вентиляционная<br>камера                      | 2,00                                    | 5                                 | Н/П                   |
|                    | - Электропункт                                               | 0,60                                    | 5                                 | Н/П                   |
|                    | - Переговорная                                               | 1,00                                    | 5                                 | 4                     |
|                    | - Помещение<br>установки<br>автоматического<br>пожаротушения | Н/П                                     | 5                                 | Н/П                   |
|                    | - Помещение ИБП                                              | 24,74                                   | 5                                 | Н/П                   |
|                    | - Контроллерная                                              | 69,53                                   | 5                                 | Н/П                   |
|                    | - Пульт (панель)<br>управления                               | 18,19                                   | 5                                 | 5                     |
|                    | - Помещение<br>инженерно-<br>технической<br>службы           | 5,36                                    | 5                                 | 3                     |
|                    | - Вытяжная<br>вентиляционная<br>камера                       | 5,60                                    | 5                                 | Н/П                   |
|                    | - Мужской туалет                                             | Н/П                                     | 5                                 | Н/П                   |
|                    | - Женский туалет                                             | Н/П                                     | 5                                 | Н/П                   |
|                    | - Кладовая                                                   | Н/П                                     | 5                                 | Н/П                   |
|                    | - Помещение<br>начальника смены                              | 0,37                                    | 5                                 | 1                     |
|                    | - Монтажная<br>мастерская КИПиА                              | 0,37                                    | 5                                 | 1                     |
|                    | - Столовая                                                   | 1,42                                    | 5                                 | Н/П                   |
|                    | - Коридор                                                    | Н/П                                     | 5                                 | Н/П                   |
|                    | - Тамбур-шлюз 1 и 2                                          | Н/П                                     | 5                                 | Н/П                   |
| A11.101            | <b>Компрессорная</b>                                         |                                         |                                   |                       |

| Здания и помещения |                                                                                     | Теплопоступлени<br>я от<br>оборудования | Теплопоступлени<br>я от освещения | Кол.<br>персонал<br>а |
|--------------------|-------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------|-----------------------|
|                    |                                                                                     | (кВт)                                   | (Вт/м²)                           | чел.                  |
|                    | - Зона компрессоров<br>1 и 2                                                        | 682,30                                  | 5                                 | Н/П                   |
|                    | - Приточная<br>вентиляционная<br>камера                                             | 2,00                                    | 5                                 | Н/П                   |
|                    | - Туалет                                                                            | Н/П                                     | 5                                 | Н/П                   |
|                    | - Помещение<br>установки<br>автоматического<br>пожаротушения                        | 0,52                                    | 5                                 | Н/П                   |
| A11.104.2          | <b>Насосная станция<br/>питательной воды</b>                                        |                                         |                                   |                       |
|                    | - Насосная котловой<br>питательной воды<br>ВД                                       | 163,80                                  | 5                                 | Н/П                   |
| A17.704            | <b>Склад химреагентов</b>                                                           |                                         |                                   |                       |
|                    | - Склад<br>химреагентов                                                             | 2,52                                    | 5                                 | Н/П                   |
| A17.707            | <b>Насосная станция<br/>оборотного<br/>водоснабжения</b>                            |                                         |                                   |                       |
|                    | - Комплектная<br>установка<br>химической очистки                                    | 2,36                                    | 5                                 | Н/П                   |
|                    | - Туалет                                                                            | Н/П                                     | 5                                 | Н/П                   |
| A17.710.2          | <b>Здание азотной<br/>установки и<br/>установки<br/>деминерализованной<br/>воды</b> |                                         |                                   |                       |
|                    | - Азотная установка                                                                 | 140,36                                  | 5                                 | Н/П                   |
|                    | - Установка<br>деминерализованн<br>ой воды                                          | 77,60                                   | 5                                 | Н/П                   |
|                    | - Насос<br>деминерализованн<br>ой воды                                              |                                         | 5                                 | Н/П                   |
| A17.715.1          | <b>Здание установки<br/>водоподготовки 1</b>                                        |                                         |                                   |                       |



| Здания и помещения |                                                                                   | Теплопоступлени<br>я от<br>оборудования | Теплопоступлени<br>я от освещения | Кол.<br>персонал<br>а |
|--------------------|-----------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------|-----------------------|
|                    |                                                                                   | (кВт)                                   | (Вт/м²)                           | чел.                  |
|                    | - Цокольный этаж<br>зала фильтрации<br>(план на отм.<br>+100.200)                 | 133,53                                  | 5                                 | Н/П                   |
|                    | - Трансформаторная                                                                | 20,14                                   | 5                                 | Н/П                   |
|                    | - Электрощитовая                                                                  | 49,31                                   | 5                                 | Н/П                   |
|                    | - <i>Помещение ИБП</i>                                                            | 6,61                                    | 5                                 | Н/П                   |
|                    | - Приточная<br>вентиляционная<br>камера                                           | 2,90                                    | 5                                 | Н/П                   |
|                    | - Туалет                                                                          | Н/П                                     | 5                                 | Н/П                   |
|                    | - Первый этаж зала<br>фильтрации (план<br>на отм. +108.250)                       | 211,64                                  | 5                                 | Н/П                   |
|                    | - Контроллерная                                                                   | 9,59                                    | 5                                 | Н/П                   |
|                    | - Вытяжная<br>вентиляционная<br>камера                                            | Н/П                                     | 5                                 | Н/П                   |
|                    | - Тамбур                                                                          | Н/П                                     | 5                                 | Н/П                   |
|                    | - Помещение серной<br>и соляной кислоты                                           | Н/П                                     | 5                                 | Н/П                   |
|                    | - Помещение<br>каустической соды                                                  | Н/П                                     | 5                                 | Н/П                   |
|                    | - Помещение<br>гипохлоритов                                                       | Н/П                                     | 5                                 | Н/П                   |
|                    | - Станция<br>известкового<br>молока                                               | 2,10                                    | 5                                 | Н/П                   |
|                    | - Помещение<br>системы обогрева                                                   | Н/П                                     | 5                                 | Н/П                   |
|                    | - Экспресс-<br>лаборатория и<br>операторная                                       | 1,90                                    | 5                                 | Н/П                   |
| A17.715.2          | <b>Здание установки<br/>водоподготовки 2<br/>(блок биологической<br/>очистки)</b> |                                         |                                   |                       |
|                    | - Помещение<br>биологической<br>очистки                                           | 56,60                                   | 5                                 | Н/П                   |

| Здания и помещения                         |                                                                    | Теплопоступлени<br>я от<br>оборудования | Теплопоступлени<br>я от освещения | Кол.<br>персонал<br>а |
|--------------------------------------------|--------------------------------------------------------------------|-----------------------------------------|-----------------------------------|-----------------------|
|                                            |                                                                    | (кВт)                                   | (Вт/м²)                           | чел.                  |
|                                            | - Приточная<br>вентиляционная<br>камера                            | 2,00                                    | 5                                 | Н/П                   |
| A17.710.1                                  | <b>Здание<br/>центрального<br/>теплового пункта</b>                |                                         |                                   |                       |
|                                            | - Тепловой пункт                                                   | 31,36                                   | 5                                 | Н/П                   |
| A17.717.1                                  | <b>Здание установки<br/>подготовки водно-<br/>гликолевой смеси</b> |                                         |                                   |                       |
|                                            | - Насосная станция<br>водно-гликолевой<br>смеси                    | 17,40                                   | 5                                 | Н/П                   |
| <b>УСТАНОВКА ПО ПРОИЗВОДСТВУ КАРБАМИДА</b> |                                                                    |                                         |                                   |                       |
| U20.001                                    | <b>Главная подстанция</b>                                          |                                         |                                   |                       |
|                                            | - Приточная<br>вентиляционная<br>камера 1                          | 0,55                                    | Н/П                               | Н/П                   |
|                                            | - Приточная<br>вентиляционная<br>камера 2                          |                                         | Н/П                               | Н/П                   |
|                                            | - Помещение<br>установки<br>автоматического<br>пожаротушения       | 0,87                                    | Н/П                               | Н/П                   |
|                                            | - Помещение для<br>разводки кабелей                                | 49,36                                   | Н/П                               | Н/П                   |
|                                            | - Трансформаторная<br>А                                            | 50,93                                   | Н/П                               | Н/П                   |
|                                            | - Трансформаторная<br>В                                            | 41,73                                   | Н/П                               | Н/П                   |
|                                            | - Аккумуляторная                                                   | 0,35                                    | Н/П                               | Н/П                   |
|                                            | - Помещение РУ СН<br>и НН                                          | 150,10                                  | Н/П                               | Н/П                   |
| U20.002                                    | <b>Здание пульт<br/>управления и<br/>лабораторный корпус</b>       |                                         |                                   |                       |
|                                            | <b>Зона лаборатории</b>                                            |                                         |                                   |                       |
|                                            | - Приточная<br>вентиляционная<br>камера                            | 2,00                                    | 5                                 | Н/П                   |

| Здания и помещения |                                                              | Теплопоступлени<br>я от<br>оборудования | Теплопоступлени<br>я от освещения | Кол.<br>персонал<br>а |
|--------------------|--------------------------------------------------------------|-----------------------------------------|-----------------------------------|-----------------------|
|                    |                                                              | (кВт)                                   | (Вт/м²)                           | чел.                  |
|                    | - Помещение<br>эмиссионного<br>спектрометра                  | 5,50                                    | 5                                 | 2                     |
|                    | - Помещение<br>газового<br>хроматографа                      | 6,00                                    | 5                                 | 3                     |
|                    | - Хранилище<br>поверочной газовой<br>смеси                   | Н/П                                     | 5                                 | Н/П                   |
|                    | - Вытяжная<br>вентиляционная<br>камера                       | 10,11                                   | 5                                 | Н/П                   |
|                    | - Коридор                                                    | 1,72                                    | 5                                 | Н/П                   |
|                    | - Препараторская                                             | 4,00                                    | 5                                 | 1                     |
|                    | - Помещение<br>химической<br>лаборатории                     | 9,00                                    | 5                                 | 5                     |
|                    | - Помещение<br>лабораторного<br>оборудования                 | Н/П                                     | 5                                 | Н/П                   |
|                    | - Анализаторная<br>карбамида                                 | 4,00                                    | 5                                 | 2                     |
|                    | - Туалет                                                     | Н/П                                     | 5                                 | Н/П                   |
|                    | - <i>Офис</i>                                                | 0,37                                    | 5                                 | 1                     |
|                    | <b>Зона<br/>управления</b> пульта                            |                                         |                                   |                       |
|                    | - Приточная<br>вентиляционная<br>камера                      | 2,00                                    | 5                                 | Н/П                   |
|                    | - Электропункт                                               | 0,60                                    | 5                                 | Н/П                   |
|                    | - Переговорная                                               | 1,00                                    | 5                                 | 4                     |
|                    | - Помещение<br>установки<br>автоматического<br>пожаротушения | Н/П                                     | 5                                 | Н/П                   |
|                    | - Помещение ИБП                                              | 14,62                                   | 5                                 | Н/П                   |
|                    | - Аппаратная КИПиА                                           | 42,57                                   | 5                                 | Н/П                   |
|                    | - Пульт (панель)<br>управления                               | 6,32                                    | 5                                 | 5                     |

| Здания и помещения |                                                                     | Теплопоступлени<br>я от<br>оборудования | Теплопоступлени<br>я от освещения | Кол.<br>персонал<br>а |
|--------------------|---------------------------------------------------------------------|-----------------------------------------|-----------------------------------|-----------------------|
|                    |                                                                     | (кВт)                                   | (Вт/м²)                           | чел.                  |
|                    | - Помещение инженерно-технической службы                            | 6,01                                    | 5                                 | 3                     |
|                    | - Вытяжная вентиляционная камера                                    | 5,60                                    | 5                                 | Н/П                   |
|                    | - Мужской туалет                                                    | Н/П                                     | 5                                 | Н/П                   |
|                    | - Женский туалет                                                    | Н/П                                     | 5                                 | Н/П                   |
|                    | - Кладовая                                                          | Н/П                                     | 5                                 | Н/П                   |
|                    | - Помещение начальника смены                                        | 0,37                                    | 5                                 | 1                     |
|                    | - Монтажная мастерская КИПиА                                        | 0,37                                    | 5                                 | 1                     |
|                    | - Столовая                                                          | 1,42                                    | 5                                 | Н/П                   |
|                    | - Коридор                                                           | Н/П                                     | 5                                 | Н/П                   |
|                    | - Тамбур-шлюз 3 и 4                                                 | Н/П                                     | 5                                 | Н/П                   |
| U22.201            | <b>Узел получения плава карбамида — Установка синтеза карбамида</b> |                                         |                                   |                       |
|                    | - Зона плава на отм. +100,200                                       | 253,30                                  | 5                                 | Н/П                   |
|                    | - Зона плава на отм. +100.200 оси 11-13/B-D                         | 21,80                                   | 5                                 | Н/П                   |
|                    | - Приточная вентиляционная камера                                   | 3,00                                    | 5                                 | Н/П                   |
|                    | - Вытяжная вентиляционная камера                                    | 1,00                                    | 5                                 | Н/П                   |
|                    | - Машинное отделение лифта                                          | 14,00                                   | 5                                 | Н/П                   |
|                    | - Шахта лифта                                                       | Н/П                                     | 5                                 | Н/П                   |
| U22.204            | <b>Узел получения плава карбамида — Насосная аммиака ВД</b>         |                                         |                                   |                       |
|                    | - Насосная                                                          | 96,36                                   | 5                                 | Н/П                   |

| Здания и помещения |                                                                | Теплопоступлени<br>я от<br>оборудования | Теплопоступлени<br>я от освещения | Кол.<br>персонал<br>а |
|--------------------|----------------------------------------------------------------|-----------------------------------------|-----------------------------------|-----------------------|
|                    |                                                                | (кВт)                                   | (Вт/м²)                           | чел.                  |
|                    | - Приточная<br>вентиляционная<br>камера                        | 2,00                                    | 5                                 | Н/П                   |
| U22.205            | <b>Узел получения плава<br/>карбамида —<br/>Компрессор CO2</b> |                                         |                                   |                       |
|                    | - Компрессорная<br>CO2                                         | 186,00                                  | 5                                 | Н/П                   |
|                    | - Установка сухого<br>воздуха                                  | 114,50                                  | 5                                 | Н/П                   |
|                    | - Азотная установка                                            | 4,50                                    | 5                                 | Н/П                   |
| U23.301            | <b>Установка<br/>гранулирования<br/>карбамида</b>              |                                         |                                   |                       |
|                    | - Производственное<br>помещение на<br>отм. +100.200            | 210,40                                  | 5                                 | Н/П                   |
|                    | - Производственное<br>помещение на<br>отм. +107.300            | 3,24                                    | 5                                 | Н/П                   |
|                    | - Производственное<br>помещение на<br>отм.+113.100             | 280,00                                  | 5                                 | Н/П                   |
|                    | - Производственное<br>помещение на<br>отм.+122.700             | 70,80                                   | 5                                 | Н/П                   |
|                    | - Производственное<br>помещение на<br>отм.+128.100             | 0,00                                    | 5                                 | Н/П                   |
|                    | - Производственное<br>помещение на<br>отм. +136.250            | 18,00                                   | 5                                 | Н/П                   |
|                    | - Производственное<br>помещение на<br>отм.+142.900             | 12,00                                   | 5                                 | Н/П                   |
|                    | - Производственное<br>помещение на<br>отм.+152.800             | 2,20                                    | 5                                 | Н/П                   |
|                    | - Производственное<br>помещение на<br>отм.+159.300             | 5,00                                    | 5                                 | Н/П                   |

| Здания и помещения      |                                                                                  | Теплопоступлени<br>я от<br>оборудования | Теплопоступлени<br>я от освещения | Кол.<br>персонал<br>а |
|-------------------------|----------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------|-----------------------|
|                         |                                                                                  | (кВт)                                   | (Вт/м²)                           | чел.                  |
|                         | - Машинное отделение лифта на <i>отм. +166.400</i>                               | 22,50                                   | 5                                 | Н/П                   |
|                         | - Шахта лифта                                                                    | Н/П                                     | 5                                 | Н/П                   |
|                         | - Маршевая лестница                                                              | Н/П                                     | 5                                 | Н/П                   |
|                         | - <i>Коридоры</i>                                                                | <i>Н/П</i>                              | <i>5</i>                          | <i>Н/П</i>            |
|                         | - Помещение ОВКВ 1-4                                                             | 2,00                                    | 5                                 | Н/П                   |
| U24.401                 | <b>Склад гранулированного карбамида</b>                                          |                                         |                                   |                       |
|                         | - Насыпной склад карбамида                                                       | 0,36                                    | 5                                 | Н/П                   |
| U24.402.1/<br>U24.402.2 | <b>Узел погрузки карбамида в ж/д вагоны и здание пульта управления погрузкой</b> |                                         |                                   |                       |
|                         | - Приточная вентиляционная камера                                                | 2,00                                    | 5                                 | Н/П                   |
|                         | - Помещение установки пожаротушения                                              | Н/П                                     | 5                                 | Н/П                   |
|                         | - Пульт управления                                                               | 3,76                                    | 5                                 | Н/П                   |
|                         | - Санузел и раздевалка                                                           | Н/П                                     | 5                                 | Н/П                   |
|                         | - <i>Узел фасовки некондиции в биг-беги</i>                                      | Н/П                                     | 5                                 | Н/П                   |
| U24.406                 | <b>Вспомогательная подстанция и контроллерная</b>                                |                                         |                                   |                       |
|                         | - Помещение для разводки кабелей                                                 | 6,13                                    | Н/П                               | Н/П                   |
|                         | - Помещение ИБП                                                                  | 4,12                                    | Н/П                               | Н/П                   |
|                         | - Помещение установки пожаротушения                                              | 0,14                                    | Н/П                               | Н/П                   |



| Здания и помещения |                                                  | Теплопоступления от оборудования | Теплопоступления от освещения | Кол. персонала |
|--------------------|--------------------------------------------------|----------------------------------|-------------------------------|----------------|
|                    |                                                  | (кВт)                            | (Вт/м²)                       | чел.           |
|                    | - Приточная и вытяжная вентиляционная камера     | 2,25                             | Н/П                           | Н/П            |
|                    | - Трансформаторная                               | 20,19                            | Н/П                           | Н/П            |
|                    | - Щитовая                                        | 15,00                            | Н/П                           | Н/П            |
|                    | - Контроллерная                                  | 9,43                             | Н/П                           | Н/П            |
| U27.707            | <b>Насосная станция оборотного водоснабжения</b> |                                  |                               |                |
|                    | - Комплектная установка химической очистки       | 14,30                            | 5                             | Н/П            |
|                    | - Туалет                                         | Н/П                              | 5                             | Н/П            |
| U27.717            | <b>Центральный тепловой пункт</b>                |                                  |                               |                |
|                    | - Тепловой пункт                                 | 45,00                            | 5                             | Н/П            |
|                    | - Аварийный душ                                  |                                  | 5                             | Н/П            |
|                    | - Приточная вентиляционная камера                | 4,36                             | 5                             | Н/П            |

*Общее примечание: предполагаемые теплопоступления от оборудования приточных/вытяжных вентиляционных камер и обоих центральных тепловых пунктов (в установках по производству аммиака и карбамида), приведенные в таблице выше, должны быть подтверждены субподрядчиком по системам ОВКВ на этапах рабочего проектирования и проектно-конструкторских работ.*

## 5.8 Критерии защиты от шума

### 5.8.1 Общие положения

При проектировании систем ОВКВ и выборе основного оборудования должны применяться требования по защите от шума согласно Санитарным нормам СН 2.2.4/2.1.8.562-96, как указано в следующих пунктах.

### 5.8.2 Предельные уровни шума в постоянных рабочих зонах производственных помещений

Постоянная рабочая зона согласно ГОСТ 12.1.005-88, определяется как зона, в которой человек находится более 50% времени или непрерывно в течение более 2 часов.

Согласно требованиям вышеупомянутых «Санитарных норм» (Таблица 2), если работы выполняются на постоянных рабочих местах в производственных помещениях, то допустимыми считаются уровни шума  $L_p(A)$ , не превышающие 80 дБ(А) на расстоянии 1 м от источника шума.

### 5.8.3 Предельные уровни шума в нерабочих зонах производственных помещений

Если работы выполняются на непостоянных рабочих местах в производственных помещениях, то допустимыми считаются уровни шума  $L_p(A)$ , не превышающие 85 дБ(А) на расстоянии 1 м от источника шума.

### 5.8.4 Предельные уровни шума в рабочих зонах специального назначения

Допустимые уровни шума на постоянном рабочем месте в рабочих зонах специального назначения не должны превышать следующих значений:

**Санитарные нормы СН 2.2.4 / 2.1.8.562-96 — Таблица 2**

| № | Рабочие зоны                                                                        | Допустимый уровень звукового давления (дБА) |
|---|-------------------------------------------------------------------------------------|---------------------------------------------|
| 1 | Машинные отделения систем ОВКВ                                                      | 75                                          |
| 2 | Помещение пульта дистанционного управления с речевой связью.                        | 60                                          |
| 3 | Рабочие помещения административно-управленческого персонала, помещения лабораторий. | 55                                          |

Предельные уровни шума, приведенные в таблице, относятся к шуму оборудования, а именно рабочего оборудования, расположенного в соответствующей зоне или вблизи нее, и оборудования системы ОВКВ. Шум в различных зонах, источником которого является не оборудование, а пользователи, не учитывается.

Уровень шума оборудования системы ОВКВ должен быть на 10 дБ(А) ниже указанных выше предельных значений для зон, за исключением зон, где единственным источником шума является оборудование системы ОВКВ.

Для сведения к минимуму распространяющегося по воздуху шума и вибрации от оборудования рекомендуются следующие смягчающие меры:

- выбор оборудования для подачи воздуха с низким уровнем шума;
- установка вентиляторов в соответствии с требованиями СП 73.13330.2016;
- установка виброизоляторов между воздуховодами и впускными/выпускными отверстиями вентиляторов;
- монтаж вентилятора и двигателя на общую опорную раму, установленную на пружинные или резиновые виброизоляторы;
- установка шумоглушителей;

- снижение скорости воздуха в воздуховодах, воздухозаборниках и воздухораспределителях.

## **5.9 Другие общие принципы проектирования**

### **5.9.1 Воздухозаборники**

Согласно требованиям ФНиП в области промышленной безопасности «Общие правила взрывобезопасности для взрывопожароопасных химических, нефтехимических и нефтеперерабатывающих производств» (Приказ Ростехнадзора № 96), п. 8.4, воздухозаборники системы ОВКВ должны располагаться на достаточной высоте над уровнем земли.

Перечень зданий, для которых должны быть предусмотрены самонесущие воздухозаборные трубы высотой не менее 15 м над уровнем земли, изготовленные сварными из стальных листов:

- установка по производству аммиака — здание пульта управления установки по производству аммиака;
- установка по производству аммиака — насосная станция питательной воды;
- установка по производству карбамида — центральный тепловой пункт.

### **5.9.2 Правила подачи наружного воздуха**

Условия подмешивания кондиционированного воздуха из нескольких систем вентиляции к наружному воздуху в приемном устройстве определены требованиями стандартов СП 60.13330.2016 и СП 7.13130.2013.

### **5.9.3 Правила объединения систем вентиляции**

Допускается использование общих систем приточной и вытяжной вентиляции для нескольких помещений, относящихся к разным категориям, при условии, что такое объединение выполнено в соответствии с требованиями стандартов СП 60.13330.2016 и СП 7.13130.2013.

В частности, к противопожарным отсекам применяются требования СП 7.13130.2013, а к помещениям других категорий — требования СП 60.13330.2016.

### **5.9.4 Устройства выброса воздуха вытяжных систем вентиляции**

К устройствам выброса воздуха вытяжных систем ОВКВ применяются требования СП 60.13330.2016, пп. 10.4 и 10.5.

Отвод отработанного воздуха из систем вентиляции производственных помещений должен обязательно производиться через трубы общеобменных систем вытяжной вентиляции, обслуживающих такие объекты:

- помещения категорий А и Б;
- зоны, где есть вредные вещества;

- зоны, где есть вредные вещества 1 и 2 классов опасности (согласно ГОСТ 12.1.007-76);
- зоны, где есть вещества с неприятным запахом.

Отвод отработанного воздуха из систем вентиляции производственных помещений должен обязательно производиться через трубы местных систем вытяжной вентиляции, обслуживающих помещения, где есть такие вещества:

- вредные вещества;
- взрывоопасные смеси;
- вещества с неприятным запахом.

Выбросы из систем вытяжной вентиляции для помещений категорий А и Б, которые содержат горючие и вредные вещества, следует отводить отдельно.

Устройства выброса воздуха систем вытяжной вентиляции производственных помещений следует размещать на расстоянии не менее 10 м по горизонтали от приемных устройств для наружного воздуха, а если расстояние по горизонтали меньше, то на расстоянии 6 м по вертикали.

В тех случаях, когда выброс вытяжного воздуха должен производиться через трубы, устройства выброса следует размещать на высоте не менее 2 м над кровлей в самой высокой части здания, если расстояние до ее выступа менее 10 м.

Устройства выброса воздуха систем аварийной вентиляции следует размещать на высоте не менее 3 м от земли.

#### **5.9.5 Основные принципы резервирования оборудования**

В целях обеспечения непрерывной работы систем ОВКВ должно быть предусмотрено полное резервирование такого оборудования:

- все оборудование общеобменных систем приточной вентиляции;
- циркуляционные насосы горячей воды;
- насосы питательной воды;
- вытяжные вентиляторы, обслуживающие жизненно важные зоны или зоны, где есть вредные вещества;
- змеевики центрального отопления, размещенные внутри приточно-вытяжной установки, обслуживающей аппаратную пульта управления.

#### **5.9.6 Хладагенты**

Для холодильного оборудования ОВКВ должны использоваться гидрофтороуглеродные хладагенты R407A, R134A, R410A, R744.

## **5.9.7 Инженерные сети**

### **5.9.7.1 Установка по производству аммиака**

Для систем ОВКВ предусмотрено подключение к таким сетям:

- сеть пара низкого давления с термодинамическими параметрами 4,4 бар (абс.) и 222°C, который используется как первичный теплоноситель для нагрева воды в системе отопления зданий;
- сеть питьевой воды с минимальным давлением 4,4 бар (абс.) для подпитки увлажнителей и заполнения контура горячей воды системы отопления зданий.

*Примечание: Конденсат низкого давления с давлением 4,0 бар (абс.) должен быть возвращен на границу установки подрядчика.*

### **5.9.7.2 Установка по производству карбамида**

Для систем ОВКВ предусмотрено подключение к таким сетям:

- сеть пара низкого давления с термодинамическими параметрами 3,8 бар (абс.) и 221°C, который используется как первичный теплоноситель для нагрева воды в системе отопления зданий;
- сеть питьевой воды с минимальным давлением 4,4 бар (абс.) для подпитки увлажнителей и заполнения контура горячей воды системы отопления зданий.

*Примечание: Конденсат низкого давления с давлением 5,0 бар (абс.) должен быть возвращен на границу установки подрядчика.*

## **5.9.8 Приводные заслонки**

Приводными заслонками должны быть оснащены следующие устройства:

- приемные устройства для наружного и рециркуляционного воздуха, а также выпускные отверстия для приточного воздуха установок обработки воздуха;
- впускные и выпускные отверстия основных и резервных вентиляторов;
- приемные устройства для наружного воздуха и устройства выброса вытяжного воздуха (газонепроницаемые заслонки).

Обогрев приводных заслонок электрическими теплоспутниками (для защиты от замерзания) следует предусматривать в следующих случаях:

- наружная установка;
- наружная установка воздухопроводов, по которым проходит воздух с параметрами окружающей среды;
- установка на приемных устройствах для наружного воздуха и устройствах выброса вытяжного воздуха.

### 5.9.9 Распределительные щиты системы ОВКВ

В каждом здании должен быть предусмотрен отдельный распределительный щит, специально предназначенный для системы ОВКВ.

Распределительные щиты систем ОВКВ должны монтироваться в напольные шкафы, имеющие степень защиты корпуса от механических воздействий не ниже IP41 при установке внутри зданий (непроизводственных и производственных) и не ниже IP55 при наружной установке. Распределительные щиты систем ОВКВ, устанавливаемые внутри двух главных подстанций, должны быть оборудованы кабельными вводами в нижней части корпусов, а распределительные щиты систем ОВКВ, устанавливаемые внутри других зданий, должны быть оборудованы кабельными вводами в верхней части корпусов.

Каждый распределительный щит систем ОВКВ должен иметь две входящие линии (и две соответствующие распределительные шины) с ручной или автоматической системой переключения и механической или электрической блокировкой. На каждую входящую линию подается питание от независимого источника питания. Эти источники должны быть запитаны от распределительных устройств НН, установленных на двух главных подстанциях. В нормальных условиях каждая входящая линия запитывается от соответствующего источника питания. В случае отключения одного из источников питания, питание на обе распределительные электрошины будет подаваться от другого источника, подключенного с помощью шиносоединительного выключателя. После восстановления питания возвращение системы в исходное состояние выполняется вручную.

В соответствии с ПУЭ пп. 1.2.18–1.2.20 потребители электроэнергии системы ОВКВ делятся на 1-ю и 2-ю категории в зависимости от требований к надежности обеспечения энергоснабжением.

Во всех распределительных щитах, обслуживающих потребителей электроэнергии 1-й категории надежности, система ввода резерва должна срабатывать автоматически.

Во всех распределительных щитах, обслуживающих потребителей электроэнергии 2-й категории надежности, включение системы ввода резерва должно выполняться вручную.

Действующие и резервные потребители электроэнергии подключаются к разным секциям распределительных шин. Остальных нерезервированных потребителей электроэнергии можно подключать к любой секции.

Во все здания должно подаваться питание напряжением 690 В, 3 фазы + защитное заземление, без нейтрали, за исключением здания установки водоподготовки 1, здания установки подготовки воды 2 (установки биологической очистки), склада гранулированного карбамида, узла погрузки карбамида в ж/д вагоны и здания пульты управления погрузкой (два отдельных здания), вспомогательной подстанции и контроллерной — на эти объекты должно подаваться питание напряжением 400 В, 3 фазы + защитное заземление + нейтраль.

Все панели распределения питания, установленные в перечисленных ниже зданиях, должны быть оборудованы автономными средствами пожаротушения (с генератором огнетушащих аэрозолей типа 2 и 3 с низкотемпературной сепарацией). Количество таких средств, а также места их размещения, определяются с учетом рекомендаций производителя.



- Установка гранулирования карбамида;
- Склад гранулированного карбамида;
- Узел погрузки карбамида в ж/д вагоны и здание пульты управления погрузкой (два отдельных здания);
- Узел получения плава карбамида — Установка синтеза карбамида;
- Насосная аммиака ВД.

В системе ОВКВ должна быть предусмотрена «панель устройств противопожарной защиты» (если это требуется или определено). Такая же панель, окрашенная в красный цвет, должна обеспечивать потребителей электроэнергии систем противопожарной защиты (таких как противопожарные/противодымные заслонки, вытяжные/подпорные вентиляторы для дыма, заслонки задержки выпуска инертных газов, эвакуационное освещение, панели пожарной сигнализации, *панели систем пожаротушения*, системы пожаротушения), и кроме того, эта панель должна быть связана с внешней системой пожарной сигнализации, как описано в п. 5.9.17.3. Панели устройств противопожарной защиты оснащаются двумя входящими линиями (основная и резервная) с автоматической системой ввода резерва. Электропитание на обе входящих линии поступает от соответствующего распределительного щита системы ОВКВ.

Потребители электроэнергии, питание для которых подается с панели устройств противопожарной защиты, должны относиться к 1-й категории надежности энергоснабжения (S).

Для панели устройств противопожарной защиты необходимо предоставить сертификат соответствия ТР ФЗ №123 и ГОСТ Р 53325-2012.

Дополнительные функции, выполняемые панелью устройств противопожарной защиты, определяются в соответствии с п. 3.48 и п. 7.4.1 ГОСТ Р 53325-2012.

#### **5.9.10 Противопожарная защита в системе ОВКВ**

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены нормально открытые противопожарные приводные заслонки, закрывающиеся при аварийной ситуации.

Управление противопожарными заслонками должно осуществляться системой автоматического управления, а также в ручном и дистанционном режимах согласно СП 7.13330.2013, п. 7.20, и СП 60.13330.2016, п. 12.2.2.

#### **5.9.11 Заслонки обратной тяги**

В соответствии с применимыми российскими нормами и правилами для обеспечения потока воздуха в одном направлении и предотвращения обратного потока необходимо предусмотреть заслонки обратной тяги.

В частности, взрывозащищенные заслонки обратной тяги должны устанавливаться в следующих местах:

- проходы воздуховодов приточного воздуха через стены и плиты перекрытий помещений категории А;
- устройства выброса вытяжного воздуха из помещений категории А;
- проходы воздуховодов вытяжного воздуха через стены и плиты перекрытий помещений, оборудованных системой аварийной вентиляции;
- устройства выброса вытяжного воздуха из помещений, оборудованных системой аварийной вентиляции.

#### **5.9.12 Газонепроницаемые заслонки**

На всех приемных устройствах для наружного воздуха и устройствах выброса вытяжного воздуха систем ОВКВ, расположенных вне помещений, должны быть предусмотрены приводные газонепроницаемые запорные заслонки для защиты зданий от проникновения газа.

#### **5.9.13 Заслонки задержки выпуска газовых огнетушащих веществ**

Для задержки выпуска газовых огнетушащих веществ приводные газонепроницаемые заслонки следует устанавливать в отверстиях воздуховодов и ограждающих конструкций здания в следующих помещениях, защищенных системами пожаротушения:

- контроллерная в здании пульта управления;
- помещение пульта (панели) управления в здании пульта управления;
- контроллерная узла водоподготовки;
- помещения КИПиА в здании пульта управления и лабораторном корпусе;
- помещения пульта (панели) управления в здании пульта управления и лабораторном корпусе;
- контроллерная вспомогательной подстанции и контроллерная;
- *Пульт управления узла погрузки карбамида в ж/д вагоны и здание пульта управления погрузкой.*

#### **5.9.14 Системы противодымной вентиляции**

В соответствии с требованиями СП 7.13130.2013 при возникновении пожара могут применяться две разные системы противодымной вентиляции, каждая из которых предназначена для таких целей:

- обеспечение безопасной эвакуации персонала и условий для последующей работы пожарных подразделений;
- удаление продуктов горения и газовых огнетушащих веществ из зон, защищенных системами газового пожаротушения.

Расчет расхода продуктов горения, удаляемых противодымной вентиляцией, и расхода приточного воздуха для подпора, необходимых для безопасной эвакуации персонала, выполняется в соответствии с требованиями СП 7.13130.2013 (пп. 7.4 и 7.12).

Необходимо предусмотреть вентиляцию для подпора воздуха (20 / 70 Па) в случае срабатывания пожарной сигнализации для следующих помещений:

- лифтовые шахты узла грануляции карбамида;
- ~~лифтовые шахты установки синтеза карбамида узла получения плава карбамида;~~
- лестничные шахты узла грануляции карбамида.

*В коридорах узла грануляции карбамида должно быть предусмотрено дымоудаление.*

~~Помимо перечисленного выше, необходимо предусмотреть достаточное количество жалюзи с приводными заслонками для естественного удаления дыма в верхней части обоих фасадов склада гранулированного карбамида для создания естественной тяги в сочетании с открытыми дверями.~~

*На складе гранулированного карбамида противодымная вентиляция не предусматривается, поскольку такое здание классифицируется не как постоянная рабочая зона, а как зона периодического использования, что означает, в соответствии с ГОСТ 12.1.005-88, что рабочие находятся в ней не более 2 часов подряд.*

Противодымная вентиляция для удаления продуктов горения и газовых огнетушащих веществ после выполнения работ по тушению пожара должна выполняться вручную с помощью передвижных вентиляторов дымоудаления в следующих помещениях:

- контроллерная в здании пульты управления;
- помещение пульты (панели) управления в здании пульты управления;
- контроллерная узла водоподготовки;
- помещения КИПиА в здании пульты управления и лабораторном корпусе;
- помещения пульты (панели) управления в здании пульты управления и лабораторном корпусе;
- контроллерная вспомогательной подстанции и контроллерная;
- Пульт управления узла погрузки карбамида в ж/д вагоны и здание пульты управления погрузкой.

Системы противодымной вентиляции для удаления продуктов горения и газовых огнетушащих веществ должны обеспечивать расход удаляемого воздуха не менее четырехкратного воздухообмена в час. Системы противодымной вентиляции должны обеспечивать удаление воздуха из нижней и верхней зон соответствующих помещений.

#### **5.9.15 Система аварийной вентиляции**

Система аварийной вентиляции включается после генерирования соответствующих сигналов блокировки системой аварийного останова.

Эта система аварийной вентиляции предназначена для обеспечения притока воздуха с целью снижения концентрации опасных, токсичных или вредных веществ, таких как газообразные углеводороды, пары аммиака, углекислый газ и азот (по отдельности или смесей) согласно СП 60.13330.2016.

Системы аварийной вентиляции, обеспечивающие 8-кратный воздухообмен в час по общему внутреннему объему соответствующих помещений, должны быть предусмотрены для следующих зданий:

- компрессорный зал в здании компрессорной;
- Азотная установка здания азотной установки и установки деминерализованной воды;
- зона плава карбамида узла получения плава карбамида — установка синтеза карбамида;
- насосная узла получения плава карбамида — насосная аммиака ВД;
- компрессор CO<sub>2</sub> узла получения плава карбамида — компрессор CO<sub>2</sub>;
- установка производства азота ВД узла получения плава карбамида — компрессор CO<sub>2</sub>.

Системы аварийной вентиляции для компрессорных и насосных должны использоваться в качестве дополнительных к основным системам вентиляции, при этом обе системы вентиляции должны работать одновременно.

#### **5.9.16 Переключение режимов работы оборудования**

Переключение с основного оборудования на резервное в случае отказа основного оборудования должно осуществляться автоматически.

Кроме того, следует предусмотреть еженедельное автоматическое переключение между основным и резервным оборудованием для обеспечения одинакового времени эксплуатации каждого устройства.

#### **5.9.17 Система управления**

##### **5.9.17.1 Общие положения**

Для каждого здания должна быть предусмотрена автономная система автоматического управления.

В состав каждой системы автоматического управления должна входить панель управления (оснащенная пультом оператора), датчики управляемого оборудования и исполнительные механизмы. Она должна взаимодействовать с оборудованием ОВКВ, распределительным щитом и следующими внешними системами:

- распределенная система управления (PCY);
- система пожарной сигнализации (СПС);
- система аварийного останова (АО).

В панели управления должны быть предусмотрены контроллеры и (или) интерфейсные модули для приема и обработки всех сигналов (включая аварийные сигналы), поступающих от оборудования или устройств системы ОВКВ (в том числе сигналы состояния двигателей и фидеров, поступающие через распределительный щит системы ОВКВ) и полевых КИПиА, а также для обмена всеми командами блокировок с перечисленными выше внешними системами. Кроме того, панель управления должна выполнять логические последовательности операций, требуемые для обеспечения работы различного оборудования и устройств системы ОВКВ, непосредственно а) управляя исполнительными механизмами оборудования системы ОВКВ, б) передавая команды двигателям через распределительный щит системы ОВКВ, а также с) взаимодействуя с внешними системами с помощью сигналов состояния.

При проектировании органов управления следует предусмотреть возможность работы как в автоматическом режиме (нормальный режим), так и в ручном режиме.

Система автоматического управления также должна иметь необходимые средства взаимодействия и (или) сетевые соединения с другим оборудованием и (или) системами.

Перечень основных функций систем автоматического управления:

- контроль и управление температурой и влажностью в помещении, а также температурой и влажностью приточного воздуха;
- контроль и управление расходом воздуха (для систем с переменным расходом воздуха);
- контроль и управление повышением давления в помещении (при необходимости);
- контроль и управление расходом горячей воды;
- контроль и управление температурой и давлением в системах жидкостного отопления;
- контроль и управление оборудованием системы ОВКВ;
- контроль и управление приводными заслонками и клапанами всех типов;
- автоматическая последовательность операций в системах ОВКВ;
- автоматический запуск последовательности операций в системе защиты от замерзания;
- автоматическое переключение между рабочим и резервным оборудованием;
- автоматическая сезонная замена уставок управления;
- контроль и управление обменом сигналами с электрораспределительными щитами систем ОВКВ;
- взаимодействие с другими системами КИПиА установки;
- выбор режимов работы (ручной/автоматический, вкл./откл. и др.);
- взаимодействие с внешними системами;
- изменение уставок и рабочих параметров для всех контуров управления;
- диагностические проверки всего оборудования и устройств системы автоматического управления;

- регистрация и отображение на пульте оператора всех состояний, аварийных сигналов, измерений и функциональных параметров системы автоматического управления.

Перечень аварийных сигналов, которые должны быть предусмотрены в системе автоматического управления, и должны регистрироваться и отображаться:

- аварийный сигнал высокого перепада давления (загрязнение фильтра) для фильтров грубой и тонкой очистки, расположенных внутри установок обработки воздуха;
- аварийный сигнал низкого перепада давления (нарушение циркуляции воздушного потока) для вентиляторов установок обработки воздуха;
- сигнал защитной сигнализации смотровой дверцы (дверца открыта) для секций вентиляторов установок обработки воздуха;
- аварийный сигнал низкого перепада давления (нарушение циркуляции воздушного потока) для вентиляторов;
- аварийный сигнал системы защиты от замерзания для змеевиков и радиаторов центрального отопления в составе установки обработки воздуха (при наличии);
- аварийный сигнал низкого перепада давления (отказ насоса) для насосов горячей воды;
- сигнал отказа от другого отдельного оборудования;
- аварийный сигнал низкого давления в помещении для всех помещений, где задано управления наддувом;
- аварийный сигнал низкой температуры для всех производственных зданий;
- аварийный сигнал высокой температуры для системы водяного отопления;
- аварийный сигнал низкого давления для системы водяного отопления;
- аварийный сигнал системы аварийной вентиляции, при необходимости;
- сигнал пожарной тревоги;
- аварийный сигнал датчика газа, установленного вне помещения.

Панели управления должны соответствовать требованиям документов Подрядчика 4124-JK-SE-200000050 «Технические условия на шкафы и вспомогательные шкафы системы управления» и 4124-JK-SE-200000130 «Технические условия на систему ПЛК».

Подрядчик должен отдавать предпочтение ПЛК производства компании SIEMENS, модели S7-1500.

Объем поставки субподрядчика должен включать в себя 2 инженерные станции ПЛК ОБКВ:

- 1 инженерная станция ПЛК ОБКВ для установки по производству аммиака;
- 1 инженерная станция ПЛК ОБКВ для установки по производству карбамида.

Две указанные рабочие станции (вместе со столом и креслом) размещаются в приточных вентиляционных камерах зданий пультов управления.



Инженерные станции должны соответствовать требованиям, изложенным в пп. 5.5 и 6.2 документа 4124-JK-SE-200000130 «Технические условия на систему ПЛК».

На случай отключения питания в системах автоматического управления должна быть предусмотрена возможность в течение неограниченного времени сохранять системное программное обеспечение вместе с соответствующей конфигурацией и записывать данные либо с помощью энергонезависимой памяти, либо с помощью надежной системы резервного питания, пригодной для конкретных условий эксплуатации.

После аварийного отключения питания в системах управления и соответствующем управляемом оборудовании должен автоматически восстанавливаться нормальный режим работы.

Для оборудования, запитанного от фидеров двигателей, между системой автоматического управления и распределительным щитом системы ОВКВ должен осуществляться обмен следующими интерфейсными сигналами для подачи команд пуска/останова двигателей и определения их состояния:

- рабочее состояние двигателя;
- отказ двигателя;
- управление двигателем по месту/дистанционное управление;
- команда пуска двигателя;
- команда останова двигателя, которая должна быть взаимосвязана (аппаратно) с командами на отключение, если применимо.

Для оборудования/устройств, запитанных от линий подвода питания, между системой автоматического управления и распределительным щитом системы ОВКВ должны передаваться только сигналы состояния аварийного отключения.

#### **5.9.17.2 Взаимодействие с РСУ**

Все ПЛК ОВКВ предназначены для интеграции установок по производству аммиака и карбамида в РСУ для выполнения функций управления по сети Modbus TCP/IP. Все ПЛК ОВКВ должны быть также подключены к отдельной инженерной сети ПЛК для обеспечения доступа к программе ПЛК с рабочей станции инженера в инженерно-техническом помещении для поиска и устранения неисправностей и изменения программы.

Реализация и разработка последовательных интерфейсов между ПЛК ОВКВ и РСУ должны соответствовать требованиям документа Подрядчика 4124-JK-SE-200000001 «Инструкции по реализации последовательных интерфейсов».

Перечень команд и сигналов, которыми автоматическая система управления ОВКВ должна обмениваться с системой РСУ посредством протокола Modbus TCP/IP:

- аналоговые параметры измерений (температура, влажность, расход, давление, и т. д.);
- состояние вентиляторов;
- состояние конденсаторных агрегатов с воздушным охлаждением;

- состояние увлажнителей;
- состояние заслонок и арматуры;
- состояние системы вентиляции (в работе/остановлена/отключена);
- назначение регулятора и выходной сигнал на клапан регулирования температуры воздуха;
- сигналы диагностики аппаратного обеспечения и программного обеспечения системы управления ОВКВ;
- аварийные сигналы.

Для получения более подробной информации по архитектуре соответствующей сетевой системы управления ОВКВ см.:

1. описание выделенной сети Modbus TCP/IP (гирляндная конфигурация) для получения информации от ПЛК ОВКВ (PCY - ведущее устройство, ПЛК ОВКВ - ведомое устройство).

Все данные должны быть представлены в режиме «только для чтения» (только для осуществления контроля со стороны PCY).

Данная внешняя одномодовая волоконно-оптическая сеть называется «маршрут 1».

2. описание выделенной инженерной сети ПЛК (гирляндная конфигурация) для выполнения соединений с каждым ПЛК панелей управления ОВКВ с целью отладки или изменения программы (рабочая станция ОВКВ - ведущее устройство, ПЛК ОВКВ - ведомое устройство)

Данная внешняя одномодовая двунаправленная (TX / RX) волоконно-оптическая сеть называется «маршрут 2».

Для каждой зоны, установок по производству аммиака и карбамида, два волоконно-оптических маршрута должны быть независимыми.

Для каждого здания будет предусмотрена панель ОВКВ<sup>А</sup> оборудованная ПЛК с платами ввода/вывода и клеммными колодками для подключения полевых устройств, а также коммутатора, оборудованного следующим:

- портами ВОЛС (типа SC) для реализации двух маршрутов волоконно-оптической сети 1/2;
- портом RJ45 для кабеля Ethernet для обеспечения проведения технического обслуживания и (или) местного обнаружения данных посредством портативного ПК.

Внутри здания пульта управления установки по производству аммиака и установки по производству карбамида, а также в здании лаборатории порт ВОЛС (типа SC) для соединения с панелью в том же здании заменяется портами RJ45.

### 5.9.17.3 Взаимодействие с системой пожарной сигнализации

В случае пожара последовательность управляющих сигналов для закрытия противопожарных заслонок, отключения оборудования системы ОВКВ, закрывания заслонок задержки выпуска газовых огнетушащих веществ (там где они требуются или предусмотрены) и включения противодымной подпорной вентиляции (для безопасной эвакуации персонала), если это требуется или указано, должна формироваться на основании сигналов, поступающих со входов блокировок, и исходить непосредственно от секции противопожарной защиты распределительного щита системы ОВКВ. Перечень управляющих сигналов от блокировок:

- управляющий сигнал от системы пожарной сигнализации в случае ручного включения специальных кнопок, установленных возле каждого аварийного выхода;
- управляющий сигнал от системы пожарной сигнализации при обнаружении дыма или пламени либо срабатывании соответствующих извещателей.

Помимо описанного выше, секция противопожарной защиты распределительного щита системы ОВКВ должна быть оборудована специальными кнопками для ручного дистанционного закрытия каждой противопожарной заслонки и для ручного дистанционного включения каждого вентилятора системы противодымной подпорной вентиляции (при наличии).

Кроме того, секция противопожарной защиты распределительного щита системы ОВКВ должна быть оборудована специальными контрольными лампами (свет зеленый/красный) для индикации состояния (открыто/закрыто) каждой противопожарной и противодымной заслонки.

Панель управления системы ОВКВ должна передавать в систему противопожарной сигнализации следующие выходные сигналы:

- сигнал состояния при отключении системы ОВКВ;
- сигнал состояния при закрытии противопожарных заслонок;
- сигнал состояния (для каждого помещения) при закрытии заслонок задержки выпуска газовых огнетушащих веществ;
- сигнал состояния при включении противодымной подпорной вентиляции (при наличии).

*Для дистанционного останова системы ОВКВ извне в случае пожара предусматриваются кнопочные пульты (не входят в объем работ субподрядчика по ОВКВ).*

### 5.9.17.4 Взаимодействие с системой аварийного останова (АО) для включения системы аварийной вентиляции

В соответствии с описанием, приведенным в пункте 5.9.15 настоящих технических условий, при поступлении сигналов со входов блокировок панель управления системы ОВКВ должна формировать и передавать управляющий сигнал на включение системы аварийной

вентиляции (если это требуется или указано). Перечень управляющих сигналов от блокировок:

- управляющий сигнал от системы аварийного отключения в случае ручного включения специальных кнопок, установленных возле входа в здание;
- управляющий сигнал от системы аварийного отключения при обнаружении горючих или токсичных газов либо срабатывании соответствующих устройств контроля, расположенных внутри здания.

Панель управления системы ОВКВ должна формировать выходной сигнал состояния при включении системы аварийной вентиляции и передавать его в систему аварийного отключения.

#### **5.9.17.5 Взаимодействие с системой АО при обнаружении газа вне помещений**

В случае выброса газообразных углеводородов и паров аммиака и поступления управляющего сигнала от блокировок системы аварийного отключения при обнаружении горючих или токсичных газов либо срабатывании соответствующих устройств контроля, расположенных возле приемных устройств для наружного воздуха, панель управления системы ОВКВ должна формировать управляющий сигнал на отключения оборудования системы ОВКВ.

Панель управления системы ОВКВ должна формировать выходной сигнал состояния при отключении системы ОВКВ и передавать его в систему аварийного отключения.

#### **5.9.18 Применение электрооборудования в опасных зонах**

Любое оборудование или электрические компоненты систем ОВКВ, предназначенные для использования в зонах, которые отнесены к категории опасных, подлежат сертификации для работы в соответствующей зоне.

#### **5.9.19 Противовзрывная защита в системе ОВКВ**

При необходимости в здании пульта управления (А10.002) установки по производству аммиака должны быть предусмотрены противовзрывные устройства и расширительные камеры (кирпичные или металлические) в местах прохода воздухопроводов системы ОВКВ и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий. Кроме того, в таких стенах и плитах перекрытий должны быть предусмотрены групповые кабельные вводы во всех местах прохода кабелей и муфты в местах прохода трубопроводов.

#### **5.9.20 Защита змеевиков центрального отопления от замерзания**

Для змеевиков центрального отопления, размещенных внутри приточно-вытяжных и отопительно-вентиляционных установок должна быть предусмотрена автоматическая защита от замерзания.

Если температура воздуха на участке перед нагревательным змеевиком выше +3°C, нагревательный змеевик не замерзнет при любой температуре обратной горячей воды. Однако если температура воздуха на участке перед нагревательным змеевиком ниже +3°C,

нагревательный змеевик может замерзнуть, если температура обратной горячей воды упадет до 30°C.

Если описанные выше условия возникают одновременно, это может привести к замерзанию нагревательного змеевика установки обработки воздуха, поэтому при получении сигналов обратной связи о низкой температуре воздуха и воды от местных КИПиА система автоматического управления ОВКВ должна генерировать аварийный сигнал защиты от замерзания для соответствующего нагревательного змеевика.

В соответствии с логическими последовательностями, реализованными в этой же системе автоматического управления ОВКВ, при получении аварийного сигнала защиты от замерзания нагревательного змеевика установки обработки воздуха на оборудование/устройства установки обработки воздуха должны передаваться следующие управляющие сигналы: отключение приточного вентилятора, закрытие соответствующих приводных заслонок, полное открытие регулирующего клапана нагревательного змеевика в течение 15 секунд и включение рециркуляционного насоса, установленного на байпасе этого нагревательного змеевика, который соединяет трубопроводы подачи и возврата горячей воды. В случае отмены аварийного сигнала системы защиты от замерзания должна восстанавливаться первоначальная конфигурация установки обработки воздуха.

#### **5.9.21 Правила применения рециркуляции воздуха**

Правила применения рециркуляции воздуха определены требованиями СП 60.13330.2016.

#### **5.9.22 Установки центрального отопления**

##### **5.9.22.1 Установка по производству аммиака**

Установка центрального отопления должна быть расположена в *здании* центрального теплового пункта.

Назначение установки центрального отопления — выработка низкотемпературной горячей воды, используемой в качестве теплоносителя для отопления следующих зданий установки по производству карбамида:

- А.10.002 — Здание пульта управления;
- А.11.101 — Компрессорная;
- А.11.104.2 — Насосная станция питательной воды;
- А.17.704 — Склад химреагентов;
- А.17.707 — Насосная станция оборотного водоснабжения;
- А.17.710.2 - *Здание азотной установки и установки деминерализованной воды;*
- А.17.715.1 - *Здание установки водоподготовки 1;*
- А.17.715.2 - *Здание установки водоподготовки 2 (блок биологической очистки);*
- А.17.710.1 - *Здание центрального теплового пункта;*
- А.17.717.1 - *Здание установки подготовки водно-гликолевой смеси.*

В каждое из вышеупомянутых зданий необходимо подавать низкотемпературную горячую воду со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C;
- давление поступающей горячей воды: 5,5 бар (абс.).

Состав оборудования центральной отопительной установки:

- водогрейная установка;
- циркуляционная насосная установка горячей воды;
- установка водоподготовки и впрыска;
- парогенераторная установка;
- конденсаторная установка.

В состав водогрейной установки должны входить два пароводяных теплообменника (пластинчатого или кожухотрубного типа), каждый теплопроизводительностью, равной 50% от общей потребной тепловой нагрузки.

В теплообменники (пластинчатого или кожухотрубного типа) в качестве первичного теплоносителя должен подаваться пар низкого давления с термодинамическими параметрами 4,4 бар (абс.).

При необходимости будет предусмотрена редукционно-охладительная установка для понижения температуры и давления перегретого пара.

В состав циркуляционной насосной установки для подачи горячей воды должны входить два центробежных насоса (один рабочий и один резервный, с частотно-регулируемым приводом), предназначенных для обеспечения циркуляции горячей воды в замкнутом контуре с целью ее распределения от установки центрального отопления до каждого из перечисленных выше зданий.

В объем работ подрядчика (трубопроводы подачи и возврата горячей воды, соединяющие центральный тепловой пункт со зданиями) входит выполнение субподрядчиком расчета/выбора циркуляционных насосов для подачи горячей воды с помощью определения соответствующего общего перепада давления с учетом потерь давления на трение в трубопроводах.

Расчет дополнительных потерь давления (на трение, на арматуре и линейных компонентах) в трубопроводах входит в объем работ субподрядчика и должен быть выполнен тем же субподрядчиком.

Высота подъема замкнутого контура горячей воды не должна превышать 16 м над уровнем земли.

В состав установки водоподготовки и впрыска должно входить необходимое оборудование (устройства), предназначенное для заполнения замкнутого контура горячей воды подготовленной питьевой водой под давлением. Такая установка должна быть



оборудована установкой для магнитной обработки воды, теплообменником для подогрева питьевой воды, двумя насосами питательной воды (один рабочий и один резервный), комплектной установкой для умягчения воды и комплектным агрегатом химической дегазации.

В состав парогенераторной установки должны входить трубопроводы с соответствующими встроенными устройствами и арматурой перед входными патрубками подачи пара в теплообменники. На трубопроводах подачи пара должны быть установлены два двухходовых регулирующих клапана — по одному на каждый теплообменник, предназначенные для автоматического регулирования производительности теплообменника в зависимости от потребной тепловой нагрузки.

В состав конденсаторной установки должны входить два насоса и трубопроводы с соответствующими встроенными устройствами и арматурой, расположенными ниже по потоку от патрубков теплообменников для отвода конденсата. Эти насосы (один рабочий и один резервный) предназначены для возврата конденсата с давлением 4 бар (абс.) на границу установки подрядчика.

#### **5.9.22.2 Установка по производству карбамида**

Установка центрального отопления должна быть расположена в помещении центрального теплового пункта.

Назначение центральной отопительной установки — выработка низкотемпературной горячей воды, используемой в качестве теплоносителя для отопления следующих зданий установки по производству карбамида:

- U20.002 — Здание пульта управления и лабораторный корпус;
- U22.201 — Узел получения плава карбамида — Установка синтеза карбамида;
- U22.204 — Узел получения плава карбамида — Насосная аммиака ВД;
- U22.205 — Узел получения плава карбамида — Компрессор CO<sub>2</sub>;
- U23.301 — Установка грануляции карбамида;
- U24.401 — Склад гранулированного карбамида;
- *U24.402.1 и U24.402.2 - Узел погрузки карбамида в ж/д вагоны и здание пульта управления погрузкой;*
- U27.707 — Насосная станция обратного водоснабжения;
- U27.717 — Центральный тепловой пункт.

В каждое из вышеупомянутых зданий необходимо подавать низкотемпературную горячую воду со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C;
- давление поступающей горячей воды: 5,5 бар (абс.).

Состав оборудования центральной отопительной установки:

- водогрейная установка;
- циркуляционная насосная установка горячей воды;
- установка водоподготовки и впрыска;
- парогенераторная установка;
- конденсаторная установка.

В состав водогрейной установки должны входить два пароводяных теплообменника (пластинчатого или кожухотрубного типа), каждый теплопроизводительностью, равной 50% от общей потребной тепловой нагрузки.

В теплообменники в качестве первичного теплоносителя должен подаваться пар низкого давления с термодинамическими параметрами 3,8 бар (абс.) и 221°C.

При необходимости будет предусмотрена редукционно-охладительная установка для понижения температуры и давления перегретого пара.

В состав циркуляционной насосной установки для подачи горячей воды должны входить два центробежных насоса (один рабочий и один резервный, с частотно-регулируемым приводом), предназначенных для обеспечения циркуляции горячей воды в замкнутом контуре с целью ее распределения от центрального теплового пункта до каждого из перечисленных выше зданий.

В объем работ подрядчика (трубопроводы подачи и возврата горячей воды, соединяющие центральный тепловой пункт со зданиями) входит выполнение субподрядчиком расчета/выбора циркуляционных насосов для подачи горячей воды с помощью определения соответствующего общего перепада давления с учетом потерь давления на трение в трубопроводах.

Расчет дополнительных потерь давления (на трение, на арматуре и линейных компонентах) в трубопроводах входит в объем работ субподрядчика и должен быть выполнен тем же субподрядчиком.

Высота подъема замкнутого контура горячей воды не должна превышать 45 м над уровнем земли.

В состав установки водоподготовки и впрыска должно входить необходимое оборудование (устройства), предназначенное для заполнения замкнутого контура горячей воды подготовленной питьевой водой под давлением. Такая установка должна быть оборудована установкой для магнитной обработки воды, теплообменником для подогрева питьевой воды, двумя насосами питательной воды (один рабочий и один резервный), комплектной установкой для умягчения воды и комплектным агрегатом химической дегазации.

В состав парогенераторной установки должны входить трубопроводы с соответствующими встроенными устройствами и арматурой перед входными патрубками подачи пара в теплообменники. На трубопроводах подачи пара должны быть установлены два двухходовых регулирующих клапана — по одному на каждый теплообменник,

предназначенные для автоматического регулирования производительности теплообменника в зависимости от потребной тепловой нагрузки.

В состав конденсаторной установки должны входить два насоса и трубопроводы с соответствующими встроенными устройствами и арматурой, расположенными ниже по потоку от патрубков теплообменников для отвода конденсата. Эти насосы (один рабочий и один резервный) предназначены для возврата конденсата с давлением 5 бар (абс.) на границу установки подрядчика.

#### **5.10 Общие требования к оборудованию и материалам**

- Все оборудование и материалы должны быть полностью пригодны для установки в данных условиях окружающей среды и для предполагаемого применения. В частности, материалы должны иметь защиту от воздействия аммиачно-воздушной смеси и гидроокиси аммония (водный раствор аммиака). Кроме того, материал, используемый для зданий складов гранулированного карбамида и установок грануляции карбамида, должен иметь защиту от пыли карбамида на весь расчетный срок службы (25 лет).
- Как правило, все оборудование и материалы должны быть серийно выпускаемыми товарами, которые к настоящему времени хорошо зарекомендовали себя в сфере ОВКВ. Однако, если это предусмотрено в Технической документации к Договору субподряда, субподрядчик обязан предоставить приточно-вытяжные установки, изготовленные по индивидуальным размерам, пригодные для установки в условиях ограниченного пространства.
- Змеевики конденсатора с воздушным охлаждением должны быть изготовлены из медных трубок с механически прикрепленными алюминиевыми ребрами. Змеевики должны иметь антикоррозийное покрытие Heresite. Змеевики непосредственного охлаждения должны быть изготовлены из медных трубок с алюминиевыми ребрами. Змеевики должны иметь антикоррозийное покрытие Heresite.
- Трубопровод горячей воды должен быть изготовлен из углеродистой стали, а трубопроводы хладагента, соединяющие охладительные змеевики приточно-вытяжной установки и соответствующие конденсаторные агрегаты с воздушным охлаждением (а также соединяющие внутренние и наружные блоки бытовых сплит-систем кондиционирования воздуха и прецизионных кондиционеров воздуха) должны быть изготовлены из меди и оснащены теплоизоляцией.
- Воздуховоды вытяжного воздуха из оцинкованного стального листа должны быть устойчивы к коррозии от воздействия лабораторных паров.

## 6. ОПИСАНИЕ СИСТЕМЫ ОВКВ

### 6.1 Здание пульты управления (A10.002)

#### 6.1.1 Общие положения

В здании должно быть предусмотрено три системы ОВКВ для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям.

Три системы ОВКВ предназначены для следующих зон здания:

- зона пульты управления (с кондиционированием воздуха);
- зона контроллерной и помещения ИБП (с кондиционированием воздуха);
- служебные помещения (с кондиционированием воздуха).

В указанных ниже помещениях должны быть дополнительно предусмотрены специальные системы противодымной вентиляции для удаления продуктов горения и газового огнетушащего вещества:

- контроллерная;
- помещение пульты (панели) управления.

Для обеспечения приемлемой для персонала температуры окружающего воздуха во время останова технологического оборудования должен быть предусмотрен переносной обогреватель мощностью 4,5 кВт, который обычно хранится в приточной вентиляционной камере.

*Кроме того, противодымная вентиляция предусматривается в помещении начальника смены.*

#### 6.1.2 Зона пульты управления

В эту зону входят следующие помещения:

- помещение пульты (панели) управления;
- помещение инженерно-технической службы.

Эта зона должна обслуживаться полностью воздушной однотрубной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной приточно-вытяжной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный), охладительными змеевиками с непосредственным охлаждением, а также увлажнителем для регулирования влажности в обслуживаемых помещениях.

Кроме того, приточно-вытяжная установка должна быть оснащена двумя змеевиками центрального водяного отопления (один рабочий и один резервный).

Охладительные змеевики приточно-вытяжной установки должны обслуживаться двумя конденсаторными агрегатами с воздушным охлаждением. Два конденсаторных агрегата с воздушным охлаждением, каждый из которых рассчитан на 1/2 общей потребной холодопроизводительности, должны быть установлены на крыше этого же здания.

Помимо описанного выше, для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 к настоящим техническим условиям, в помещении инженерно-технической службы может потребоваться установка дополнительных электрических конвекторов (со ступенчатым регулятором мощности).

Для обеспечения надлежащего распределения тепла в помещении необходимо установить соответствующее количество нагревательных приборов.

Для регулирования температуры внутри помещения пульта (панели) управления система воздушного отопления должна быть оснащена датчиком температуры воздуха в помещении.

При необходимости в основных приточных и вытяжных воздуховодах должны быть предусмотрены шумоглушители для снижения шума.

### **6.1.3 Зона контроллерной и помещения ИБП**

В эту зону входят следующие помещения:

- контроллерная;
- электропункт;
- помещение ИБП.

Эта зона должна обслуживаться полностью воздушной одноканальной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной приточно-вытяжной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный), охлаждаемыми змеевиками с непосредственным охлаждением, а также увлажнителем для регулирования влажности в обслуживаемых помещениях.

Кроме того, приточно-вытяжная установка должна быть оснащена двумя змеевиками центрального водяного отопления (один рабочий и один резервный).

Охладительные змеевики приточно-вытяжной установки должны обслуживаться двумя конденсаторными агрегатами с воздушным охлаждением. Два конденсаторных агрегата с воздушным охлаждением, каждый из которых рассчитан на 1/2 общей потребной холодопроизводительности, должны быть установлены на крыше этого же здания.

Помимо описанного выше, для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 к настоящим техническим условиям, в помещении электропункта может потребоваться установка дополнительных электрических конвекторов (со ступенчатым регулятором мощности).

Для обеспечения надлежащего распределения тепла в помещении необходимо установить соответствующее количество нагревательных приборов.

В помещении электропункта, контроллерной, приточной и вытяжной вентиляционных камерах должна быть предусмотрена общая система вытяжной вентиляции с двумя вытяжными вентиляторами (один рабочий и один резервный), которая предназначена для сброса поступающего в помещение воздуха. Вытяжные вентиляторы должны размещаться в вытяжной вентиляционной камере.

В мужском и женском туалетах должна быть предусмотрена общая система вытяжной вентиляции с одним вытяжным вентилятором для сброса воздуха, поступающего в эти помещения из примыкающего коридора. Вытяжной вентилятор должен размещаться в вытяжной вентиляционной камере.

В помещении ИБП должна быть предусмотрена специальная система вытяжной вентиляции с двумя вытяжными вентиляторами (один рабочий и один резервный), которая предназначена для сброса поступающего в помещение воздуха. Система вентиляции должна обеспечивать удаление воздуха из нижней и верхней зоны помещения. Вытяжные вентиляторы должны размещаться в вытяжной вентиляционной камере.

При необходимости в основных приточных и вытяжных воздуховодах должны быть предусмотрены шумоглушители для снижения шума.

#### **6.1.4 Служебные помещения**

В эту зону входят следующие помещения:

- переговорная;
- помещение установки автоматического пожаротушения;
- кладовая;
- помещение начальника смены;
- монтажная мастерская КИПиА;
- столовая;
- коридор;
- приточная вентиляционная камера;
- вытяжная вентиляционная камера.

Эта зона должна обслуживаться полностью воздушной одноструйной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной приточно-вытяжной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и охладительными змеевиками с непосредственным охлаждением.

Кроме того, приточно-вытяжная установка должна быть оснащена змеевиками центрального водяного отопления.



Охлажденные змеевики приточно-вытяжной установки должны обслуживаться двумя конденсаторными агрегатами с воздушным охлаждением. Два конденсаторных агрегата с воздушным охлаждением, каждый из которых рассчитан на 1/2 общей потребной холодопроизводительности, должны быть установлены на крыше этого же здания.

Помимо описанного выше, для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 к настоящим техническим условиям, в некоторых перечисленных выше помещениях может потребоваться установка дополнительных электрических конвекторов (со ступенчатым регулятором мощности).

Для обеспечения надлежащего распределения тепла в помещении необходимо установить соответствующее количество нагревательных приборов.

В коридоре, монтажной мастерской КИПиА, помещении начальника смены, кладовой, помещении установки автоматического пожаротушения, переговорной, помещении пульта (панели) управления и помещении инженерно-технической службы должна быть предусмотрена общая система вытяжной вентиляции с двумя вытяжными вентиляторами (один рабочий и один резервный), которая предназначена для сброса поступающего в помещения воздуха. Вытяжные вентиляторы должны размещаться в вытяжной вентиляционной камере.

В столовой должна быть предусмотрена специальная система вытяжной вентиляции с одним вентилятором, которая предназначена для сброса поступающего в помещение воздуха. Вытяжной вентилятор должен размещаться в вытяжной вентиляционной камере.

При необходимости в основных приточных и вытяжных воздуховодах должны быть предусмотрены шумоглушители для снижения шума.

#### **6.1.5 Система противодымной вентиляции**

В помещениях контрольной и пульта (панели) управления должны быть предусмотрены две автономные системы противодымной вентиляции для удаления продуктов горения и газового огнетушащего вещества после тушения пожара. Согласно требованиям СП 7.13130.2013, для удаления дыма из верхней и нижней зон этих помещений приточная вентиляция должна обеспечивать 4-кратный воздухообмен в час.

В каждом из упомянутых выше помещений должна применяться система дымоудаления на базе передвижного вентилятора дымоудаления, укомплектованного гибким воздуховодом на барабане (подсоединяется к впускному отверстию вентилятора), включающая оконечные устройства в двух проемах, расположенных на верхнем и нижнем уровне соответствующей внутренней стены помещения, которые обычно закрыты съёмными крышками или решетками.

При нормальных рабочих условиях все проемы должны быть перекрыты, а передвижные вентиляторы дымоудаления (две шт., один из них резервный) должны храниться внутри вытяжной вентиляционной камеры.

После тушения пожара в одном из указанных помещений крышки или решетки с обоих проемов на соответствующей стене снимаются, передвижной вентилятор дымоудаления перемещается в примыкающий к этому помещению коридор (или размещается вне здания), подключается к источнику питания и пристыковывается (с помощью гибких

воздуховодов) к нижнему проему. После ручного открытия обеих противопожарных заслонок (одна в верхнем и одна в нижнем проеме) этот вентилятор дымоудаления включается, и начинается наружный выброс продуктов горения и газовых огнетушащих веществ. Одновременно через верхний проем в это помещение поступает эквивалентное количество чистого воздуха из примыкающего коридора (или снаружи) для компенсации удаляемого объема газов.

Для удаления дыма из верхней и нижней зон соответствующего помещения должна быть предусмотрена надлежащая система воздуховодов, снабженных воздухозаборниками вытяжного воздуха в верхней и нижней зонах этого помещения и присоединенных к оконечному устройству в нижнем проеме.

#### **6.1.6 Общие требования**

Для приточно-вытяжных установок должна быть предусмотрена одна общая наружная воздухозаборная труба высотой не менее 15 метров над уровнем земли.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13130.2013, в местах прохода воздуховода и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Приточно-вытяжные установки, увлажнители, переносной обогреватель, распределительный щит и панель автоматического управления должны размещаться в приточной вентиляционной камере.

Вентиляторы общей системы вытяжной вентиляции и передвижные вентиляторы дымоудаления должны размещаться в вытяжной вентиляционной камере.

Это здание должно выдерживать ударную волну с избыточным давлением 2,5 кПа, поэтому при необходимости во всех местах прохода воздуховодов системы ОВКВ и проходных отверстиях в наружных стенах и кровельных панелях должны быть предусмотрены противовзрывные устройства и расширительные камеры (кирпичные или металлические).

## **6.2 Главная подстанция (A10.001)**

### **6.2.1 Общие положения**

В здании должно быть предусмотрено четыре системы ОВКВ для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям.

Четыре системы ОВКВ предназначены для следующих зон здания:

- помещение для разводки кабелей (с отоплением и вентиляцией);
- трансформаторная А и В и помещение установки автоматического пожаротушения (с отоплением и вентиляцией);
- аккумуляторная (с кондиционированием воздуха);
- помещение РУ СН и НН и электрощитовая (с отоплением и вентиляцией).

Для обеспечения приемлемой для персонала температуры окружающего воздуха во время останова технологического оборудования должен быть предусмотрен переносной обогреватель мощностью 4,5 кВт, который обычно хранится в приточной вентиляционной камере.

### **6.2.2 Помещение для разводки кабелей**

Помещение для разводки кабелей должно обслуживаться полностью воздушной одноструйной системой вентиляции открытого типа с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и электрическим нагревательным змеевиком.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

В помещении для разводки кабелей должна быть предусмотрена специальная система вытяжной вентиляции, включающая два вытяжных вентилятора (каждый обеспечивает 50% общей производительности) с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса поступающего в помещение воздуха. Вытяжной вентилятор должен размещаться в специально отведенном месте вне помещения на уровне земли.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Отопительно-вентиляционная установка должна размещаться в приточной вентиляционной камере 1.

### **6.2.3 Трансформаторные и помещение установки автоматического пожаротушения**

В эту зону входят следующие помещения:

- трансформаторные А и В;
- помещение установки автоматического пожаротушения;
- приточные вентиляционные камеры 1 и 2.

Перечисленные выше помещения должны обслуживаться полностью воздушной однотрубной приточной системой вентиляции с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и электрическим нагревательным змеевиком.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Кроме того, в помещении установки автоматического пожаротушения и приточных вентиляционных камерах 1 и 2 должны быть предусмотрены электрические конвекторы со ступенчатым регулятором мощности для регулирования температуры в этих помещениях.

Для обеспечения надлежащего распределения тепла в этих помещениях необходимо установить соответствующее количество нагревательных приборов.

В помещениях трансформаторных должны быть предусмотрены специальные системы вытяжной вентиляции, включающие по одному вытяжному вентилятору с частотно-регулируемым приводом (для регулирования расхода воздуха), которые предназначены для сброса воздуха, поступающего в эти помещения. Вытяжной вентилятор должен размещаться в специально отведенном месте вне помещения на уровне земли.

В помещении установки автоматического пожаротушения должна быть предусмотрена специальная система вытяжной вентиляции с одним вентилятором, которая предназначена для сброса поступающего в помещение воздуха. Вытяжной вентилятор должен размещаться в этом же помещении.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Отопительно-вентиляционная установка должна размещаться в приточной вентиляционной камере 2.

#### **6.2.4 Аккумуляторная**

Это помещение должно обслуживаться полностью воздушной одноканальной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной приточно-вытяжной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и охладительными змеевиками с непосредственным охлаждением. Кроме того, приточно-вытяжная установка должна быть оснащена электрическими нагревательными змеевиками.

Охлаждающие змеевики приточно-вытяжной установки должны обслуживаться двумя конденсаторными агрегатами с воздушным охлаждением. Два конденсаторных агрегата с воздушным охлаждением, каждый из которых рассчитан на 1/2 общей потребной холодопроизводительности, должны быть снаружи здания.

В аккумуляторной должна быть предусмотрена специальная система вытяжной вентиляции с двумя вытяжными вентиляторами (один рабочий и один резервный), которая предназначена для сброса поступающего в помещение воздуха. Согласно требованиям стандарта МЭК, п. 4.4.41, необходимо обеспечить вытяжку воздуха из верхней (100 мм от потолка) и нижней (300 мм от пола) зон этого помещения. Вытяжные вентиляторы должны размещаться в помещении этой же аккумуляторной.

Кроме того, для аккумуляторной необходимо предусмотреть воздухозаборники на крыше (жалюзи-башенки) для частичной компенсации удаленного воздуха за счет процесса инфильтрации.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Приточно-вытяжная установка должна размещаться в приточной вентиляционной камере 1.

#### **6.2.5 Помещения РУ СН и НН и электрощитовая**

Помещения РУ СН и НН и электрощитовая должны обслуживаться полностью воздушной одноканальной приточной системой вентиляции с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и электрическим нагревательным змеевиком.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Для вентиляционной установки, обслуживающей помещения РУ СН и НН, должен быть

предусмотрен отдельный воздухозаборник, расположенный снаружи на высоте не менее 11 метров над уровнем земли.

В помещении РУ должна быть предусмотрена специальная система вытяжной вентиляции, включающая один вытяжной вентилятор с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса воздуха, поступающего в эти помещения. Вытяжные вентиляторы должны размещаться в этом же помещении РУ СН и НН.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Отопительно-вентиляционная установка должна размещаться в приточной вентиляционной камере 2.

### **6.2.6 Общие требования**

Для перечисленных ниже систем должен быть предусмотрен один общий воздухозаборник, расположенный снаружи на высоте не менее 11 метров над уровнем земли:

- отопительно-вентиляционная установка для помещения разводки кабелей;
- отопительно-вентиляционная установка для помещения трансформаторной;
- приточно-вытяжная установка для аккумуляторной.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13130.2013, в местах прохода воздуховода и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит и панель автоматического управления должны быть расположены в помещении РУ.

## **6.3 Компрессорная (А11.101)**

### **6.3.1 Общеобменная система вентиляции**

В здании должно быть предусмотрено отопление и вентиляция для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Система вентиляции должна быть полностью воздушной одноканальной системой открытого типа с постоянным/переменным расходом воздуха.



Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Для обеспечения заданного минимального расхода приточного воздуха необходимо предусмотреть две отопительно-вентиляционные установки с постоянным расходом воздуха, каждая из которых оснащена фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления. Обе отопительно-вентиляционные установки должны размещаться в приточной вентиляционной камере.

Эти две отопительно-вентиляционные установки должны обслуживать помещения компрессорной и установки автоматического пожаротушения, приточную вентиляционную камеру и туалет, используя соответствующую систему воздуховодов. В помещении компрессорной должна быть предусмотрена подача воздуха в верхнюю и нижнюю зоны.

Кроме того, в приточной вентиляционной камере и туалете должны быть предусмотрены специальные электрические конвекторы для регулирования температуры в этих помещениях.

Для обеспечения надлежащего распределения тепла в помещении необходимо установить соответствующее количество нагревательных приборов.

В качестве теплоносителя в системе ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

В помещении компрессорной должна быть предусмотрена специальная система вытяжной вентиляции для сброса поступающего воздуха из верхней и нижней зон помещения (верхняя зона — 60% общего расхода воздуха, нижняя зона — 40% общего расхода воздуха).

В составе системы вытяжной вентиляции для помещения компрессорной должно быть следующее оборудование: необходимое количество устройств выброса вытяжного воздуха на крыше (жалюзи-башенки) для обеспечения заданных требований по воздухообмену в верхней зоне помещения компрессорной за счет процесса эксфильтрации и четыре канальных центробежных вытяжных вентилятора корпусного типа, установленных вне помещения, для обеспечения заданных требований по воздухообмену в нижней зоне помещения компрессорной (каждый вентилятор, соединенный с соответствующим наружным ответвлением воздуховода, должен выбрасывать воздух из помещения через отдельный настенный воздухоприемник). В случае отказа одного из четырех вытяжных вентиляторов общая производительность остальных трех вентиляторов должна обеспечивать заданный минимальный расход вытяжного воздуха для нижней зоны помещения компрессорной. Все четыре ответвления воздуховода должны быть подсоединены к общей наружной камере статического давления, которая, в свою очередь, подсоединена к общей выпускной трубе, установленной снаружи.

Общая выпускная труба для выброса вытяжного воздуха, в которую поступает воздух, удаляемый описанными выше четырьмя вытяжными вентиляторами, должна быть факельного типа и должна обеспечивать выброс воздуха в атмосферу со скоростью не менее 20 м/с.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

В туалете и помещении установки автоматического пожаротушения должны быть предусмотрены специальные системы вытяжной вентиляции с одним вытяжным вентилятором для сброса воздуха, поступающего в эти помещения из примыкающего помещения компрессорной. Вытяжной вентилятор должен размещаться в этом же помещении.

Воздух, подаваемый в приточную вентиляционную камеру, при необходимости должен выводиться наружу через специальный настенный клапан избыточного давления.

Для удаления избыточного тепла, поступающего в помещение компрессорной, должна использоваться специальная дополнительная система вентиляции с переменным расходом воздуха, в составе которой должно быть следующее оборудование: одна вентиляционная установка с частотно-регулируемым приводом (устанавливается в приточной вентиляционной камере), фильтр грубой очистки, приточный вентилятор (для подачи приточного воздуха через соответствующую систему наружных воздухопроводов в настенные приточные воздухораспределители), обслуживающий нижнюю зону помещения компрессорной, и три настенных вытяжных вентилятора с частотно-регулируемым приводом (для выброса воздуха через жалюзи воздухозаборников вытяжного воздуха), обслуживающие верхнюю зону этого помещения. Система воздухопроводов приточного воздуха должна иметь наружный участок, соединяющий приточную вентиляционную камеру с настенными приточными воздухораспределителями, как описано выше.

Для отопительно-вентиляционных установок и вентиляционной установки должна быть предусмотрена одна общая воздухозаборная труба высотой не менее 15 метров над уровнем земли, расположенная на крыше приточной вентиляционной камеры.

### **6.3.2 Система аварийной вентиляции**

Согласно требованиям СП 60.13330.2016 в помещении компрессорной должна быть также предусмотрена система аварийной вентиляции. Аварийная вентиляция — это дополнительная система вентиляции, специально предназначенная для снижения концентрации газообразных углеводородов и паров аммиака внутри здания. Аварийная вентиляция включается при поступлении следующих сигналов от установленных в здании датчиков:

- дозврывная концентрация водорода и метана в помещениях;
- повышенная концентрация паров аммиака в помещениях.

Система аварийной вентиляции должна обеспечивать 8-кратный воздухообмен в час по общему внутреннему объему соответствующего помещения.

При обнаружении довзрывной концентрации водорода и метана система аварийной вентиляции должна обеспечить необходимый приток воздуха в верхнюю зону помещения компрессорной. В состав этой системы аварийной вентиляции должно входить следующее оборудование: необходимое количество крышных вытяжных вентиляторов (обеспечивают 40% выброса от общего объема вытяжного воздуха) и необходимое количество настенных вытяжных вентиляторов (обеспечивают 60% выброса от общего объема вытяжного воздуха через настенные жалюзи воздухозаборников вытяжного воздуха).

В случае обнаружения довзрывной концентрации паров аммиака система аварийной вентиляции должна обеспечить необходимый приток воздуха в верхнюю и нижнюю зоны помещения компрессорной. В состав этой системы аварийной вентиляции должно входить следующее оборудование: необходимое количество настенных вытяжных вентиляторов (обеспечивают 60% выброса от общего объема вытяжного воздуха через настенные жалюзи воздухозаборников вытяжного воздуха, расположенные в верхней зоне помещения) и четыре канальных центробежных вытяжных вентилятора корпусного типа, установленных вне помещения (обеспечивают 40% выброса от общего объема вытяжного воздуха через настенные жалюзи воздухозаборников вытяжного воздуха, расположенные в нижней зоне помещения).

Для каждого из этих канальных центробежных вытяжных вентиляторов корпусного типа должна быть предусмотрена специальная система воздуховодов и устройство выброса вытяжного воздуха.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Воздух, удаленный с помощью системы аварийной вентиляции, должен компенсироваться равным количеством компенсационного воздуха, поступающего в здание через те же установленные на крыше жалюзи-башенки системы вытяжной вентиляции, которые обычно используются для частичного удаления воздуха, поступающего из общеобменной системы приточной вентиляции, как описано в п. 6.3.1 настоящих технических условий.

Вентиляционная установка, описанная в п. 6.3.1 настоящих технических условий (предназначенная для удаления избыточного тепла, поступающего в помещение), в случае аварийного режима вентиляции должна работать с максимальной производительностью, чтобы обеспечить увеличение притока воздуха для частичной компенсации удаленного воздуха.

### **6.3.3 Общие требования**

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Все оборудование системы ОВКВ должно иметь исполнение для монтажа в зоне категории 2, группа IIC, класс T1, за исключением оборудования, расположенного внутри приточной вентиляционной камеры, туалета и помещения установки автоматического пожаротушения, которые должны быть в стандартном исполнении.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Отопительно-вентиляционные установки, вентиляционная установка, распределительный щит и панель автоматического управления должны устанавливаться в приточной вентиляционной камере.

#### **6.4 Насосная станция питательной воды (А11.104.2)**

В здании должно быть предусмотрено отопление и вентиляция для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Система вентиляции должна быть полностью воздушной одноконтурной системой открытого типа с переменным расходом воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и элеватором центрального водяного отопления.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Отопительно-вентиляционная установка должна быть расположена вне помещения на уровне земли.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

Для отопительно-вентиляционной установки должна быть предусмотрена одна воздухозаборная труба высотой не менее 15 метров над уровнем земли.

В помещении насосной станции питательной воды котла ВД должна быть предусмотрена специальная система вытяжной вентиляции, включающая необходимое количество крышных вытяжных вентиляторов с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса поступающего в помещение воздуха.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит и панель автоматического управления должны быть расположены в помещении насосной станции питательной воды котла ВД.

## **6.5 Склад химреагентов (А17.704)**

В здании должно быть предусмотрено отопление и вентиляция для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Система вентиляции должна быть полностью воздушной одноконтурной системой открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и элеватором центрального водяного отопления.

Отопительно-вентиляционная установка должна быть расположена вне помещения на уровне земли.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Для отопительно-вентиляционной установки должен быть предусмотрен один воздухозаборник, расположенный на высоте не менее 7 метров над уровнем земли.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

В помещении склада химреактивов должна быть предусмотрена специальная система вытяжной вентиляции с необходимым количеством крышных вытяжных вентиляторов, которая предназначена для сброса поступающего в помещение воздуха. Выброс воздуха должен производиться в верхней зоне этого помещения.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит и панель автоматического управления должны быть расположены в помещении склада химреактивов.

## **6.6 Насосная станция оборотного водоснабжения (A17.707)**

В помещении комплектной установки химической очистки должно быть предусмотрено отопление и вентиляция для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Система вентиляции должна быть полностью воздушной одноканальной системой открытого типа с постоянным расходом воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и элеватором центрального водяного отопления.

Отопительно-вентиляционная установка должна быть расположена вне помещения на уровне земли.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

Для отопительно-вентиляционной установки должен быть предусмотрен один воздухозаборник, расположенный на высоте не менее 6 метров над уровнем земли.

Для комплектной установки химической очистки должно быть предусмотрено необходимое количество устройств выброса вытяжного воздуха на крыше (жалюзи-башенки) для вывода приточного воздуха наружу.

В туалете должна быть предусмотрена специальная система вытяжной вентиляции с одним вытяжным вентилятором для сброса воздуха, поступающего в него из соседних помещений. Вытяжной вентилятор должен размещаться в этом же помещении.



Кроме того, в туалете должны быть предусмотрены специальные электрические конвекторы для регулирования температуры в этом помещении.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит и панель автоматического управления должны быть расположены в помещении комплектной установки химической очистки.

## **6.7 Здание азотной установки и установки деминерализованной воды (А17.710.2)**

### **6.7.1 Общие положения**

В здании должно быть предусмотрено две системы ОВКВ для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям.

Две системы ОВКВ предназначены для следующих зон здания:

- азотная установка (с отоплением и вентиляцией);
- зона установки деминерализованной воды (с отоплением и вентиляцией).

Для азотной установки должна быть дополнительно предусмотрена специальная система аварийной вентиляции.

### **6.7.2 Азотная установка**

Азотная установка должна обслуживаться полностью воздушной одноконтурной системой вентиляции открытого типа с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и элеватором центрального водяного отопления.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не

меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Отопительно-вентиляционная установка должна быть расположена вне помещения на уровне земли.

В помещении азотной установки должна быть предусмотрена специальная система вытяжной вентиляции, включающая два крышных вытяжных вентилятора с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса поступающего в помещение воздуха.

### **6.7.3 Зона установки деминерализованной воды**

В эту зону входят следующие помещения:

- установка деминерализованной воды;
- насос деминерализованной воды.

Перечисленные выше помещения должны обслуживаться полностью воздушной одноструйной приточной системой вентиляции с постоянным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Отопительно-вентиляционная установка должна быть расположена вне помещения на уровне земли.

В помещениях установки деминерализации воды и насосной деминерализованной воды должны быть предусмотрены специальные системы вытяжной вентиляции с 4 крышными вытяжными вентиляторами каждая, которые предназначены для сброса воздуха, поступающего в эти помещения.

### **6.7.4 Система аварийной вентиляции**

Согласно требованиям СП 60.13330.2016 в помещении азотной установки должна быть также предусмотрена система аварийной вентиляции. Аварийная вентиляция — это дополнительная система вентиляции, специально предназначенная для предотвращения опасной концентрации азота (и, следовательно, для поддержания такого газового состава воздуха, чтобы он был пригоден для дыхания) за счет увеличения объемной концентрации кислорода внутри здания. Аварийная вентиляция включается при поступлении сигнала от установленных в здании датчиков о низкой концентрации кислорода в помещении.

Объемная доля кислорода в воздухе помещения азотной установки должна быть не менее 19% и не более 23%. Такая объемная доля кислорода должна поддерживаться путем непрерывной работы общеобменной и аварийной вентиляции.

Система аварийной вентиляции должна обеспечивать 8-кратный воздухообмен в час по общему внутреннему объему здания.

При обнаружении низкой концентрации кислорода необходимая производительность вентиляции должна обеспечиваться системой аварийной вентиляции двухтактного типа, состоящей из двух наружных канальных приточных вентиляторов настенной установки (для забора наружного воздуха и перемещения его в стенные приточные воздухораспределители внутри здания) и двух канальных центробежных вытяжных вентиляторов, установленных снаружи на первом этаже (для выпуска воздуха из здания через стенные воздухозаборники вытяжного воздуха). Приточные вентиляторы должны быть взаимосвязаны с соответствующими вытяжными вентиляторами.

Для каждого из этих центробежных вытяжных вентиляторов должна быть предусмотрена специальная система воздуховодов и устройство выброса вытяжного воздуха.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.7.5 Общие требования**

Для отопительно-вентиляционной установки и приточных вентиляторов аварийной вентиляционной системы должен быть предусмотрен один общий воздухозаборник, расположенный снаружи на высоте не менее 11 метров над уровнем земли.

Необходимо предусмотреть общую систему наружных воздуховодов, соединяющую воздухозаборную трубу с перечисленным выше оборудованием для распределения наружного воздуха от места забора до систем приточной вентиляции.

В качестве теплоносителя в системе ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит и панель автоматического управления должны быть расположены в помещении азотной установки.

#### **6.8 Здание установки подготовки водно-гликолевой смеси (A17.717.1)**

В здании установки подготовки водно-гликолевой смеси должно быть предусмотрено отопление и вентиляция для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Система вентиляции должна быть полностью воздушной одноструйной системой открытого типа с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Для отопительно-вентиляционной установки должен быть предусмотрен один воздухозаборник, расположенный снаружи на высоте не менее 5 метров над уровнем земли.

Отопительно-вентиляционная установка должна быть расположена вне помещения на уровне земли.

В качестве теплоносителя в системе ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

В помещении насосной станции водно-гликолевой смеси должна быть предусмотрена специальная система вытяжной вентиляции, включающая необходимое количество крышных вытяжных вентиляторов с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса поступающего в помещение воздуха.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит и панель автоматического управления должны быть расположены в помещении насосной станции водно-гликолевой смеси.

### **6.9 Здание центрального теплового пункта (А17.710.1)**

В здании должно быть предусмотрено отопление и вентиляция для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Система вентиляции должна быть полностью воздушной одноконтурной системой открытого типа с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и элеватором центрального водяного отопления.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Для отопительно-вентиляционной установки должен быть предусмотрен один воздухозаборник, расположенный снаружи на высоте не менее 6 метров над уровнем земли.

Отопительно-вентиляционная установка должна быть расположена вне помещения на уровне земли.

В качестве теплоносителя в системе ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

В помещении теплового пункта должна быть предусмотрена специальная система вытяжной вентиляции, включающая необходимое количество крышных вытяжных

вентиляторов с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса поступающего в помещение воздуха.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит и панель автоматического управления должны быть расположены внутри здания.

## **6.10 Здание узла водоподготовки 1 (А17.715.1)**

### **6.10.1 Общие положения**

В здании должно быть предусмотрено четыре системы ОВКВ для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям.

Четыре системы ОВКВ предназначены для следующих зон здания:

- первого этажа зала фильтрации (с отоплением и вентиляцией);
- электрощитовой и трансформаторной (с отоплением и вентиляцией);
- цокольного этажа зала фильтрации (с отоплением и вентиляцией);
- контроллерной/помещения ИБП, экспресс-лаборатории и операторной (с кондиционированием воздуха).

В помещении контроллерной должна быть дополнительно предусмотрена специальная система противодымной вентиляции для удаления продуктов горения и газового огнетушащего вещества.

### **6.10.2 Первый этаж зала фильтрации**

Эта зона должна обслуживаться полностью воздушной одноконтурной приточной отопительно-вентиляционной системой с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и элеватором центрального водяного отопления.



Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Отопительно-вентиляционная установка должна размещаться в приточной вентиляционной камере.

На первом этаже зала фильтрации должна быть предусмотрена специальная система вытяжной вентиляции, включающая один вытяжной вентилятор с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса воздуха, поступающего в это помещение. Вытяжной вентилятор должен размещаться внутри вытяжной вентиляционной камеры.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

### **6.10.3 Электрощитовая и трансформаторная**

В эту зону входят следующие помещения:

- трансформаторная;
- электрощитовая;
- приточная вентиляционная камера;
- вытяжная вентиляционная камера.

Перечисленные выше помещения должны обслуживаться полностью воздушной одноконтурной отопительно-вентиляционной системой открытого типа с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и элеватором центрального водяного отопления.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Отопительно-вентиляционная установка должна размещаться в приточной вентиляционной камере.

Кроме того, в приточной вентиляционной камере и вытяжной вентиляционной камере должны быть предусмотрены электрические конвекторы со ступенчатым регулятором мощности для регулирования температуры в этих помещениях.

Для обеспечения надлежащего распределения тепла в здании необходимо установить соответствующее количество нагревательных приборов.

В помещении трансформаторной должна быть предусмотрена специальная система вытяжной вентиляции, включающая один вытяжной вентилятор с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса воздуха, поступающего в это помещение. Вытяжной вентилятор должен размещаться внутри вытяжной вентиляционной камеры.

В помещении электрощитовой должна быть предусмотрена специальная система вытяжной вентиляции, включающая один вытяжной вентилятор с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса воздуха, поступающего в это помещение. Вытяжной вентилятор должен размещаться внутри вытяжной вентиляционной камеры.

В приточной вентиляционной камере и вытяжной вентиляционной камере должны быть предусмотрены две специальные системы вытяжной вентиляции, каждая с одним вытяжным вентилятором, которые предназначены для сброса воздуха, поступающего в эти помещения. Вытяжной вентилятор должен размещаться внутри соответствующего помещения.

В туалете должна быть предусмотрена специальная система вытяжной вентиляции с одним вытяжным вентилятором для сброса воздуха, поступающего в него из соседних помещений. Вытяжной вентилятор должен размещаться в этом же туалете.

Кроме того, в туалете должен быть предусмотрен электрический конвектор со ступенчатыми регуляторами мощности для регулирования температуры в этом помещении.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.10.4 Цокольный этаж зала фильтрации**

В эту зону входят следующие помещения:

- цокольный этаж зала фильтрации;
- помещение гипохлоритов;
- помещение каустической соды;
- помещение серной и соляной кислоты;
- станция известкового молока;
- помещение системы обогрева.

Перечисленные выше помещения должны обслуживаться полностью воздушной одноконтурной отопительно-вентиляционной системой открытого типа с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Отопительно-вентиляционная установка должна размещаться в приточной вентиляционной камере.

На цокольном этаже зала фильтрации должна быть предусмотрена специальная система вытяжной вентиляции, включающая один вытяжной вентилятор с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса воздуха, поступающего в это помещение. Вытяжной вентилятор должен размещаться внутри вытяжной вентиляционной камеры.

Для помещения гипохлоритов, помещения системы обогрева, помещения каустической соды, помещения серной и соляной кислоты, а также станции известкового молока необходимо предусмотреть четыре отдельные системы вентиляции, включающие в себя один вытяжной вентилятор, для сброса поступающего в эти помещения воздуха. Вытяжные вентиляторы должны размещаться внутри соответствующего помещения.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.10.5 Контроллерная/помещение ИБП, экспресс-лаборатория и операторная**

В эту зону входят следующие помещения:

- экспресс-лаборатория;
- операторная;
- *помещение ИБП*;
- контроллерная.

Перечисленные выше помещения должны обслуживаться полностью воздушной одноконтурной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной приточно-вытяжной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и охладительным змеевиком с непосредственным охлаждением.

Кроме того, приточно-вытяжная установка должна быть оснащена змеевиками центрального водяного отопления.

Приточный воздуховод должен быть оборудован увлажнителем для регулирования влажности в обслуживаемых помещениях.

Приточно-вентиляционная установка должна размещаться в приточной вентиляционной камере.

Охлаждающие змеевики приточно-вытяжной установки должны обслуживаться двумя конденсаторными агрегатами с воздушным охлаждением. Два конденсаторных агрегата с воздушным охлаждением, каждый из которых рассчитан на 1/2 общей потребной холодопроизводительности, должны быть установлены на крыше этого же здания.

Кроме того, в экспресс-лаборатории и операторной должны быть предусмотрены электрические конвекторы со ступенчатым регулятором мощности для регулирования температуры в этих помещениях.

Для обеспечения надлежащего распределения тепла в помещении необходимо установить соответствующее количество нагревательных приборов.

В экспресс-лаборатории и операторной должна быть предусмотрена одна специальная система вытяжной вентиляции с одним вытяжным вентилятором, которая предназначена для сброса воздуха, поступающего в эти помещения. Вытяжной вентилятор должен размещаться внутри вытяжной вентиляционной камеры.

В контроллерной должна быть предусмотрена одна отдельная система вытяжной вентиляции с одним вытяжным вентилятором, которая предназначена для сброса поступающего в помещение воздуха. Вытяжной вентилятор должен размещаться внутри вытяжной вентиляционной камеры.

*В помещении ИБП должна быть предусмотрена специальная система вытяжной вентиляции с двумя вытяжными вентиляторами (один рабочий и один резервный), которая предназначена для сброса поступающего в помещение воздуха. Система вентиляции должна обеспечивать удаление воздуха из нижней и верхней зоны помещения. Вытяжные вентиляторы должны размещаться в вытяжной вентиляционной камере.*

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.10.6 Система противодымной вентиляции**

В помещении контроллерной должна быть предусмотрена специальная система противодымной вентиляции для удаления продуктов горения и газового огнетушащего вещества после тушения пожара. Согласно требованиям СП 7.13130.2013, для удаления дыма из верхней и нижней зон этих помещений приточная вентиляция должна обеспечивать 4-кратный воздухообмен в час.

В перечисленных выше помещениях должна применяться система дымоудаления на базе передвижного вентилятора дымоудаления, укомплектованного гибким воздуховодом на

барабана (подсоединяется к впускному отверстию вентилятора), включающая оконечные устройства в двух проемах, расположенных на верхнем и нижнем уровне соответствующей внутренней стены помещения, которые обычно закрыты съемными крышками или решетками.

При нормальных рабочих условиях все проемы должны быть перекрыты, а передвижные вентиляторы дымоудаления (две шт., один из них резервный) должны храниться внутри приточной вентиляционной камеры.

После тушения пожара в указанном помещении крышки или решетки с обоих проемов на соответствующей стене снимаются, передвижной вентилятор дымоудаления перемещается в примыкающий к этому помещению коридор (или размещается вне здания), подключается к источнику питания и пристыковывается (с помощью гибких воздуховодов) к нижнему проему. После ручного открытия обеих противопожарных заслонок (одна в верхнем и одна в нижнем проеме) этот вентилятор дымоудаления включается, и начинается наружный выброс продуктов горения и газовых огнетушащих веществ. Одновременно через верхний проем в это помещение поступает эквивалентное количество чистого воздуха из примыкающего коридора (или снаружи) для компенсации удаляемого объема газов.

Для удаления дыма из верхней и нижней зон соответствующего помещения должна быть предусмотрена надлежащая система воздуховодов, снабженных воздухозаборниками вытяжного воздуха в верхней и нижней зонах этого помещения и присоединенных к оконечному устройству в нижнем проеме.

#### **6.10.7 Общие требования**

Необходимо предусмотреть специальные воздухозаборники, расположенные снаружи на высоте не менее 7 метров над уровнем земли, для каждой из следующих зон:

- первого этажа зала фильтрации (с отоплением и вентиляцией);
- электрощитовой и трансформаторной (с отоплением и вентиляцией);
- цокольного этажа зала фильтрации (с отоплением и вентиляцией);
- контроллерной/помещения ИБП, экспресс-лаборатории и операторной (с кондиционированием воздуха).

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13130.2013, в местах прохода воздуховода и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит, увлажнитель и панель автоматического управления должны быть расположены в приточной вентиляционной камере.

### **6.11 Здание установки водоподготовки 2 (блок биологической очистки) (A17.715.2)**

В здании должно быть предусмотрено отопление и вентиляция для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Система вентиляции должна быть полностью воздушной одноканальной системой открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и элеватором центрального водяного отопления.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Для отопительно-вентиляционной установки должен быть предусмотрен один воздухозаборник, расположенный снаружи на высоте не менее 7 метров над уровнем земли.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 105°C;
- температура обратной горячей воды: 70°C.

В помещении биологической очистки должна быть предусмотрена специальная система вытяжной вентиляции с необходимым количеством крышных вытяжных вентиляторов, которая предназначена для сброса поступающего в помещение воздуха.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.



Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Отопительно-вентиляционные установки, распределительный щит и панель автоматического управления должны размещаться в приточной вентиляционной камере.

## **6.12 Здание пульта управления и лабораторный корпус (U20.002)**

### **6.12.1 Общеобменная система вентиляции для зоны лаборатории**

Система ОВКВ обеспечивает кондиционирование воздуха в зоне для соответствия проектным условиям по атмосфере внутри помещений, определенным в приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим ТУ. Система ОВКВ должна быть полностью воздушной одноканальной системой открытого типа с переменным расходом воздуха, оснащенной зональными воздухораспределителями.

Система должна быть оснащена одной приточно-вытяжной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и охладительным змеевиком с непосредственным охлаждением. Приточные вентиляторы приточно-вытяжной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Кроме того, приточно-вытяжная установка должна быть оснащена змеевиками центрального водяного отопления.

Охлаждающий змеевик приточно-вентиляционной установки должен обслуживаться конденсаторным агрегатом с воздушным охлаждением.

Конденсаторный агрегат с воздушным охлаждением должен быть расположен на крыше этого же здания.

Приточный воздуховод должен быть оборудован увлажнителем для регулирования влажности в обслуживаемых помещениях.

Для приточно-вытяжной установки должен быть предусмотрен один воздухозаборник, расположенный снаружи на высоте не менее 5 метров над уровнем земли.

В воздуховодах, подающих приточный воздух в каждую зону, при необходимости должны быть предусмотрены специальные воздухораспределители с переменным или постоянным расходом воздуха для регулирования расхода приточного воздуха и температуры в зонах с индивидуальным режимом кондиционирования. Максимальная производительность приточных воздухораспределителей с переменным расходом воздуха должна обеспечивать пиковую потребную нагрузку по охлаждению соответствующих помещений, или компенсировать максимальный объем воздуха, удаляемого из лабораторной мебели, или обеспечивать минимальный расход приточного воздуха, установленный для помещения (в зависимости от того, какая величина больше). При этом минимальный расход приточного воздуха, обеспечиваемый воздухораспределителями, должен быть не ниже соответствующих минимальных значений, определенных в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям.

Описанные выше воздухораспределители при необходимости должны быть оборудованы электрическими подогревателями.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

Перечисленная ниже лабораторная мебель не входит в объем работ субподрядчика:

- вытяжные шкафы (переменный расход, как описано ниже);
- вентилируемые шкафы (постоянный расход, как описано ниже);
- вытяжки для вентиляции спектрометров индуктивно связанной плазмы (постоянный расход, как описано ниже);
- местные вытяжки (постоянный расход, режим работы «включено-выключено», как описано ниже).

При этом в объем работ субподрядчика входят вентиляторы местной вытяжной вентиляции, предназначенной для обслуживания перечисленной лабораторной мебели, которые должны быть пластиковыми.

В частности, каждая система вытяжной вентиляции (с переменным или постоянным расходом воздуха по потребности), как подробно описано ниже, может быть оснащена одним или двумя вытяжными вентиляторами, пригодными для установки в безопасной зоне (стандартное исполнение), для удаления воздуха из лабораторной мебели по месту.

- Предусматриваются специальные вытяжные системы (с переменным расходом воздуха) для групп вытяжных шкафов, расположенных в одном помещении. Вытяжные шкафы поставляются с комплектом управления расходом и регулирующим клапаном расхода или аналогичным устройством, предназначенным для изменения расхода вытяжного воздуха с целью поддержания постоянной скорости потока воздуха у оконного проема.
- Предусматриваются специальные вытяжные системы (с постоянным расходом воздуха) для групп вентилируемых шкафов, расположенных в одном помещении.
- Предусматриваются специальные вытяжные системы (с постоянным расходом воздуха) для групп вытяжек, предназначенных для вентиляции спектрометров индуктивно связанной плазмы, расположенных в одном помещении.
- Предусматриваются специальные вытяжные системы (с постоянным расходом воздуха, режим работы «включено-выключено») для групп местных вытяжек, расположенных в одном помещении. Управление вытяжными вентиляторами этих систем при необходимости выполняется операторами лаборатории с помощью переключателей, расположенных рядом с местными вытяжками.

Реализация взаимодействий функциональной логической схемы между вытяжным оборудованием лаборатории и соответствующими вентиляторами (т. е., соответствующим ЧРП, там где это применимо) входит в объем работ субподрядчика, который включает в себя, помимо прочего, следующее:

- настенные местные панели ПЛК (в случае двух или более вытяжных шкафов соединены с одним ЧРП и, следовательно, несколько сигналов должны быть обработаны и преобразованы в один сигнал);
- питание для этих местных панелей ПЛК;
- соединительные кабели между вытяжным оборудованием лаборатории и вышеупомянутыми местными панелями ПЛК;
- соединительные кабели между вышеупомянутыми местными панелями ПЛК и соответствующим ЧРП;
- кабели для непосредственного соединения вытяжного оборудования лаборатории с соответствующим вентилятором (т. е., соответствующим ЧРП, там где это применимо);
- все ЧРП;
- все вытяжные вентиляторы.

Для лаборатории должны быть предусмотрены общие системы вытяжной вентиляции, включающие по одному вытяжному вентилятору (в стандартном исполнении, пригодном для установки в безопасной зоне) с частотно-регулируемым приводом для регулирования расхода воздуха в обслуживаемых помещениях (где нет удаления воздуха с помощью местных систем выпуска воздуха) и для поддержания давления (избыточного или пониженного в зависимости от технических условий).

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Все вытяжные вентиляторы должны размещаться в специальной вытяжной вентиляционной камере.

Лабораторные вытяжные воздуховоды должны быть изготовлены из негорючих материалов (ПВХ), стойких к химической коррозии и пригодных для транспортировки всех видов дыма и паров.

В туалете должна быть предусмотрена отдельная система вытяжной вентиляции с одним вентилятором, которая предназначена для сброса поступающего в помещение воздуха. Вытяжной вентилятор должен размещаться в этом же помещении.

В туалетах должны быть предусмотрены электрические конвекторы со ступенчатыми регуляторами мощности для регулирования температуры в этих помещениях.

В воздуховодах, удаляющих вытяжной воздух из каждой зоны, при необходимости должны быть предусмотрены специальные воздухоприемники с переменным или постоянным расходом воздуха для регулирования расхода вытяжного воздуха, удаляемого из зон с индивидуальным режимом кондиционирования. Производительность воздухоприемников с переменным расходом воздуха должна компенсировать непостоянство объема воздуха, удаляемого из лабораторной мебели, и поддерживать в лабораторных помещениях пониженное давление относительно соседних помещений, которые не относятся к лаборатории. Для управления каждым воздухоприемником должны использоваться специальные регуляторы перепада давления в помещении.

При необходимости в основных приточных и вытяжных воздуховодах должны быть предусмотрены шумоглушители для снижения шума.

#### **6.12.2 Общие требования для зоны лаборатории**

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Приточно-вытяжная установка, увлажнитель, распределительный щит и панель автоматического управления должны размещаться в приточной вентиляционной камере.

#### **6.12.3 Общеобменная система вентиляции для зоны пульта управления**

В здании должно быть предусмотрено три системы ОВКВ для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям.

Три системы ОВКВ предназначены для следующих зон здания:

- зона пульта управления (с кондиционированием воздуха);
- зона помещения ИБП и аппаратной КИПиА (с кондиционированием воздуха);
- служебные помещения (с кондиционированием воздуха).

В указанных ниже помещениях должны быть дополнительно предусмотрены специальные системы противодымной вентиляции для удаления продуктов горения и газового огнетушащего вещества:

- аппаратная КИПиА;
- помещение пульта (панели) управления;

Для обеспечения приемлемой для персонала температуры окружающего воздуха во время останова технологического оборудования должен быть предусмотрен переносной обогреватель мощностью 4,5 кВт, который обычно хранится в приточной вентиляционной камере.

#### **6.12.4 Зона пульта управления**

В эту зону входят следующие помещения:

- помещение пульта (панели) управления;
- помещение инженерно-технической службы.

Эта зона должна обслуживаться полностью воздушной однетрубной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной приточно-вытяжной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный), охладительными змеевиками с непосредственным охлаждением, а также увлажнителем для регулирования влажности в обслуживаемых помещениях.

Кроме того, приточно-вытяжная установка должна быть оснащена двумя змеевиками центрального водяного отопления (один рабочий и один резервный).

Охладительные змеевики приточно-вытяжной установки должны обслуживаться двумя конденсаторными агрегатами с воздушным охлаждением. Два конденсаторных агрегата с воздушным охлаждением, каждый из которых рассчитан на 1/2 общей потребной холодопроизводительности, должны быть установлены на крыше этого же здания.

Помимо описанного выше, для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 к настоящим техническим условиям, в помещении инженерно-технической службы может потребоваться установка дополнительных электрических конвекторов (со ступенчатым регулятором мощности).

Для обеспечения надлежащего распределения тепла в помещении необходимо установить соответствующее количество нагревательных приборов.

В мужском и женском туалетах должна быть предусмотрена общая система вытяжной вентиляции с одним вытяжным вентилятором для сброса воздуха, поступающего в эти помещения из примыкающего коридора. Вытяжной вентилятор должен размещаться в вытяжной вентиляционной камере.

Для регулирования температуры внутри помещения пульта (панели) управления система воздушного отопления должна быть оснащена датчиком температуры воздуха в помещении.

При необходимости в основных приточных и вытяжных воздуховодах должны быть предусмотрены шумоглушители для снижения шума.

#### **6.12.5 Зона помещения ИБП и аппаратной КИПиА**

В эту зону входят следующие помещения:

- электропункт;
- помещение ИБП;

- аппаратная КИПиА.

Эта зона должна обслуживаться полностью воздушной однетрубной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной приточно-вытяжной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный), охладительными змеевиками с непосредственным охлаждением, а также увлажнителем для регулирования влажности в обслуживаемых помещениях.

Кроме того, приточно-вытяжная установка должна быть оснащена двумя змеевиками центрального водяного отопления (один рабочий и один резервный).

Охладительные змеевики приточно-вытяжной установки должны обслуживаться двумя конденсаторными агрегатами с воздушным охлаждением. Два конденсаторных агрегата с воздушным охлаждением, каждый из которых рассчитан на 1/2 общей потребной холодопроизводительности, должны быть установлены на крыше этого же здания.

Помимо описанного выше, для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 к настоящим техническим условиям, в помещении электропункта может потребоваться установка дополнительных электрических конвекторов (со ступенчатым регулятором мощности).

Для обеспечения надлежащего распределения тепла в помещении необходимо установить соответствующее количество нагревательных приборов.

В помещении электропункта, аппаратной КИПиА, приточной и вытяжной вентиляционных камерах должна быть предусмотрена общая система вытяжной вентиляции с двумя вытяжными вентиляторами (один рабочий и один резервный), которая предназначена для сброса поступающего в помещение воздуха. Вытяжные вентиляторы должны размещаться в вытяжной вентиляционной камере.

В помещении ИБП должна быть предусмотрена специальная система вытяжной вентиляции с двумя вытяжными вентиляторами (один рабочий и один резервный), которая предназначена для сброса поступающего в помещение воздуха. Система вентиляции должна обеспечивать удаление воздуха из нижней и верхней зоны помещения. Вытяжные вентиляторы должны размещаться в вытяжной вентиляционной камере.

При необходимости в основных приточных и вытяжных воздуховодах должны быть предусмотрены шумоглушители для снижения шума.

#### **6.12.6 Служебные помещения**

В эту зону входят следующие помещения:

- переговорная;
- помещение установки автоматического пожаротушения;
- кладовая;
- помещение начальника смены;



- монтажная мастерская КИПиА;
- столовая;
- коридор;
- приточная вентиляционная камера;
- вытяжная вентиляционная камера.

Эта зона должна обслуживаться полностью воздушной однотрубной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной приточно-вытяжной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и охладительными змеевиками с непосредственным охлаждением.

Кроме того, приточно-вытяжная установка должна быть оснащена змеевиками центрального водяного отопления.

Охлажденные змеевики приточно-вытяжной установки должны обслуживаться двумя конденсаторными агрегатами с воздушным охлаждением. Два конденсаторных агрегата с воздушным охлаждением, каждый из которых рассчитан на 1/2 общей потребной холодопроизводительности, должны быть установлены на крыше этого же здания.

Помимо описанного выше, для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 к настоящим техническим условиям, в некоторых перечисленных выше помещениях может потребоваться установка дополнительных электрических конвекторов (со ступенчатым регулятором мощности).

Для обеспечения надлежащего распределения тепла в помещении необходимо установить соответствующее количество нагревательных приборов.

В помещении начальника смены, переговорной, монтажной мастерской КИПиА, помещении установки автоматического пожаротушения, кладовой, помещении пульта (панели) управления и помещении инженерно-технической службы должна быть предусмотрена общая система вытяжной вентиляции с двумя вытяжными вентиляторами (один рабочий и один резервный), которая предназначена для сброса поступающего в помещения воздуха. Вытяжные вентиляторы должны размещаться в вытяжной вентиляционной камере.

В столовой должна быть предусмотрена отдельная система вытяжной вентиляции с одним вентилятором, которая предназначена для сброса поступающего в помещение воздуха. Вытяжной вентилятор должен размещаться в вытяжной вентиляционной камере.

При необходимости в основных приточных и вытяжных воздуховодах должны быть предусмотрены шумоглушители для снижения шума.

#### **6.12.7 Система противодымной вентиляции**

В помещениях аппаратной КИПиА и пульта (панели) управления должны быть предусмотрены две автономные системы противодымной вентиляции для удаления продуктов горения и газового огнетушащего вещества после тушения пожара. Согласно

требованиям СП 7.13130.2013, для удаления дыма из верхней и нижней зон этих помещений приточная вентиляция должна обеспечивать 4-кратный воздухообмен в час.

В каждом из упомянутых выше помещений должна применяться система дымоудаления на базе передвижного вентилятора дымоудаления, укомплектованного гибким воздуховодом на барабане (подсоединяется к впускному отверстию вентилятора), включающая оконечные устройства в двух проемах, расположенных на верхнем и нижнем уровне соответствующей внутренней стены помещения, которые обычно закрыты съёмными крышками или решетками.

При нормальных рабочих условиях все проемы должны быть перекрыты, а передвижные вентиляторы дымоудаления (две шт., один из них резервный) должны храниться внутри вытяжной вентиляционной камеры.

После тушения пожара в одном из указанных помещений крышки или решетки с обоих проемов на соответствующей стене снимаются, передвижной вентилятор дымоудаления перемещается в примыкающий к этому помещению коридор (или размещается вне здания), подключается к источнику питания и пристыковывается (с помощью гибких воздуховодов) к нижнему проему. После ручного открытия обеих противопожарных заслонок (одна в верхнем и одна в нижнем проеме) этот вентилятор дымоудаления включается, и начинается наружный выброс продуктов горения и газовых огнетушащих веществ. Одновременно через верхний проем в это помещение поступает эквивалентное количество чистого воздуха из примыкающего коридора (или снаружи) для компенсации удаляемого объема газов.

Для удаления дыма из верхней и нижней зон соответствующего помещения должна быть предусмотрена надлежащая система воздуховодов, снабженных воздухозаборниками вытяжного воздуха в верхней и нижней зонах этого помещения и присоединенных к оконечному устройству в нижнем проеме.

#### **6.12.8 Общие требования**

Для вентиляционных установок должен быть предусмотрен один общий воздухозаборник, расположенный снаружи на высоте не менее 5 метров над уровнем земли.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13130.2013, в местах прохода воздуховода и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Приточно-вытяжные установки, передвижные вентиляторы дымоудаления, переносной обогреватель, распределительный щит и панель автоматического управления должны размещаться в приточной вентиляционной камере.

## **6.13 Главная подстанция (U20.001)**

### **6.13.1 Общие положения**

В здании должно быть предусмотрено четыре системы ОВКВ для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям.

Четыре системы ОВКВ предназначены для следующих зон здания:

- помещение для разводки кабелей (с отоплением и вентиляцией);
- трансформаторная А и В и помещение установки автоматического пожаротушения (с отоплением и вентиляцией);
- аккумуляторная (с кондиционированием воздуха);
- помещение РУ СН и НН (с отоплением и вентиляцией).

Для обеспечения приемлемой для персонала температуры окружающего воздуха во время останова технологического оборудования должен быть предусмотрен переносной обогреватель мощностью 4,5 кВт, который обычно хранится в приточной вентиляционной камере.

### **6.13.2 Помещение для разводки кабелей**

Помещение для разводки кабелей должно обслуживаться полностью воздушной одноструйной системой вентиляции открытого типа с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и электрическим нагревательным змеевиком.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

В помещении для разводки кабелей должна быть предусмотрена специальная система вытяжной вентиляции, включающая два вытяжных вентилятора (каждый обеспечивает 50% общей производительности) с частотно-регулируемым приводом (для регулирования

расхода воздуха), которая предназначена для сброса поступающего в помещение воздуха. Вытяжной вентилятор должен размещаться в специально отведенном месте вне помещения на уровне земли.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Отопительно-вентиляционная установка должна размещаться в приточной вентиляционной камере 1.

### **6.13.3 Трансформаторные и помещение установки автоматического пожаротушения**

В эту зону входят следующие помещения:

- трансформаторные А и В;
- помещение установки автоматического пожаротушения;
- приточные вентиляционные камеры 1 и 2.

Перечисленные выше помещения должны обслуживаться полностью воздушной одноструйной приточной системой вентиляции с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и электрическим нагревательным змеевиком.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Кроме того, в помещении установки автоматического пожаротушения и приточных вентиляционных камерах 1 и 2 должны быть предусмотрены электрические конвекторы со ступенчатым регулятором мощности для регулирования температуры в этих помещениях.

Для обеспечения надлежащего распределения тепла в этих помещениях необходимо установить соответствующее количество нагревательных приборов.

В помещениях трансформаторных должны быть предусмотрены специальные системы вытяжной вентиляции, включающие по одному вытяжному вентилятору с частотно-регулируемым приводом (для регулирования расхода воздуха), которые предназначены для сброса воздуха, поступающего в эти помещения. Вытяжной вентилятор должен размещаться в специально отведенном месте вне помещения на уровне земли.

В помещении установки автоматического пожаротушения должна быть предусмотрена специальная система вытяжной вентиляции с одним вентилятором, которая предназначена для сброса поступающего в помещение воздуха. Вытяжной вентилятор должен размещаться в этом же помещении.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Отопительно-вентиляционная установка должна размещаться в приточной вентиляционной камере 2.

#### **6.13.4 Аккумуляторная**

Это помещение должно обслуживаться полностью воздушной одноконтурной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной приточно-вытяжной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и охладительными змеевиками с непосредственным охлаждением. Кроме того, приточно-вытяжная установка должна быть оснащена электрическими нагревательными змеевиками.

Охлажденные змеевики приточно-вытяжной установки должны обслуживаться двумя конденсаторными агрегатами с воздушным охлаждением. Два конденсаторных агрегата с воздушным охлаждением, каждый из которых рассчитан на 1/2 общей потребной холодопроизводительности, должны быть снаружи здания.

В аккумуляторной должна быть предусмотрена специальная система вытяжной вентиляции с двумя вытяжными вентиляторами (один рабочий и один резервный), которая предназначена для сброса поступающего в помещение воздуха. Согласно требованиям стандарта МЭК, п. 4.4.41, необходимо обеспечить вытяжку воздуха из верхней (100 мм от потолка) и нижней (300 мм от пола) зон этого помещения. Вытяжные вентиляторы должны размещаться в помещении этой же аккумуляторной.

Кроме того, для аккумуляторной необходимо предусмотреть воздухозаборники на крыше (жалюзи-башенки) для частичной компенсации удаленного воздуха за счет процесса инфильтрации.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Приточно-вытяжная установка должна размещаться в приточной вентиляционной камере 1.

#### **6.13.5 Помещения РУ СН и НН**

Помещения РУ СН и НН должны обслуживаться полностью воздушной одноконтурной приточной системой вентиляции с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и электрическим нагревательным змеевиком.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Для вентиляционной установки, обслуживающей помещения РУ СН и НН, должен быть предусмотрен отдельный воздухозаборник, расположенный снаружи на высоте не менее 11 метров над уровнем земли.

В помещении РУ должна быть предусмотрена специальная система вытяжной вентиляции, включающая один вытяжной вентилятор с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса воздуха, поступающего в эти помещения. Вытяжные вентиляторы должны размещаться в этом же помещении РУ СН и НН.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Отопительно-вентиляционная установка должна размещаться в приточной вентиляционной камере 2.

#### **6.13.6 Общие требования**

Для перечисленных ниже систем должен быть предусмотрен один общий воздухозаборник, расположенный снаружи на высоте не менее 11 метров над уровнем земли:

- отопительно-вентиляционная установка для помещения разводки кабелей;
- отопительно-вентиляционная установка для помещения трансформаторной;
- приточно-вытяжная установка для аккумуляторной.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13130.2013, в местах прохода воздуховода и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит и панель автоматического управления должны быть расположены в помещении РУ.



## **6.14 Узел получения плава карбамида — Установка синтеза карбамида (U22.201)**

### **6.14.1 Общие положения**

В здании должно быть предусмотрено две системы ОВКВ для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям.

Две системы ОВКВ предназначены для следующих зон здания:

- зона плава карбамида (с отоплением и вентиляцией);
- машинное отделение лифта (с отоплением и вентиляцией).

Для зоны плава карбамида должна быть дополнительно предусмотрена специальная система аварийной вентиляции.

~~Необходимо предусмотреть вентиляцию для подпора воздуха в случае срабатывания пожарной сигнализации лифтовой шахты для эвакуации персонала и работы пожарной бригады.~~

### **6.14.2 Общеобменная система вентиляции для зоны плава карбамида**

Зона плава карбамида должна обслуживаться полностью воздушной одноканальной системой вентиляции открытого типа с переменным расходом воздуха.

Система должна быть оснащена двумя отопительно-вентиляционными установками с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Перечисленные выше отопительно-вентиляционные установки должны обслуживать зону плава карбамида, приточную вентиляционную камеру, вытяжную вентиляционную камеру и машинное отделение лифта, используя соответствующую систему воздуховодов.

В приточной вентиляционной камере и вытяжной вентиляционной камере должен быть установлен электрический конвектор.

Для обеспечения надлежащего распределения тепла в этих помещениях необходимо установить соответствующее количество нагревательных приборов.

Для сброса указанного минимального объема наружного воздуха, поступающего в зону плава карбамида, должна быть предусмотрена общеобменная система вытяжной вентиляции с тремя канальными центробежными вытяжными вентиляторами с постоянным

расходом воздуха, установленными в вытяжной вентиляционной камере, и тремя настенными вытяжными вентиляторами (один вентилятор резервный).

В зоне плава карбамида должна быть предусмотрена дополнительная специальная система вытяжной вентиляции, включающая один вытяжной вентилятор с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для компенсации изменений расхода воздуха, подаваемого в это помещение приточными вентиляторами отопительно-вентиляционной установки.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Все оборудование системы ОВКВ должно быть в стандартном исполнении.

#### **6.14.3 Система аварийной вентиляции для зоны плава карбамида**

Согласно требованиям СП 60.13330.2016 в зоне плава карбамида должна быть также предусмотрена система аварийной вентиляции. Аварийная вентиляция — это дополнительная система вентиляции, специально предназначенная для снижения концентрации паров аммиака внутри здания. Аварийная вентиляция включается при поступлении сигнала о повышенной концентрации паров аммиака в помещении.

Система аварийной вентиляции должна обеспечивать 8-кратный воздухообмен в час по общему внутреннему объему здания.

При обнаружении дозрывной концентрации паров аммиака система аварийной вентиляции должна обеспечить необходимый приток воздуха в верхнюю и нижнюю зоны плава карбамида. В состав этой системы аварийной вентиляции должно входить следующее оборудование: два настенных вытяжных вентилятора (обеспечивают 50% выброса от общего объема вытяжного воздуха) для обслуживания верхней зоны помещения и два канальных центробежных вытяжных вентилятора, установленных снаружи на первом этаже (обеспечивают 50% выброса от общего объема вытяжного воздуха через воздухоприемники вытяжного воздуха) для обслуживания нижней зоны помещения.

Для центробежных вытяжных вентиляторов должна быть предусмотрена специальная система воздуховодов и устройство выброса вытяжного воздуха.

Кроме того, для зоны плава карбамида необходимо предусмотреть воздухозаборники на крыше (жалюзи-башенки) для компенсации воздуха, удаленного во время аварийной вентиляции, за счет процесса инфильтрации.

#### **6.14.4 Машинное отделение лифта**

Для удаления избыточного тепла, поступающего в помещение машинного отделения лифта, должна использоваться специальная дополнительная система вентиляции с переменным расходом воздуха, с одной вентиляционной установкой (расположенной в том же обслуживаемом помещении), оборудованной частотно-регулируемым приводом, предварительным фильтром и приточным воздушным вентилятором.

Подаваемый воздух должен выводиться наружу посредством настенных вытяжных жалюзи.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.14.5 Система противодымной / подпорной вентиляции**

~~Для обеспечения безопасной эвакуации персонала в случае пожара и условий для последующей работы пожарных подразделений, необходимо предусмотреть систему удаления дыма для подпора воздуха в шахте лифта в соответствии с требованиями СП 7.13130.2013.~~

~~Система должна быть полностью воздушной однетрубной системой открытого типа с постоянным расходом воздуха.~~

~~Система дымоудаления для шахты лифта должна включать в себя один приточный вентилятор для подачи наружного воздуха. Такой же вентилятор должен быть расположен на крыше вышеупомянутого помещения машинного отделения лифта.~~

#### **6.14.5 Общие требования**

Для отопительной и вентиляционной установок должен быть предусмотрен один общий воздухозаборник, расположенный снаружи на высоте *не менее 13* метров над уровнем земли.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один общий распределительный щит, а для управления этим оборудованием — одна общая панель автоматического управления.

Отопительно-вентиляционные установки, распределительный щит и панель автоматического управления должны размещаться в приточной вентиляционной камере.

## **6.15 Зона плава карбамида - Насосная аммиака ВД (U22.204)**

### **6.15.1 Общеобменная система вентиляции**

В здании должно быть предусмотрено отопление и вентиляция для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Система вентиляции должна быть полностью воздушной одноканальной системой открытого типа с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и элеватором центрального водяного отопления.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Эти отопительно-вентиляционные установки должны обслуживать насосную и приточную вентиляционную камеру, используя соответствующую систему воздуховодов. В помещении насосной распределение воздуха должно быть обеспечено в рабочей зоне.

При необходимости в приточной вентиляционной камере должен быть установлен электрический конвектор.

Для обеспечения надлежащего распределения тепла в здании необходимо установить соответствующее количество нагревательных приборов.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

В составе системы вытяжной вентиляции для помещения насосной должно быть следующее оборудование: необходимое количество устройств выброса вытяжного воздуха на крыше (жалюзи-башенки) для обеспечения заданных требований по воздухообмену в верхней зоне помещения (60%) за счет процесса эксфильтрации и два канальных центробежных вытяжных вентилятора корпусного типа (один рабочий и один резервный), установленных вне помещения, для обеспечения заданных требований по воздухообмену в нижней зоне помещения насосной (40%).

Каждый наружный центробежный вытяжной вентилятор, соединенный с соответствующим наружным ответвлением воздуховода, должен выбрасывать воздух из помещения через специальную выпускную трубу факельного типа, обеспечивая скорость выброса воздуха в атмосферу не менее 20 м/с.

Для удаления избыточного тепла, поступающего в помещение насосной, должна использоваться отопительно-вентиляционная система, автоматически увеличивающая расход воздуха, и один настенный вытяжной вентилятор с частотно-регулируемым приводом, который предназначен для сброса воздуха, поступающего в верхнюю зону помещения. Приточный вентилятор должен быть взаимосвязан с соответствующим вытяжным вентилятором.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

### **6.15.2 Система аварийной вентиляции**

Согласно требованиям СП 60.13330.2016 в помещении насосной должна быть также предусмотрена система аварийной вентиляции. Аварийная вентиляция — это дополнительная система вентиляции, специально предназначенная для снижения концентрации паров аммиака внутри здания. Аварийная вентиляция включается при поступлении сигнала о повышенной концентрации паров аммиака в помещении.

Система аварийной вентиляции должна обеспечивать 8-кратный воздухообмен в час по общему внутреннему объему здания.

При обнаружении дозрывной концентрации паров аммиака система аварийной вентиляции двухтактного типа должна обеспечить необходимый приток воздуха в верхнюю и нижнюю зоны помещения насосной. В состав этой системы аварийной вентиляции должно входить следующее оборудование: одна вентиляционная установка (в приточной вентиляционной камере) с приточным вентилятором (для подачи приточного воздуха через соответствующую систему наружных воздухопроводов в приточные воздухораспределители), один настенный вытяжной вентилятор (обеспечивает 60% выброса от общего объема вытяжного воздуха) для обслуживания верхней зоны помещения и один канальный центробежный вытяжной вентилятор, установленный снаружи на первом этаже (обеспечивает 40% выброса от общего объема вытяжного воздуха через воздухоприемники вытяжного воздуха) для обслуживания нижней зоны помещения. Приточные вентиляторы должны быть взаимосвязаны с соответствующими вытяжными вентиляторами.

Каждый наружный центробежный вытяжной вентилятор, соединенный с соответствующим наружным ответвлением воздуховода, должен выбрасывать воздух из помещения через специальную выпускную трубу факельного типа, обеспечивая скорость выброса воздуха в атмосферу не менее 20 м/с.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

### **6.15.3 Общие требования**

Для отопительно-вентиляционной установки и приточных вентиляторов аварийной вентиляционной системы должен быть предусмотрен один общий воздухозаборник, расположенный снаружи на высоте не менее 15 метров над уровнем земли.

Необходимо предусмотреть соответствующую систему наружных воздуховодов, соединяющую воздухозаборник с приточной вентиляционной камерой для распределения наружного воздуха в эти системы приточной вентиляции.

Все оборудование системы ОВКВ должно иметь исполнение для монтажа в зоне категории 2, группа IIC, класс T1, за исключением оборудования, расположенного внутри приточной вентиляционной камеры, которое должно быть в стандартном исполнении.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Отопительно-вентиляционная установка, приточный вентилятор аварийной вентиляционной системы, распределительный щит и панель автоматического управления должны размещаться в приточной вентиляционной камере.

## **6.16 Узел получения плава карбамида — Компрессор CO<sub>2</sub> (U22.205)**

### **6.16.1 Общеобменная система вентиляции**

В здании должно быть предусмотрено отопление и вентиляция для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Система вентиляции должна быть полностью воздушной одноконтурной системой открытого типа с постоянным расходом воздуха и должна обслуживать следующие помещения:

- компрессорная CO<sub>2</sub>;
- установка осушки воздуха;
- Азотная установка

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Для обеспечения заданного минимального расхода приточного воздуха необходимо предусмотреть одну отопительно-вентиляционную установку с постоянным расходом воздуха, оснащенную фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления. Отопительно-вентиляционная установка должна быть расположена вне помещения.



Эти отопительно-вентиляционные установки должны обслуживать помещения компрессорной CO<sub>2</sub>, установки осушки воздуха и азотной установки, используя соответствующую систему воздуховодов. В помещении компрессорной CO<sub>2</sub> должна быть предусмотрена подача воздуха в верхнюю и нижнюю зоны.

В качестве теплоносителя в системе ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

В помещении компрессорной CO<sub>2</sub> должна быть предусмотрена специальная система вытяжной вентиляции для сброса поступающего в помещение воздуха.

Для обеспечения заданных требований по воздухообмену в верхней зоне помещения компрессорной CO<sub>2</sub> за счет процесса эксфильтрации и принудительной вентиляции в составе этой системы вытяжной вентиляции должно быть необходимое количество устройств выброса вытяжного воздуха на крыше (жалюзи-башенки), три крышных и три настенных вытяжных вентилятора. В случае отказа одного из трех вытяжных вентиляторов (крышных или настенных), общая производительность остальных двух вентиляторов должна обеспечивать заданный минимальный расход вытяжного воздуха.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Для удаления избыточного тепла, поступающего в помещение компрессорной CO<sub>2</sub>, должна использоваться специальная дополнительная система вентиляции с одним настенным приточным вентилятором и одним настенным вытяжным вентилятором, который предназначен для сброса воздуха, поступающего в верхнюю зону помещения.

В помещении установки осушки воздуха должна быть предусмотрена специальная система вытяжной вентиляции с необходимым количеством крышных вытяжных вентиляторов, которая предназначена для сброса поступающего в помещение воздуха.

Для удаления избыточного тепла, поступающего в помещение установки осушки воздуха, должна использоваться специальная дополнительная система вентиляции с двумя настенными приточными вентиляторами и двумя настенными вытяжными вентиляторами, которые предназначены для сброса воздуха, поступающего в помещение.

В помещении азотной установки должна быть предусмотрена специальная система вытяжной вентиляции с необходимым количеством крышных вытяжных вентиляторов, которая предназначена для сброса поступающего в помещение воздуха.

Для отопительно-вентиляционной установки должен быть предусмотрен один общий воздухозаборник, расположенный на высоте не менее 8 метров над уровнем земли.

## **6.16.2 Система аварийной вентиляции**

### **6.16.2.1 Компрессорная CO<sub>2</sub>**

Согласно требованиям СП 60.13330.2016 в помещении компрессорной CO<sub>2</sub> должна быть также предусмотрена система аварийной вентиляции. Аварийная вентиляция — это дополнительная система вентиляции, специально предназначенная для предотвращения опасной концентрации кислорода (и, следовательно, для поддержания такого газового состава воздуха, чтобы он был пригоден для дыхания) за счет увеличения объемной концентрации кислорода внутри здания. Аварийная вентиляция включается при поступлении сигналов датчиков кислорода о снижении его содержания в воздухе.

Система аварийной вентиляции должна обеспечивать 8-кратный воздухообмен в час по общему внутреннему объему соответствующего помещения.

При обнаружении низкой концентрации кислорода необходимая производительность вентиляции должна обеспечиваться системой аварийной вентиляции двухтактного типа с необходимым количеством настенных приточных вентиляторов, установленных в помещении (для перемещения наружного воздуха внутрь здания), канальных центробежных вытяжных вентиляторов, установленных снаружи на первом этаже, и настенных вытяжных вентиляторов (для сброса воздуха, поступающего в помещение). Приточные вентиляторы должны быть взаимосвязаны с соответствующими вытяжными вентиляторами.

Для каждого из этих центробежных вытяжных вентиляторов должна быть предусмотрена специальная система воздуховодов и устройство выброса вытяжного воздуха.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.16.2.2 Азотная установка**

Согласно требованиям СП 60.13330.2016 в помещении азотной установки должна быть также предусмотрена система аварийной вентиляции. Аварийная вентиляция — это дополнительная система вентиляции, специально предназначенная для предотвращения опасной концентрации азота (и, следовательно, для поддержания такого газового состава воздуха, чтобы он был пригоден для дыхания) за счет увеличения объемной концентрации кислорода внутри здания. Аварийная вентиляция включается при поступлении сигнала от установленных в здании датчиков о низкой концентрации кислорода в помещении.

Объемная доля кислорода в воздухе помещения азотной установки должна быть не менее 19% и не более 23%. Такая объемная доля кислорода должна поддерживаться путем непрерывной работы общеобменной и аварийной вентиляции.

Система аварийной вентиляции должна обеспечивать 8-кратный воздухообмен в час по общему внутреннему объему здания.

При обнаружении низкой концентрации кислорода необходимая производительность вентиляции должна обеспечиваться системой аварийной вентиляции двухтактного типа, состоящей из двух настенных приточных вентиляторов, установленных в помещении (для перемещения наружного воздуха внутрь здания), и двух канальных центробежных вытяжных вентиляторов, установленных снаружи на первом этаже (для сброса воздуха, поступающего в помещение). Приточные вентиляторы должны быть взаимосвязаны с соответствующими вытяжными вентиляторами.

Для каждого из этих центробежных вытяжных вентиляторов должна быть предусмотрена специальная система воздуховодов и устройство выброса вытяжного воздуха.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

### **6.16.3 Общие требования**

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Все оборудование системы ОВКВ должно быть в стандартном исполнении.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит и панель автоматического управления должны быть установлены внутри здания.

## **6.17 Узел грануляции карбамида (U23.301)**

### **6.17.1 Общие положения**

В здании должно быть предусмотрено семь систем ОВКВ для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям.

Семь систем ОВКВ предназначены для следующих зон здания:

- производственное помещение на отм. +100,200 (с отоплением и вентиляцией);
- производственное помещение на отм. +107,300 (с отоплением и вентиляцией);
- производственное помещение на отм. +113,100 (с отоплением и вентиляцией);
- производственное помещение на отм. +122,700 (с отоплением и вентиляцией);
- производственное помещение на отм. +128,100 и +136,250 (с отоплением и вентиляцией);
- производственное помещение на отм. +142,900, +152,800, +159,300 (с отоплением и вентиляцией);
- машинное отделение лифта (с отоплением и вентиляцией).

Помимо указанного выше, в следующих помещениях должна быть предусмотрена вентиляция для создания избыточного давления с целью обеспечения безопасной эвакуации персонала в случае пожара и работы пожарной бригады.

- Незадымляемые лестничные клетки типа Н2 в соответствии с п. 7.14в СП 7.13130.2013;
- Шахты лифта с функцией аварийного вызова пожарной бригады в соответствии с п. 7.14б СП 7.13130.2013.

*Противодымная вентиляция предусматривается для всех зон коридоров (за исключением коридора на первом этаже, для которого не требуется противодымная вентиляция).*

#### **6.17.2 Производственное помещение на отм. +100,200**

Это производственное здание должно обслуживаться полностью воздушной однотрубной системой вентиляции открытого типа с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Эти отопительно-вентиляционные установки должны обслуживать производственное помещение и помещение системы ОВКВ-1, используя соответствующую систему воздухопроводов.

Кроме того, в помещении системы ОВКВ-1 должны быть предусмотрены электрические конвекторы.

Для обеспечения надлежащего распределения тепла в здании необходимо установить соответствующее количество нагревательных приборов.

В производственных помещениях должна быть предусмотрена отдельная система вытяжной вентиляции, включающая необходимое количество вытяжных вентиляторов с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса поступающего в помещение воздуха. Каждый вытяжной вентилятор должен размещаться в соответствующем обслуживаемом помещении.

Отопительно-вентиляционная установка должна быть расположена в помещении системы ОВКВ-1.

Воздухозаборники отопительно-вентиляционной установки должны располагаться на наружной стене помещения системы ОВКВ-1 на достаточной высоте над уровнем земли.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.17.3 Производственное помещение на отм. +107,300**

Это производственное здание должно обслуживаться полностью воздушной одноконтурной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Эти отопительно-вентиляционные установки должны обслуживать производственное помещение и помещение системы ОВКВ-1, используя соответствующую систему воздуховодов.

В производственном помещении должна быть предусмотрена специальная система вытяжной вентиляции с необходимым количеством вытяжных вентиляторов, которая предназначена для сброса поступающего в помещение воздуха. Каждый вытяжной вентилятор должен размещаться в соответствующем обслуживаемом помещении.

Отопительно-вентиляционная установка должна быть расположена в помещении системы ОВКВ-1.

Воздухозаборники отопительно-вентиляционной установки должны располагаться на наружной стене помещения системы ОВКВ-1 на достаточной высоте над уровнем земли.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.17.4 Производственное помещение на отм. +113,100**

Это производственное здание должно обслуживаться полностью воздушной одноконтурной системой вентиляции открытого типа с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Эти отопительно-вентиляционные установки должны обслуживать производственное помещение и помещение системы ОВКВ-2, используя соответствующую систему воздухопроводов.

Кроме того, в помещении системы ОВКВ-2 должны быть предусмотрены электрические конвекторы.

Для обеспечения надлежащего распределения тепла в здании необходимо установить соответствующее количество нагревательных приборов.

В производственных помещениях должна быть предусмотрена отдельная система вытяжной вентиляции, включающая необходимое количество вытяжных вентиляторов с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса поступающего в помещение воздуха. Каждый вытяжной вентилятор должен размещаться в соответствующем обслуживаемом помещении.

Отопительно-вентиляционная установка должна быть расположена в помещении системы ОВКВ-2.

Воздухозаборники отопительно-вентиляционной установки должны располагаться на наружной стене помещения системы ОВКВ-2 на достаточной высоте над уровнем земли.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.17.5 Производственное помещение на отм. +122,700**

Это производственное здание должно обслуживаться полностью воздушной одноконтурной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и элеватором центрального водяного отопления.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Эти отопительно-вентиляционные установки должны обслуживать производственное помещение и помещение системы ОВКВ-2, используя соответствующую систему воздухопроводов.

В производственном помещении должна быть предусмотрена специальная система вытяжной вентиляции с необходимым количеством вытяжных вентиляторов, которая



предназначена для сброса поступающего в помещение воздуха. Каждый вытяжной вентилятор должен размещаться в соответствующем обслуживаемом помещении.

Отопительно-вентиляционная установка должна быть расположена в помещении системы ОВКВ-2.

Воздухозаборники отопительно-вентиляционной установки должны располагаться на наружной стене помещения системы ОВКВ-2 на достаточной высоте над уровнем земли.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.17.6 Производственное помещение на отм. +128,100 и +136,250**

Это производственное здание должно обслуживаться полностью воздушной однотрубной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Эти отопительно-вентиляционные установки должны обслуживать производственное помещение и помещение системы ОВКВ-3, используя соответствующую систему воздуховодов.

Кроме того, в помещении системы ОВКВ-3 должны быть предусмотрены электрические конвекторы.

Для обеспечения надлежащего распределения тепла в здании необходимо установить соответствующее количество нагревательных приборов.

В производственном помещении должна быть предусмотрена специальная система вытяжной вентиляции с необходимым количеством вытяжных вентиляторов, которая предназначена для сброса поступающего в помещение воздуха. Каждый вытяжной вентилятор должен размещаться в соответствующем обслуживаемом помещении.

Отопительно-вентиляционная установка должна быть расположена в помещении системы ОВКВ-3.

Воздухозаборники отопительно-вентиляционной установки должны располагаться на наружной стене помещения системы ОВКВ-3 на достаточной высоте над уровнем земли.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.17.7 Производственное помещение на выс. отм. +142,900, +152,800, +159,300**

В эту зону входят следующие помещения:

- производственное помещение на выс. отм. +142,900;
- производственное помещение на выс. отм. +152,800;
- производственное помещение на выс. отм. +159,300;
- помещение ОВКВ-4;
- машинное отделение лифта.

Все перечисленные выше помещения должны обслуживаться полностью воздушной однотрубной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Эта отопительно-вентиляционная установка должна обслуживать перечисленные выше помещения, используя соответствующую систему воздухопроводов.

Кроме того, в помещении системы ОВКВ-4 должны быть предусмотрены электрические конвекторы.

Для обеспечения надлежащего распределения тепла в здании необходимо установить соответствующее количество нагревательных приборов.

В перечисленных выше помещениях должны быть предусмотрены специальные системы вытяжной вентиляции с необходимым количеством вытяжных вентиляторов, которые предназначены для сброса воздуха, поступающего в эти помещения. Каждый вытяжной вентилятор должен размещаться в соответствующем обслуживаемом помещении.

Отопительно-вентиляционная установка должна быть расположена в помещении системы ОВКВ-4.

Воздухозаборники отопительно-вентиляционной установки должны располагаться на наружной стене помещения системы ОВКВ-4 на достаточной высоте над уровнем земли.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.17.8 Машинное отделение лифта**

Для удаления избыточного тепла, поступающего в помещение машинного отделения лифта, должна использоваться специальная дополнительная система вентиляции с

переменным расходом воздуха, с одной вентиляционной установкой (расположенной в том же обслуживаемом помещении), оборудованной частотно-регулируемым приводом, предварительным фильтром и приточным воздушным вентилятором.

Подаваемый воздух должен выводиться наружу посредством настенных вытяжных жалюзи.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

### **6.17.9 Системы противодымной / подпорной вентиляции**

#### **6.17.9.1 Шахта лифта**

Для обеспечения безопасной эвакуации персонала в случае пожара и условий для последующей работы пожарных подразделений, необходимо предусмотреть систему удаления дыма для подпора воздуха в шахте лифта в соответствии с требованиями СП 7.13130.2013.

Система должна быть полностью воздушной одноканальной системой открытого типа с постоянным расходом воздуха.

Система дымоудаления для шахты лифта должна включать в себя один приточный вентилятор для подачи наружного воздуха. Такой же вентилятор должен быть расположен на крыше вышеупомянутого помещения машинного отделения лифта.

#### **6.17.9.2 Лестничные клетки**

Для обеспечения безопасной эвакуации персонала в случае пожара и условий для последующей работы пожарных подразделений, необходимо предусмотреть систему удаления дыма для подпора воздуха для незадымляемых лестничных клеток типа Н2 в соответствии с требованиями СП 7.13130.2013.

Система должна быть полностью воздушной одноканальной системой открытого типа с постоянным расходом воздуха.

Система дымоудаления для лестничной клетки должна включать в себя три приточных вентилятора для подачи наружного воздуха на верхнем, промежуточном и нижнем уровнях, соответственно. Указанные три вентилятора должны быть расположены на крыше лестничной клетки, в помещении ОВКВ-3 и в помещении ОВКВ-1.

#### **6.17.9.3 Коридоры**

*Для обеспечения безопасной эвакуации персонала в случае пожара и условий для последующей работы пожарных подразделений, для всех коридоров (за исключением коридора на первом этаже) необходимо предусмотреть систему удаления дыма в соответствии с требованиями СП 7.13130.2013.*

*Система должна быть полностью воздушной одноканальной системой открытого типа с постоянным расходом воздуха.*

*Система удаления дыма включает в себя один вентилятор дымоудаления и соответствующую систему вытяжных воздуховодов, из которых попадающий в них воздух удаляется с помощью системы приточных воздуховодов, втягивающих свежий воздух извне через один воздухозаборник, расположенный на высоком уровне. Такой же вентилятор должен быть расположен на крыше вышеупомянутого помещения машинного отделения лифта.*

#### **6.17.10 Общие требования**

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

В качестве теплоносителя в системе ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит и панель автоматического управления должны быть расположены в помещении системы ОВКВ-3.

#### **6.18 Склад гранулированного карбамида (U24.401)**

В помещении склада гранулированного карбамида должно быть предусмотрено отопление для соответствия расчетным условиям для помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям.

В составе системы отопления должно быть необходимое количество водяных нагревательных агрегатов для обеспечения надлежащего распределения тепла в этом здании.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

Для автоматического управления системой отопления должно быть предусмотрено не менее четырех датчиков температуры и четырех датчиков влажности.

Кроме того, операторам должен быть предоставлен один гигрометр для измерения влажности.

Необходимо предусмотреть достаточное количество жалюзи с приводными заслонками для естественной вентиляции ~~удаления дыма~~ в верхней части обоих фасадов склада гранулированного карбамида для создания естественной тяги в сочетании с открытыми дверями.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит и панель автоматического управления должны быть расположены внутри здания.

#### **6.19 Узел погрузки карбамида в ж/д вагоны и здание пульт управления погрузкой (U24.402.1/U24.402.2)**

##### **6.19.1 Общие положения**

В здании должно быть предусмотрено две системы ОВКВ для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям.

Две системы ОВКВ предназначены для следующих зон здания:

- зона пульта управления (с кондиционированием воздуха);
- *Узел фасовки некондиции в биг-беги* (с отоплением и вентиляцией).

В помещении пульта управления должна быть дополнительно предусмотрена специальная система противодымной вентиляции для удаления продуктов горения и газового огнетушащего вещества.

Для обеспечения приемлемой для персонала температуры окружающего воздуха во время останова технологического оборудования должен быть предусмотрен переносной обогреватель мощностью 4,5 кВт, который обычно хранится в приточной вентиляционной камере.

##### **6.19.2 Зона пульта управления**

В эту зону входят следующие помещения:

- пульт управления;
- помещение установки пожаротушения;
- санузел и раздевалка;
- приточная вентиляционная камера.

Эта зона должна обслуживаться полностью воздушной одноканальной системой вентиляции открытого типа с постоянным расходом воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Система должна быть оснащена одной приточно-вытяжной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный), охладительными змеевиками с непосредственным охлаждением, а также увлажнителем для регулирования влажности в обслуживаемых помещениях.

Кроме того, приточно-вытяжная установка должна быть оснащена змеевиками центрального водяного отопления (один рабочий и один резервный).

Охлажденные змеевики приточно-вытяжной установки должны обслуживаться двумя конденсаторными агрегатами с воздушным охлаждением. Два конденсаторных агрегата с воздушным охлаждением, каждый из которых рассчитан на 1/2 общей потребной холодопроизводительности, должны быть снаружи здания.

Для приточно-вытяжных установок, обслуживающих зону пульты управления, должен быть предусмотрен отдельный воздухозаборник, расположенный снаружи на высоте не менее 5 метров над уровнем земли.

Кроме того, в санузле, раздевалке и приточной вентиляционной камере должны быть предусмотрены электрические конвекторы со ступенчатым регулятором мощности для регулирования температуры в этих помещениях.

Для обеспечения надлежащего распределения тепла в помещении необходимо установить соответствующее количество нагревательных приборов.

В помещении пульты управления должна быть предусмотрена специальная система вытяжной вентиляции с двумя вытяжными вентиляторами (один рабочий и один резервный), которая предназначена для сброса поступающего в помещение воздуха. Вытяжные вентиляторы должны размещаться в приточной вентиляционной камере.

В помещении санузла и раздевалки должна быть предусмотрена специальная система вытяжной вентиляции с одним вентилятором, которая предназначена для сброса поступающего в помещение воздуха. Вытяжной вентилятор должен размещаться в этом же помещении.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Для регулирования температуры внутри помещения пульты управления система воздушного отопления должна быть оснащена датчиком температуры воздуха в помещении.

При необходимости в основных приточных и вытяжных воздуховодах должны быть предусмотрены шумоглушители для снижения шума.



### **6.19.3 Узел фасовки некондиции в биг-беги**

Зона должна обслуживаться полностью воздушной однотрубной системой вентиляции открытого типа с переменным расходом воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления.

Отопительно-вентиляционная установка должна быть расположена вне помещения на уровне земли.

Для приточно-вытяжных установок, обслуживающих *узел фасовки некондиции в биг-беги*, должен быть предусмотрен отдельный воздухозаборник, расположенный снаружи на высоте не менее 8 метров над уровнем земли.

В помещении *узла фасовки некондиции в биг-беги* должна быть предусмотрена специальная система вытяжной вентиляции с одним настенным вытяжным вентилятором, которая предназначена для сброса поступающего в помещение воздуха.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

### **6.19.4 Система противодымной вентиляции**

В помещении пульта управления должны быть предусмотрены отдельные специальные системы противодымной вентиляции для удаления продуктов горения и газового огнетушащего вещества после тушения пожара. Согласно требованиям СП 7.13130.2013, для удаления дыма из верхней и нижней зон этих помещений приточная вентиляция должна обеспечивать 4-кратный воздухообмен в час.

В перечисленных выше помещениях должна применяться система дымоудаления на базе передвижного вентилятора дымоудаления, укомплектованного гибким воздуховодом на барабане (подсоединяется к впускному отверстию вентилятора), включающая оконечные устройства в двух проемах, расположенных на верхнем и нижнем уровне соответствующей внутренней стены помещения, которые обычно закрыты съемными крышками или решетками.

При нормальных рабочих условиях все проемы должны быть перекрыты, а передвижные вентиляторы дымоудаления (две шт., один из них резервный) должны храниться внутри приточной вентиляционной камеры.

После тушения пожара в одном из указанных помещений крышки или решетки с обоих проемов на соответствующей стене снимаются, передвижной вентилятор дымоудаления перемещается в примыкающий к этому помещению коридор (или размещается вне здания), подключается к источнику питания и пристыковывается (с помощью гибких

воздуховодов) к нижнему проему. После ручного открытия обеих противопожарных заслонок (одна в верхнем и одна в нижнем проеме) этот вентилятор дымоудаления включается, и начинается наружный выброс продуктов горения и газовых огнетушащих веществ. Одновременно через верхний проем в это помещение поступает эквивалентное количество чистого воздуха из примыкающего коридора (или снаружи) для компенсации удаляемого объема газов.

Для удаления дыма из верхней и нижней зон соответствующего помещения должна быть предусмотрена надлежащая система воздуховодов, снабженных воздухозаборниками вытяжного воздуха в верхней и нижней зонах этого помещения и присоединенных к оконечному устройству в нижнем проеме.

#### **6.19.5 Общие требования**

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13130.2013, в местах прохода воздуховода и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ, обслуживающей зону пульта управления, должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Для электропитания всего оборудования системы ОВКВ, обслуживающей склад пустых биг-бегов, должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Приточно-вытяжная установка, передвижные вентиляторы дымоудаления, вытяжные вентиляторы помещения пульта управления, переносной обогреватель, распределительный щит и панель автоматического управления должны размещаться в приточной вентиляционной камере.

Распределительный щит и панель автоматического управления для обслуживания склада пустых биг-бегов должны быть расположены в одном помещении.

## **6.20 Вспомогательная подстанция и контроллерная (U24.406)**

### **6.20.1 Общие положения**

В здании должно быть предусмотрено две системы ОВКВ для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям.

Две системы ОВКВ предназначены для следующих зон здания:

- помещение для разводки кабелей; помещение трансформаторной и помещение РУ (с отоплением и вентиляцией);
- помещения ИБП и контроллерной (с кондиционированием воздуха);

В помещении контроллерной должна быть дополнительно предусмотрена специальная система противодымной вентиляции для удаления продуктов горения и газового огнетушащего вещества.

Для обеспечения приемлемой для персонала температуры окружающего воздуха во время останова технологического оборудования должен быть предусмотрен переносной обогреватель мощностью 4,5 кВт, который обычно хранится в помещении системы ОВКВ-4.

### **6.20.2 Помещение для разводки кабелей, трансформаторные и помещение РУ**

В эту зону входят следующие помещения:

- помещение для разводки кабелей;
- помещение РУ;
- трансформаторная;
- помещение установки пожаротушения;
- приточная и вытяжная вентиляционная камера.

Эта помещения должны обслуживаться полностью воздушной одноструйной системой вентиляции открытого типа с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и электрическим нагревательным змеевиком.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Кроме того, в помещении установки пожаротушения и приточной и вытяжной вентиляционной камере должны быть предусмотрены электрические конвекторы со ступенчатым регулятором мощности для регулирования температуры в этих помещениях.

Для обеспечения надлежащего распределения тепла в этих помещениях необходимо установить соответствующее количество нагревательных приборов.

В помещении для разводки кабелей должна быть предусмотрена специальная система вытяжной вентиляции, включающая один вытяжной вентилятор с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса воздуха, поступающего в эти помещения. Вытяжной вентилятор должен размещаться в этом же помещении.

В помещении трансформаторной должна быть предусмотрена специальная система вытяжной вентиляции, включающая один вытяжной вентилятор с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса воздуха, поступающего в это помещение. Вытяжные вентиляторы должны размещаться в этом же помещении.

В помещении РУ должна быть предусмотрена специальная система вытяжной вентиляции, включающая два вытяжных вентилятора (каждый обеспечивает 50% общей производительности) с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса поступающего в помещение воздуха. Вытяжные вентиляторы должны размещаться в приточной и вытяжной вентиляционной камере.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

### **6.20.3 Помещения ИБП и контроллерной**

В эту зону входят следующие помещения:

- помещение ИБП;
- контроллерная.

Эти помещения должны обслуживаться полностью воздушной однотрубной системой вентиляции открытого типа с постоянным расходом воздуха.

Система должна быть оснащена одной приточно-вытяжной установкой с фильтрами грубой и тонкой очистки, двумя приточными вентиляторами (один рабочий и один резервный), охладительными змеевиками с непосредственным охлаждением, а также увлажнителем для регулирования влажности в обслуживаемых помещениях.

Кроме того, приточно-вытяжная установка должна быть оснащена электрическими нагревательными змеевиками.

Охладительные змеевики приточно-вытяжной установки должны обслуживаться двумя конденсаторными агрегатами с воздушным охлаждением. Два конденсаторных агрегата с

воздушным охлаждением, каждый из которых рассчитан на 1/2 общей потребной холодопроизводительности, должны быть установлены на крыше этого же здания.

Конденсаторные агрегаты с воздушным охлаждением должны быть расположены вне помещения.

Для регулирования температуры внутри помещения ИБП и контроллерной система воздушного отопления должна быть оснащена датчиками температуры воздуха в помещении.

В помещении контроллерной должна быть предусмотрена специальная система вытяжной вентиляции с двумя вытяжными вентиляторами (один рабочий и один резервный), которая предназначена для сброса поступающего в помещение воздуха. Вытяжные вентиляторы должны размещаться в помещении этой же контроллерной.

В помещении ИБП должна быть предусмотрена специальная система вытяжной вентиляции с двумя вытяжными вентиляторами (один рабочий и один резервный), которая предназначена для сброса поступающего в помещение воздуха. Согласно требованиям стандарта МЭК, п. 4.4.41, необходимо обеспечить вытяжку воздуха из верхней (100 мм от потолка) и нижней (300 мм от пола) зон этого помещения. Вытяжные вентиляторы должны размещаться в том же помещении ИБП.

При необходимости в основных приточных и вытяжных воздуховодах должны быть предусмотрены шумоглушители для снижения шума.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

#### **6.20.7 Система противодымной вентиляции**

В помещении контроллерной должна быть предусмотрена специальная система противодымной вентиляции для удаления продуктов горения и газового огнетушащего вещества после тушения пожара. Согласно требованиям СП 7.13130.2013, для удаления дыма из верхней и нижней зон этих помещений приточная вентиляция должна обеспечивать 4-кратный воздухообмен в час.

В перечисленных выше помещениях должна применяться система дымоудаления на базе передвижного вентилятора дымоудаления, укомплектованного гибким воздуховодом на барабане (подсоединяется к впускному отверстию вентилятора), включающая оконечные устройства в двух проемах, расположенных на верхнем и нижнем уровне соответствующей внутренней стены помещения, которые обычно закрыты съемными крышками или решетками.

При нормальных рабочих условиях все проемы должны быть перекрыты, а передвижные вентиляторы дымоудаления (две шт., один из них резервный) должны храниться внутри приточной и вытяжной вентиляционной камеры.

После тушения пожара в указанном помещении крышки или решетки с обоих проемов на соответствующей стене снимаются, передвижной вентилятор дымоудаления перемещается в примыкающий к этому помещению коридор (или размещается вне здания), подключается к источнику питания и пристыковывается (с помощью гибких

воздуховодов) к нижнему проему. После ручного открытия обеих противопожарных заслонок (одна в верхнем и одна в нижнем проеме) этот вентилятор дымоудаления включается, и начинается наружный выброс продуктов горения и газовых огнетушащих веществ. Одновременно через верхний проем в это помещение поступает эквивалентное количество чистого воздуха из примыкающего коридора (или снаружи) для компенсации удаляемого объема газов.

Для удаления дыма из верхней и нижней зон соответствующего помещения должна быть предусмотрена надлежащая система воздуховодов, снабженных воздухозаборниками вытяжного воздуха в верхней и нижней зонах этого помещения и присоединенных к оконечному устройству в нижнем проеме.

#### **6.20.5 Общие требования**

Для перечисленных ниже систем должен быть предусмотрен один общий воздухозаборник, расположенный снаружи на высоте не менее 5 метров над уровнем земли:

- отопительно-вентиляционная установка, обслуживающая помещение для разводки кабелей, помещения трансформаторных и помещение РУ;
- приточно-вытяжная установка, обслуживающая помещения ИБП и контроллерной.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13130.2013, в местах прохода воздуховода и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Отопительно-вентиляционная установка, приточно-вытяжная установка, увлажнитель, вытяжные вентиляторы для помещения РУ, переносной обогреватель и переносной вытяжной вентилятор должны размещаться в приточной и вытяжной вентиляционной камере.

Распределительный щит и панель автоматического управления должны быть расположены в приточной и вытяжной вентиляционной камере.

#### **6.21 Насосная станция обратного водоснабжения (U27 707)**

В помещении комплектной установки химической очистки должно быть предусмотрено отопление и вентиляция для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Система вентиляции должна быть полностью воздушной одноструйной системой открытого типа с постоянным расходом воздуха.



Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и змеевиком центрального водяного отопления.

Отопительно-вентиляционная установка должна быть расположена вне помещения на уровне земли.

В качестве теплоносителя в системах ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

Для отопительно-вентиляционной установки должен быть предусмотрен один воздухозаборник, расположенный на высоте не менее 6 метров над уровнем земли.

Для комплектной установки химической очистки должно быть предусмотрено необходимое количество устройств выброса вытяжного воздуха на крыше (жалюзи-башенки) для вывода приточного воздуха наружу.

В туалете должна быть предусмотрена специальная система вытяжной вентиляции с одним вытяжным вентилятором для сброса воздуха, поступающего в него из соседних помещений. Вытяжной вентилятор должен размещаться в этом же помещении.

Кроме того, в туалете должны быть предусмотрены специальные электрические конвекторы для регулирования температуры в этом помещении.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Распределительный щит и панель автоматического управления должны быть расположены в помещении комплектной установки химической очистки.

## 6.22 Центральный тепловой пункт (U27.717)

В здании должно быть предусмотрено отопление и вентиляция для соответствия расчетным условиям по атмосфере внутри помещений, определенным в Приложении 1 (Исходные данные для проектирования систем ОВКВ) к настоящим техническим условиям. Система вентиляции должна быть полностью воздушной одноконтурной системой открытого типа с переменным расходом воздуха.

Система должна быть оснащена одной отопительно-вентиляционной установкой с фильтром грубой очистки, двумя приточными вентиляторами (один рабочий и один резервный) и элеватором центрального водяного отопления.

Приточные вентиляторы отопительно-вентиляционной установки должны быть оборудованы частотно-регулируемым приводом для регулирования расхода воздуха.

Максимальный расход воздуха в системе приточной вентиляции должен рассчитываться исходя из потребной нагрузки по охлаждению помещения, при этом он должен быть не меньше минимального значения расхода воздуха, установленного для обслуживаемых зон.

Эти отопительно-вентиляционные установки должны обслуживать помещения теплового пункта, аварийной душевой и приточной вентиляционной камеры, используя соответствующую систему воздуховодов.

Для отопительно-вентиляционной установки должна быть предусмотрена одна наружная воздухозаборная труба высотой не менее 15 метров над уровнем земли.

Кроме того, в помещении аварийной душевой должен быть предусмотрен электрический конвектор.

Для обеспечения надлежащего распределения тепла в здании необходимо установить соответствующее количество нагревательных приборов.

В качестве теплоносителя в системе ОВКВ должна использоваться низкотемпературная горячая вода со следующими параметрами:

- температура поступающей горячей воды: 115°C;
- температура обратной горячей воды: 70°C.

В помещении теплового пункта должна быть предусмотрена специальная система вытяжной вентиляции, включающая необходимое количество крышных вытяжных вентиляторов с частотно-регулируемым приводом (для регулирования расхода воздуха), которая предназначена для сброса поступающего в помещение воздуха.

В помещении аварийной душевой должна быть предусмотрена специальная система вытяжной вентиляции с необходимым количеством крышных вытяжных вентиляторов, которая предназначена для сброса поступающего в помещение воздуха.

Там, где применимо, при выборе типа и расположения устройств выброса вытяжного воздуха следует соблюдать требования СП 60.13330.2016, пп. 10.4 и 10.5.

Согласно требованиям СП 7.13330.2013 в местах прохода воздуховодов и проходных отверстиях в огнестойких стенах и (или) плитах перекрытий должны быть предусмотрены противопожарные приводные заслонки.

Электропитание всего оборудования системы ОВКВ должно обеспечиваться системой электроснабжения первой категории надежности.

Для электропитания всего оборудования системы ОВКВ должен быть предусмотрен один распределительный щит, а для управления этим оборудованием — одна панель автоматического управления.

Отопительно-вентиляционные установки, распределительный щит и панель автоматического управления должны размещаться в приточной вентиляционной камере.

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п          | Помещение                                           | Категор<br>ия помеще<br>ния | Летний период                               |                                       | Зимний период                               |                                       | Давление<br><br>[Па] | Минимальные<br>требования по<br>приточному воздуху<br><br>См. прим. (О) | Минимальные требования<br>по вытяжному воздуху |
|----------------|-----------------------------------------------------|-----------------------------|---------------------------------------------|---------------------------------------|---------------------------------------------|---------------------------------------|----------------------|-------------------------------------------------------------------------|------------------------------------------------|
|                |                                                     |                             | Температур<br>а, сухой<br>термометр<br>[°C] | Относитель<br>ная<br>влажность<br>[%] | Температур<br>а, сухой<br>термометр<br>[°C] | Относитель<br>ная<br>влажность<br>[%] |                      |                                                                         |                                                |
| <b>A10.002</b> | <b>Здание пульты управления</b>                     |                             |                                             |                                       |                                             |                                       |                      |                                                                         |                                                |
|                | - Приточная вентиляционная камера                   | Д                           | ≤ 30                                        | Н/Р                                   | ≥ 10                                        | Н/Р                                   | (+)                  | См. прим. (G)                                                           | -                                              |
|                | - Электропункт                                      | ВЗ                          | ≤ 30                                        | Н/Р                                   | ≥ 10                                        | Н/Р                                   | (+)                  | См. прим. (D)                                                           | -                                              |
|                | - Переговорная                                      | Н/П                         | 24 ± 2                                      | Н/Р                                   | 21 ± 2                                      | Н/Р                                   | (+)                  | См. прим. (D) / 60<br>м³/час на 1 человека —<br>наибольшее значение     | -                                              |
|                | - Помещение установки автоматического пожаротушения | Д                           | ≤ 30                                        | Н/Р                                   | ≥ 10                                        | Н/Р                                   | (+)                  | См. прим. (A) и (G)                                                     | См. прим. (B)                                  |
|                | - Помещение ИБП                                     | В4                          | 24 ± 2                                      | 50 ± 10                               | 21 ± 2                                      | 40 ± 10                               | (-)                  | См. прим. (A) и (H) —<br>наибольшее значение                            | См. прим. (B)                                  |
|                | - Контроллерная                                     | ВЗ                          | 24 ± 2                                      | 50 ± 10                               | 21 ± 2                                      | 40 ± 10                               | (+)                  | См. прим. (H)<br>/ 60 м³/час на<br>1 человека —<br>наибольшее значение  | См. прим. (K)                                  |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п | Помещение                                | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|-------|------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|       |                                          |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
|       | - Пульт (панель) управления              | ВЗ                  | 24 ± 2                            | 50 ± 10                     | 21 ± 2                            | 40 ± 10                     | (+)              | См. прим. (Н) / 60 м³/час на 1 человека — наибольшее значение     | См. прим. (К)                               |
|       | - Помещение инженерно-технической службы | В4                  | 24 ± 2                            | Н/Р                         | 21 ± 2                            | Н/Р                         | (+)              | 60 м³/ч на 1 человека                                             | -                                           |
|       | - Вытяжная вентиляционная камера         | ВЗ                  | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (-)              | См. прим. (Е)                                                     | -                                           |
|       | - Мужской туалет                         | Н/П                 | Н/Р                               | Н/Р                         | ≥ 16                              | Н/Р                         | (-)              | -                                                                 | 50 м³/час/унитаз и См. прим. (В)            |
|       | - Женский туалет                         | Н/П                 | Н/Р                               | Н/Р                         | ≥ 16                              | Н/Р                         | (-)              | -                                                                 | 50 м³/час/унитаз и См. прим. (В)            |
|       | - Кладовая                               | Н/П                 | Н/Р                               | Н/Р                         | ≥ 16                              | Н/Р                         | (-)              | См. прим. (D)                                                     | -                                           |
|       | - Помещение начальника смены             | Н/П                 | 24 ± 2                            | Н/Р                         | 21 ± 2                            | Н/Р                         | (+)              | 60 м³/ч на 1 человека<br>См. прим. (М)                            | Вентиляция дымоудаления                     |
|       | - Монтажная мастерская КИПиА             | Н/П                 | 24 ± 2                            | Н/Р                         | 21 ± 2                            | Н/Р                         | (+)              | 60 м³/ч на 1 человека                                             | -                                           |
|       | - Столовая                               | Н/П                 | ≤ 29                              | Н/Р                         | ≥ 21                              | Н/Р                         | (-)              | См. прим. (А) и (F)                                               | См. прим. (G) и (B)                         |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п          | Помещение                                           | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|----------------|-----------------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|                |                                                     |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
|                | - Коридор                                           | Н/П                 | ≤ 28                              | Н/Р                         | ≥ 16                              | Н/Р                         | (+)              | -                                                                 | -                                           |
|                | - Тамбур-шлюз 1 и 2                                 | Н/П                 | Н/Р                               | Н/Р                         | Н/Р                               | Н/Р                         | Н/Р              | -                                                                 | -                                           |
| <b>A10.001</b> | <b>Главная подстанция</b>                           |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                | - Помещение для разводки кабелей                    | B2                  | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |
|                | - Помещение установки автоматического пожаротушения | Д                   | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (A) и (G)                                               | См. прим. (B)                               |
|                | - Приточная вентиляционная камера 1                 | Д                   | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (G)                                                     | -                                           |
|                | - Приточная вентиляционная камера 2                 | Д                   | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (G)                                                     | -                                           |
|                | - Трансформаторная А                                | B3                  | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |
|                | - Трансформаторная В                                | B3                  | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |
|                | - Помещение РУ СН и НН                              | B3                  | ≤ 30                              | Н/Р                         | ≥ 10*                             | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п            | Помещение                                           | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|------------------|-----------------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|                  |                                                     |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
|                  | - Аккумуляторная                                    | ВЗ                  | ≤25                               | Н/Р                         | ≥ 10                              | Н/Р                         | (-)              | См. прим. (А) и (М)                                               | См. прим. (J) и (С)                         |
|                  | - Электрощитовая                                    | В4                  | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |
| <b>A11.101</b>   | <b>Компрессорная</b>                                |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                  | - Зона компрессоров 1 и 2                           | А                   | ≤ 35                              | Н/Р                         | ≥ 16*                             | Н/Р                         | (+)              | См. прим. (А), (Н) и (М)                                          | См. прим. (С) и (L)                         |
|                  | - Приточная вентиляционная камера                   | Д                   | ≤ 31                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (Н)                                               | См. прим. (С)                               |
|                  | - Туалет                                            | Н/П                 | Н/Р                               | Н/Р                         | ≥ 16                              | Н/Р                         | (-)              | -                                                                 | 50 м³/час/унитаз и См. прим. (С)            |
|                  | - Помещение установки автоматического пожаротушения | Д                   | ≤30                               | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (G)                                               | См. прим. (С)                               |
| <b>A11.104.2</b> | <b>Насосная станция питательной воды</b>            |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                  | - Насосная котловой питательной воды ВД             | В1                  | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (Н)                                               | См. прим. (С)                               |



## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п            | Помещение                                                           | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|------------------|---------------------------------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|                  |                                                                     |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
|                  |                                                                     |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
| <b>A17.704</b>   | <b>Склад химреагентов</b>                                           |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                  | - Склад химреагентов                                                | ВЗ                  | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (Н)                                               | См. прим. (С)                               |
| <b>A17.707</b>   | <b>Насосная станция оборотного водоснабжения</b>                    |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                  | - Комплектная установка химической очистки                          | Д                   | ≤ 35                              | Н/Р                         | ≥ 10*                             | Н/Р                         | (+)              | См. прим. (А) и (Н)                                               | См. прим. (С)                               |
|                  | - Туалет                                                            | Н/П                 | Н/Р                               | Н/Р                         | ≥ 16                              | Н/Р                         | (-)              | -                                                                 | 50 м³/час/унитаз и<br>См. прим. (С)         |
| <b>A17.710.2</b> | <b>Здание азотной установки и установки деминерализованной воды</b> |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                  | - Азотная установка                                                 | ВЗ                  | ≤ 35                              | Н/Р                         | ≥ 10*                             | Н/Р                         | (+)              | См. прим. (А), (Н) и (L)                                          | См. прим. (С) и (L)                         |
|                  | - Установка деминерализованной воды                                 | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (Н)                                               | См. прим. (С)                               |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п            | Помещение                                                 | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|------------------|-----------------------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|                  |                                                           |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
|                  | - Насос деминерализованной воды                           | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (Н)                                               | См. прим. (С)                               |
| <b>A17.717.1</b> | <b>Здание установки подготовки водно-гликолевой смеси</b> |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                  | - Насосная станция водно-гликолевой смеси                 | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (Г)                                               | См. прим. (С)                               |
|                  |                                                           |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
| <b>A17.710.1</b> | <b>Здание центрального теплового пункта</b>               |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                  | - Тепловой пункт                                          | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (Г)                                               | См. прим. (С)                               |
| <b>A17.715.1</b> | <b>Здание установки водоподготовки 1</b>                  |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                  | - Помещение серной и соляной кислоты                      | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (Г)                                               | См. прим. (С)                               |
|                  | - Помещение каустической соды                             | Д                   | ≤ 35                              | Н/Р                         | ≥ 16                              | Н/Р                         | (+)              | См. прим. (А) и (Г)                                               | См. прим. (С)                               |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п | Помещение                                                | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|-------|----------------------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|       |                                                          |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
|       | - Помещение гипохлоритов                                 | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (G)                                               | См. прим. (С)                               |
|       | - Станция известкового молока                            | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (G)                                               | См. прим. (С)                               |
|       | - Трансформаторная                                       | B4                  | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |
|       | - Помещение ИБП                                          | B4                  | 24 ± 2                            | 50 ± 10                     | 21 ± 2                            | 40 ± 10                     | (-)              | См. прим. (А) и (H) — наибольшее значение                         | См. прим. (С)                               |
|       | - Электрощитовая                                         | B2                  | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |
|       | - Контроллерная                                          | B3                  | 24 ± 2                            | 50 ± 10                     | 21 ± 2                            | 40 ± 10                     | (+)              | См. прим. (H)                                                     | См. прим. (К)                               |
|       | - Помещение системы обогрева                             | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (G)                                                     | -                                           |
|       | - Цокольный этаж зала фильтрации (план на отм. +100.200) | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (G)                                               | См. прим. (С)                               |
|       | - Вытяжная вентиляционная камера                         | B2                  | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (-)              | См. прим. (Е)                                                     | -                                           |
|       | - Тамбур                                                 | Н/П                 | Н/Р                               | Н/Р                         | Н/Р                               | Н/Р                         | Н/Р              | -                                                                 | -                                           |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п                                      | Помещение                                                               | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|--------------------------------------------|-------------------------------------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|                                            |                                                                         |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
|                                            | - Экспресс-лаборатория                                                  | Д                   | 24 ± 2                            | Н/Р                         | 21 ± 2                            | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |
|                                            | - Операторная                                                           | В4                  | 24 ± 2                            | Н/Р                         | 21 ± 2                            | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |
|                                            | - Приточная вентиляционная камера                                       | Д                   | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (G)                                                     | -                                           |
|                                            | - Первый этаж зала фильтрации<br>- (план на отм. +108.250)              | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (A) и (G)                                               | См. прим. (C)                               |
|                                            | - Туалет                                                                | Н/П                 | Н/Р                               | Н/Р                         | ≥ 16                              | Н/Р                         | (-)              | -                                                                 | 50 м³/час/унитаз и<br>См. прим. (B)         |
| <b>A17.715.2</b>                           | <b>- Здание установки водоподготовки 2 (блок биологической очистки)</b> |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                                            | - Помещение биологической очистки                                       | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (A) и (H)                                               | См. прим. (C)                               |
|                                            | - Приточная вентиляционная камера                                       | Д                   | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (A) и (G)                                               | См. прим. (C)                               |
| <b>УСТАНОВКА ПО ПРОИЗВОДСТВУ КАРБАМИДА</b> |                                                                         |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п   | Помещение                                        | Категор<br>ия помеще<br>ния | Летний период                               |                                       | Зимний период                               |                                       | Давление<br><br>[Па] | Минимальные<br>требования по<br>приточному воздуху<br><br>См. прим. (О)             | Минимальные требования<br>по вытяжному воздуху                                   |
|---------|--------------------------------------------------|-----------------------------|---------------------------------------------|---------------------------------------|---------------------------------------------|---------------------------------------|----------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|         |                                                  |                             | Температур<br>а, сухой<br>термометр<br>[°C] | Относитель<br>ная<br>влажность<br>[%] | Температур<br>а, сухой<br>термометр<br>[°C] | Относитель<br>ная<br>влажность<br>[%] |                      |                                                                                     |                                                                                  |
| U20.002 | - Здание пульта управления и лабораторный корпус |                             |                                             |                                       |                                             |                                       |                      |                                                                                     |                                                                                  |
|         | - Зона лаборатории                               |                             |                                             |                                       |                                             |                                       |                      |                                                                                     |                                                                                  |
|         | - Приточная вентиляционная камера                | Д                           | ≤ 30                                        | Н/Р                                   | ≥ 10                                        | Н/Р                                   | (+)                  | См. прим. (А) и (Г)                                                                 | См. прим. (С)                                                                    |
|         | - Помещение эмиссионного спектрометра            | В4                          | 24 ± 2                                      | 50 ± 10                               | 21 ± 2                                      | 40 ± 10                               | (-)                  | См. прим. (А), (М),<br>(I) / 60 м³/час на<br>1 человека —<br>наибольшее<br>значение | Выбросы лабораторного<br>оборудования: 400 ÷ 1900<br>м³/ч<br>См. также прим. (С) |
|         | - Помещение газового хроматографа                | В4                          | 24 ± 2                                      | 50 ± 10                               | 21 ± 2                                      | 40 ± 10                               | (-)                  | См. прим. (А), (I),<br>(М) / 60 м³/час на<br>1 человека —<br>наибольшее<br>значение | Выбросы лабораторного<br>оборудования: 0 ÷ 1950 м³/ч<br>См. также прим. (С)      |
|         | - Хранилище поверочной газовой смеси             | В4                          | ≤ 26                                        | Н/Р                                   | ≥ 16                                        | Н/Р                                   | (-)                  | См. прим. (А), (М) и<br>(I)                                                         | Выбросы лабораторного<br>оборудования: 260 м³/ч<br>См. также прим. (С)           |
|         | - Вытяжная вентиляционная камера                 | В4                          | ≤ 30                                        | Н/Р                                   | ≥ 10                                        | Н/Р                                   | (-)                  | См. прим. (А) и (Е)                                                                 | См. прим. (С)                                                                    |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п | Помещение                              | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О)         | Минимальные требования по вытяжному воздуху                                |
|-------|----------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------|
|       |                                        |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                           |                                                                            |
|       | - Коридор                              | Н/П                 | ≤28                               | Н/Р                         | ≥ 16                              | Н/Р                         | (+)              | См. прим. (А)                                                             | См. прим. (С)                                                              |
|       | - Препараторская                       | В4                  | 24 ± 2                            | 50 ± 10                     | 21 ± 2                            | 40 ± 10                     | (-)              | См. прим. (А), (М), (I) / 60 м³/час на 1 человека — наибольшее значение   | Выбросы лабораторного оборудования: 160 ÷ 1660 м³/ч<br>См. также прим. (С) |
|       | - Помещение химической лаборатории     | В4                  | 24 ± 2                            | 50 ± 10                     | 21 ± 2                            | 40 ± 10                     | (-)              | См. прим. (А), (I), (М) / 60 м³/час на 1 человека — наибольшее значение   | Выбросы лабораторного оборудования: 0 ÷ 8700 м³/ч<br>См. также прим. (С)   |
|       | - <i>Офис</i>                          | <i>В4</i>           | <i>24 ± 2</i>                     | <i>50 ± 10</i>              | <i>21 ± 2</i>                     | <i>40 ± 10</i>              | <i>(+)</i>       | <i>См. прим. (А), (I) / 60 м³/час на 1 человека — наибольшее значение</i> | <i>См. прим. (С)</i>                                                       |
|       | - Помещение лабораторного оборудования | Д                   | 24 ± 2                            | 50 ± 10                     | 21 ± 2                            | 40 ± 10                     | (-)              | См. прим. (А) и (G)                                                       | См. прим. (С)                                                              |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п | Помещение                                           | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О)       | Минимальные требования по вытяжному воздуху                                 |
|-------|-----------------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------|
|       |                                                     |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                         |                                                                             |
|       | - Анализаторная карбамида                           | В4                  | 24 ± 2                            | 50 ± 10                     | 21 ± 2                            | 40 ± 10                     | (-)              | См. прим. (А), (І), (М) / 60 м³/час на 1 человека — наибольшее значение | Выбросы лабораторного оборудования: 0 ÷ 1500 м³/ч см. также прим. (С) и (Д) |
|       | - Туалет                                            | Н/П                 | Н/Р                               | Н/Р                         | ≥16                               | Н/Р                         | (-)              | -                                                                       | 50 м³/час/унитаз см. прим. (С)                                              |
|       | - Зона пульта управления                            |                     |                                   |                             |                                   |                             |                  |                                                                         |                                                                             |
|       | - Приточная вентиляционная камера                   | Д                   | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (G)                                                           | -                                                                           |
|       | - Электропункт                                      | В3                  | ≤ 30                              | Н/Р                         | ≥10                               | Н/Р                         | (+)              | См. прим. (D)                                                           | -                                                                           |
|       | - Переговорная                                      | Н/П                 | 24 ± 2                            | Н/Р                         | 21 ± 2                            | Н/Р                         | (+)              | См. прим. (D) / 60 м³/час на 1 человека — наибольшее значение           | -                                                                           |
|       | - Помещение установки автоматического пожаротушения | Д                   | ≤30                               | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (G)                                                     | См. прим. (B)                                                               |



## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п | Помещение                                | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|-------|------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|       |                                          |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
|       | - Помещение ИБП                          | В4                  | 24 ± 2                            | 50 ± 10                     | 21 ± 2                            | 40 ± 10                     | (-)              | См. прим. (А) и (Н) — наибольшее значение                         | См. прим. (В)                               |
|       | - Аппаратная КИПиА                       | В3                  | 24 ± 2                            | 50 ± 10                     | 21 ± 2                            | 40 ± 10                     | (+)              | См. прим. (Н) / 60 м³/час на 1 человека — наибольшее значение     | См. прим. (К)                               |
|       | - Пульт (панель) управления              | В3                  | 24 ± 2                            | 50 ± 10                     | 21 ± 2                            | 40 ± 10                     | (+)              | См. прим. (Н) / 60 м³/час на 1 человека — наибольшее значение     | См. прим. (К)                               |
|       | - Помещение инженерно-технической службы | В4                  | 24 ± 2                            | Н/Р                         | 21 ± 2                            | Н/Р                         | (+)              | 60 м³/ч на 1 человека                                             | -                                           |
|       | - Вытяжная вентиляционная камера         | В3                  | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (-)              | См. прим. (Е)                                                     | -                                           |
|       | - Мужской туалет                         | Н/П                 | Н/Р                               | Н/Р                         | ≥ 16                              | Н/Р                         | (-)              | -                                                                 | 50 м³/час/унитаз и См. прим. (В)            |
|       | - Женский туалет                         | Н/П                 | Н/Р                               | Н/Р                         | ≥ 16                              | Н/Р                         | (-)              | -                                                                 | 50 м³/час/унитаз и См. прим. (В)            |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п          | Помещение                                           | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|----------------|-----------------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|                |                                                     |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
|                | - Кладовая                                          | Н/П                 | Н/Р                               | Н/Р                         | ≥16                               | Н/Р                         | (-)              | См. прим. (D)                                                     | -                                           |
|                | - Помещение начальника смены                        | Н/П                 | 24 ± 2                            | Н/Р                         | 21 ± 2                            | Н/Р                         | (+)              | 60 м³/ч на 1 человека                                             | -                                           |
|                | - Монтажная мастерская КИПиА                        | Н/П                 | 24 ± 2                            | Н/Р                         | 21 ± 2                            | Н/Р                         | (+)              | 60 м³/ч на 1 человека                                             | -                                           |
|                | - Столовая                                          | Н/П                 | ≤ 29                              | Н/Р                         | ≥21                               | Н/Р                         | (-)              | См. прим. (А) и (F)                                               | См. прим. (G) и (B)                         |
|                | - Коридор                                           | Н/П                 | ≤ 28                              | Н/Р                         | ≥16                               | Н/Р                         | (+)              | -                                                                 | -                                           |
|                | - Тамбур-шлюз 3 и 4                                 | Н/П                 | Н/Р                               | Н/Р                         | Н/Р                               | Н/Р                         | Н/Р              | -                                                                 | -                                           |
|                |                                                     |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
| <b>U20.001</b> | <b>- Главная подстанция</b>                         |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                | - Помещение для разводки кабелей                    | В2                  | ≤ 35                              | Н/Р                         | ≥10                               | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |
|                | - Помещение установки автоматического пожаротушения | Д                   | ≤30                               | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (G)                                               | См. прим. (B)                               |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п          | Помещение                                                             | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|----------------|-----------------------------------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|                |                                                                       |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
|                | - Приточная вентиляционная камера 1                                   | Д                   | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (G)                                                     | -                                           |
|                | - Приточная вентиляционная камера 2                                   | Д                   | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (G)                                                     | -                                           |
|                | - Трансформаторная А                                                  | ВЗ                  | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |
|                | - Трансформаторная В                                                  | ВЗ                  | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |
|                | - Помещение РУ СН и НН                                                | ВЗ                  | ≤ 30                              | Н/Р                         | ≥ 10*                             | Н/Р                         | (+)              | См. прим. (D)                                                     | -                                           |
|                | - Аккумуляторная                                                      | ВЗ                  | ≤ 25                              | Н/Р                         | ≥ 10                              | Н/Р                         | (-)              | См. прим. (А) и (М)                                               | См. прим. (J) и (C)                         |
| <b>U22.201</b> | <b>- Узел получения плава карбамида — Установка синтеза карбамида</b> |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                | - Зона плава на отм. +100,200                                         | ВЗ                  | ≤ 35                              | Н/Р                         | ≥ 10*                             | Н/Р                         | (+)              | См. прим. (А), (H) и (L)                                          | См. прим. (C) и (L)                         |
|                | - Машинное отделение лифта                                            | Н/П                 | ≤ 35                              | Н/Р                         | ≥ 5                               | Н/Р                         | (+)              | См. прим. (А) и (D)                                               | См. прим. (C)                               |
|                | - Зона плава на отм. +100.200 оси 11-13/В-D                           | ВЗ                  | ≤ 35                              | Н/Р                         | ≥ 10*                             | Н/Р                         | (+)              | См. прим. (А), (H) и (L)                                          | См. прим. (C) и (L)                         |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п          | Помещение                                                     | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|----------------|---------------------------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|                |                                                               |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
|                | - Шахта лифта                                                 | Н/П                 | Н/Р                               | Н/Р                         | Н/Р                               | Н/Р                         | Н/Р              | <del>См. прим. (Н)</del>                                          | <del>См. прим. (В)</del>                    |
|                | - Приточная вентиляционная камера                             | Д                   | ≤ 32                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (G)                                               | См. прим. (С)                               |
|                | - Вытяжная вентиляционная камера                              | ВЗ                  | ≤ 32                              | Н/Р                         | ≥ 10                              | Н/Р                         | (-)              | См. прим. (А) и (Е)                                               | См. прим. (С)                               |
| <b>U22.204</b> | - <b>Узел получения плава карбамида — Насосная аммиака ВД</b> |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                | - Насосная                                                    | А                   | ≤ 35                              | Н/Р                         | ≥ 5                               | Н/Р                         | (+)              | См. прим. (А), (Н) и (L)                                          | См. прим. (С) и (L)                         |
|                | - Приточная вентиляционная камера                             | Д                   | ≤ 32                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (Н)                                               | См. прим. (С)                               |
| <b>U22.205</b> | - <b>Узел получения плава карбамида — Компрессор CO2</b>      |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                | - Компрессорная CO2                                           | ВЗ                  | ≤ 35                              | Н/Р                         | ≥ 10*                             | Н/Р                         | (+)              | См. прим. (А), (Н) и (L)                                          | См. прим. (С) и (L)                         |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п          | Помещение                                     | Категор<br>ия помеще<br>ния | Летний период                               |                                       | Зимний период                               |                                       | Давление<br><br>[Па] | Минимальные<br>требования по<br>приточному воздуху<br><br>См. прим. (О) | Минимальные требования<br>по вытяжному воздуху |
|----------------|-----------------------------------------------|-----------------------------|---------------------------------------------|---------------------------------------|---------------------------------------------|---------------------------------------|----------------------|-------------------------------------------------------------------------|------------------------------------------------|
|                |                                               |                             | Температур<br>а, сухой<br>термометр<br>[°C] | Относитель<br>ная<br>влажность<br>[%] | Температур<br>а, сухой<br>термометр<br>[°C] | Относитель<br>ная<br>влажность<br>[%] |                      |                                                                         |                                                |
|                | - Установка сухого воздуха                    | B3                          | ≤ 35                                        | H/P                                   | ≥ 10                                        | H/P                                   | (+)                  | См. прим. (А) и (Н)                                                     | См. прим. (С)                                  |
|                | - Азотная установка                           | B3                          | ≤ 35                                        | H/P                                   | ≥ 10*                                       | H/P                                   | (+)                  | См. прим. (А), (Н) и (L)                                                | См. прим. (С) и (L)                            |
| <b>U23.301</b> | <b>- Установка гранулирования карбамида</b>   |                             |                                             |                                       |                                             |                                       |                      |                                                                         |                                                |
|                | - Производственное помещение на отм. +100,200 | B1                          | ≤ 35                                        | H/P                                   | ≥ 5                                         | H/P                                   | (+)                  | См. прим. (А) и (Н)                                                     | См. прим. (С)                                  |
|                | - Производственное помещение на отм. +107,300 | B1                          | ≤ 35                                        | H/P                                   | ≥ 5                                         | H/P                                   | (+)                  | См. прим. (А) и (Н)                                                     | См. прим. (С)                                  |
|                | - Производственное помещение на отм. +113,100 | B1                          | ≤ 35                                        | H/P                                   | ≥ 5                                         | H/P                                   | (+)                  | См. прим. (А) и (Н)                                                     | См. прим. (С)                                  |
|                | - Производственное помещение на отм. +122,700 | B1                          | ≤ 35                                        | H/P                                   | ≥ 5                                         | H/P                                   | (+)                  | См. прим. (А) и (Н)                                                     | См. прим. (С)                                  |
|                | - Производственное помещение на отм. +128,100 | B1                          | ≤ 35                                        | H/P                                   | ≥ 5                                         | H/P                                   | (+)                  | См. прим. (А) и (Н)                                                     | См. прим. (С)                                  |
|                | - Производственное помещение на отм. +136,250 | B1                          | ≤ 35                                        | H/P                                   | ≥ 5                                         | H/P                                   | (+)                  | См. прим. (А) и (Н)                                                     | См. прим. (С)                                  |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п | Помещение                                                                                                             | Категор<br>ия помеще<br>ния | Летний период                               |                                       | Зимний период                               |                                       | Давление<br><br>[Па] | Минимальные<br>требования по<br>приточному воздуху<br><br>См. прим. (О) | Минимальные требования<br>по вытяжному воздуху |
|-------|-----------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------------------------------|---------------------------------------|---------------------------------------------|---------------------------------------|----------------------|-------------------------------------------------------------------------|------------------------------------------------|
|       |                                                                                                                       |                             | Температур<br>а, сухой<br>термометр<br>[°C] | Относитель<br>ная<br>влажность<br>[%] | Температур<br>а, сухой<br>термометр<br>[°C] | Относитель<br>ная<br>влажность<br>[%] |                      |                                                                         |                                                |
|       | - Производственное помещение<br>на отм. +142,900                                                                      | B1                          | ≤ 35                                        | Н/Р                                   | ≥ 5                                         | Н/Р                                   | (+)                  | См. прим. (А) и (Н)                                                     | См. прим. (С)                                  |
|       | - Производственное помещение<br>на отм. +152,800                                                                      | B1                          | ≤ 35                                        | Н/Р                                   | ≥ 5                                         | Н/Р                                   | (+)                  | См. прим. (А) и (Н)                                                     | См. прим. (С)                                  |
|       | - Производственное помещение<br>на отм. +159,300                                                                      | B1                          | ≤ 35                                        | Н/Р                                   | ≥ 5                                         | Н/Р                                   | (+)                  | См. прим. (А) и (Н)                                                     | См. прим. (С)                                  |
|       | - Машинное отделение лифта на<br>отм. +166,400                                                                        | Н/П                         | ≤ 35                                        | Н/Р                                   | ≥ 5                                         | Н/Р                                   | (+)                  | См. прим. (А) и (D)                                                     | См. прим. (С)                                  |
|       | - Шахта лифта                                                                                                         | Н/П                         | Н/Р                                         | Н/Р                                   | Н/Р                                         | Н/Р                                   | Н/Р                  | См. прим. (N)                                                           | См. прим. (B)                                  |
|       | - Маршевая лестница                                                                                                   | Н/П                         | Н/Р                                         | Н/Р                                   | Н/Р                                         | Н/Р                                   | Н/Р                  | См. прим. (N)                                                           | См. прим. (B)                                  |
|       | - Коридоры на отм. +107.300,<br>+113.100, + 122.700, +128.100,<br>+131.630, +136.250, +142.900,<br>+152.800, 159.300. | Н/П                         | Н/Р                                         | Н/Р                                   | Н/Р                                         | Н/Р                                   | Н/Р                  | См. прим. (M)                                                           | Вентиляция дымоудаления                        |
|       | - Помещение ОВКВ 1-4                                                                                                  | Д                           | ≤ 31                                        | Н/Р                                   | ≥ 10                                        | Н/Р                                   | (+)                  | См. прим. (А) и (G)                                                     | См. прим. (С)                                  |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п                           | Помещение                                                                   | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|---------------------------------|-----------------------------------------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|                                 |                                                                             |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
| <b>U24.401</b>                  | - Склад гранулированного карбамида                                          |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                                 | - Насыпной склад карбамида                                                  | B1                  | H/P                               | H/P                         | ≥ 25                              | H/P                         | (+)              | -                                                                 | Естественное удаление дыма                  |
| <b>U24.402.1/<br/>U24.402.2</b> | - Узел погрузки карбамида в ж/д вагоны и здание пульта управления погрузкой |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                                 | - Приточная вентиляционная камера                                           | Д                   | ≤ 30                              | H/P                         | ≥ 10                              | H/P                         | (+)              | См. прим. (G)                                                     | -                                           |
|                                 | - Помещение установки пожаротушения                                         | Д                   | ≤ 30                              | H/P                         | ≥ 10                              | H/P                         | (+)              | См. прим. (A) и (G)                                               | См. прим. (B)                               |
|                                 | - Пульт управления                                                          | B4                  | 24 ± 2                            | 50 ± 10                     | 21 ± 2                            | 40 ± 10                     | (+)              | См. прим. (H)                                                     | См. прим. (K)                               |
|                                 | - Санузел и раздевалка                                                      | H/П                 | H/P                               | H/P                         | ≥ 16                              | H/P                         | (-)              | -                                                                 | 50 м³/час/унитаз и См. прим. (B)            |
|                                 | - Узел фасовки некондиции в биг-беги                                        | B1                  | ≤ 35                              | H/P                         | ≥ 10                              | H/P                         | (+)              | См. прим. (A) и (H)                                               | См. прим. (C)                               |



## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п          | Помещение                                           | Категор<br>ия помеще<br>ния | Летний период                               |                                       | Зимний период                               |                                       | Давление<br><br>[Па] | Минимальные<br>требования по<br>приточному воздуху<br><br>См. прим. (О) | Минимальные требования<br>по вытяжному воздуху |
|----------------|-----------------------------------------------------|-----------------------------|---------------------------------------------|---------------------------------------|---------------------------------------------|---------------------------------------|----------------------|-------------------------------------------------------------------------|------------------------------------------------|
|                |                                                     |                             | Температур<br>а, сухой<br>термометр<br>[°C] | Относитель<br>ная<br>влажность<br>[%] | Температур<br>а, сухой<br>термометр<br>[°C] | Относитель<br>ная<br>влажность<br>[%] |                      |                                                                         |                                                |
| <b>U24.406</b> | - <b>Вспомогательная подстанция и контроллерная</b> |                             |                                             |                                       |                                             |                                       |                      |                                                                         |                                                |
|                | - Помещение для разводки кабелей                    | B2                          | ≤ 35                                        | Н/Р                                   | ≥ 10                                        | Н/Р                                   | (+)                  | См. прим. (D)                                                           | -                                              |
|                | - Помещение ИБП                                     | B4                          | 24 ± 2                                      | 50 ± 10                               | 21 ± 2                                      | 40 ± 10                               | (-)                  | См. прим. (А) и (Н) —<br>наибольшее значение                            | См. прим. (В)                                  |
|                | - Помещение установки пожаротушения                 | Д                           | ≤ 30                                        | Н/Р                                   | ≥ 10                                        | Н/Р                                   | (+)                  | См. прим. (А) и (G)                                                     | См. прим. (В)                                  |
|                | - Приточная и вытяжная вентиляционная камера        | Д                           | ≤ 30                                        | Н/Р                                   | ≥ 10                                        | Н/Р                                   | (+)                  | См. прим. (G)                                                           | -                                              |
|                | - Трансформаторная                                  | B4                          | ≤ 35                                        | Н/Р                                   | ≥ 10                                        | Н/Р                                   | (+)                  | См. прим. (D)                                                           | -                                              |
|                | - Щитовая                                           | B3                          | ≤ 30                                        | Н/Р                                   | ≥ 10*                                       | Н/Р                                   | (+)                  | См. прим. (D)                                                           | -                                              |
|                | - Контроллерная                                     | B3                          | 24 ± 2                                      | 50 ± 10                               | 21 ± 2                                      | 40 ± 10                               | (+)                  | См. прим. (Н)                                                           | См. прим. (К)                                  |
|                |                                                     |                             |                                             |                                       |                                             |                                       |                      |                                                                         |                                                |

## Приложение 1 – Исходные данные для проектирования систем ОВКВ

| № п/п          | Помещение                                          | Категория помещения | Летний период                     |                             | Зимний период                     |                             | Давление<br>[Па] | Минимальные требования по приточному воздуху<br><br>См. прим. (О) | Минимальные требования по вытяжному воздуху |
|----------------|----------------------------------------------------|---------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------|------------------|-------------------------------------------------------------------|---------------------------------------------|
|                |                                                    |                     | Температура, сухой термометр [°C] | Относительная влажность [%] | Температура, сухой термометр [°C] | Относительная влажность [%] |                  |                                                                   |                                             |
| <b>U27.707</b> | - <b>Насосная станция оборотного водоснабжения</b> |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                | - Комплектная установка химической очистки         | Д                   | ≤ 35                              | Н/Р                         | ≥ 10*                             | Н/Р                         | (+)              | См. прим. (А) и (Н)                                               | См. прим. (С)                               |
|                | - Туалет                                           | Н/П                 | Н/Р                               | Н/Р                         | ≥ 16                              | Н/Р                         | (-)              | -                                                                 | 50 м³/час/унитаз                            |
| <b>U27.717</b> | - <b>Центральный тепловой пункт</b>                |                     |                                   |                             |                                   |                             |                  |                                                                   |                                             |
|                | - Тепловой пункт                                   | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (Г)                                               | См. прим. (С)                               |
|                | - Аварийный душ                                    | Д                   | ≤ 35                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (Г)                                               | См. прим. (С)                               |
|                | - Приточная вентиляционная камера                  | Д                   | ≤ 30                              | Н/Р                         | ≥ 10                              | Н/Р                         | (+)              | См. прим. (А) и (Г)                                               | См. прим. (С)                               |

Условные обозначения:

Н/П : Не применимо.

Н/Р : Не регулируется.

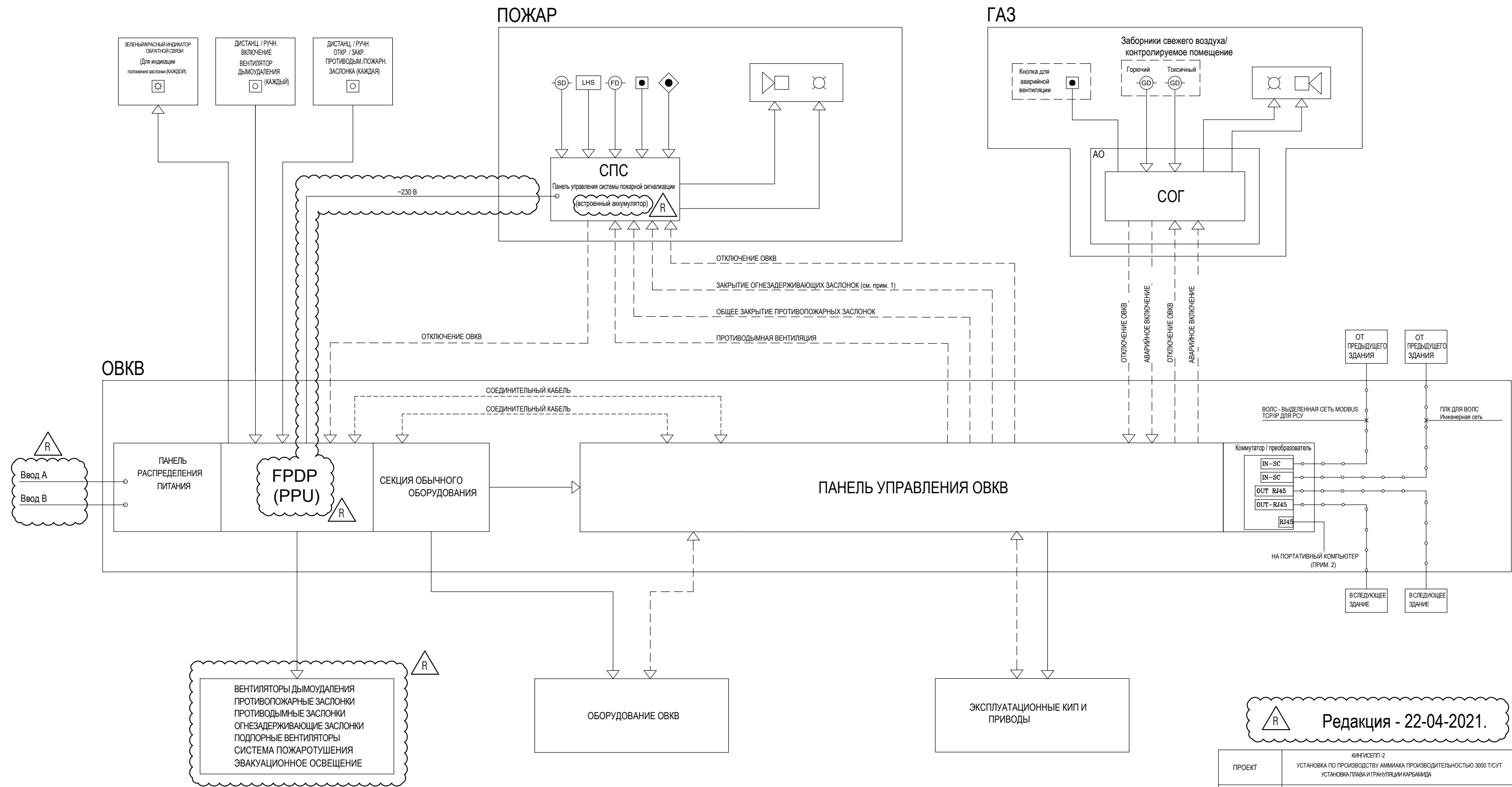
(+) : Помещение с избыточным давлением по отношению к наружному.

- (-) : Помещение с пониженным давлением относительно соседних помещений, но с избыточным давлением относительно атмосферного.
- \* : Минимально допустимая температура во время останова технологического оборудования 5°C.

Примечания:

- (A) : По мере необходимости для удовлетворения требований по тепловой нагрузке помещения.
- (B) : Полный отвод/эксфильтрация приточного воздуха.
- (C) : 100% приточно-вентиляционная камера; подаваемый воздух полностью отводится/эксфильтруется.
- (D) : В соответствии с российскими стандартами и нормами.
- (E) : Не менее 1-кратного воздухообмена.
- (F) : Не менее 2-кратного воздухообмена.
- (G) : Не менее 3-кратного воздухообмена.
- (H) : Не менее 5-кратного воздухообмена.
- (I) : Не менее 8-кратного воздухообмена.
- (J) : Не менее 10-кратного воздухообмена.
- (K) : Удаление дыма: не менее 4-кратного воздухообмена.
- (L) : Аварийная вентиляция: не менее 8-кратного воздухообмена (по фактическому объему здания).
- (M) : По мере необходимости для компенсации удаленного воздуха.
- (N) : В помещении предусмотрен подпор воздуха в случае срабатывания пожарной сигнализации.
- (O) : Кратность воздухообмена рассчитывается по «объему вентилируемого помещения» в соответствии с приложением И к СП 60.13330.2012, где указано, что объем помещений высотой более 6 м следует принимать равным 6А, где А — площадь помещения.

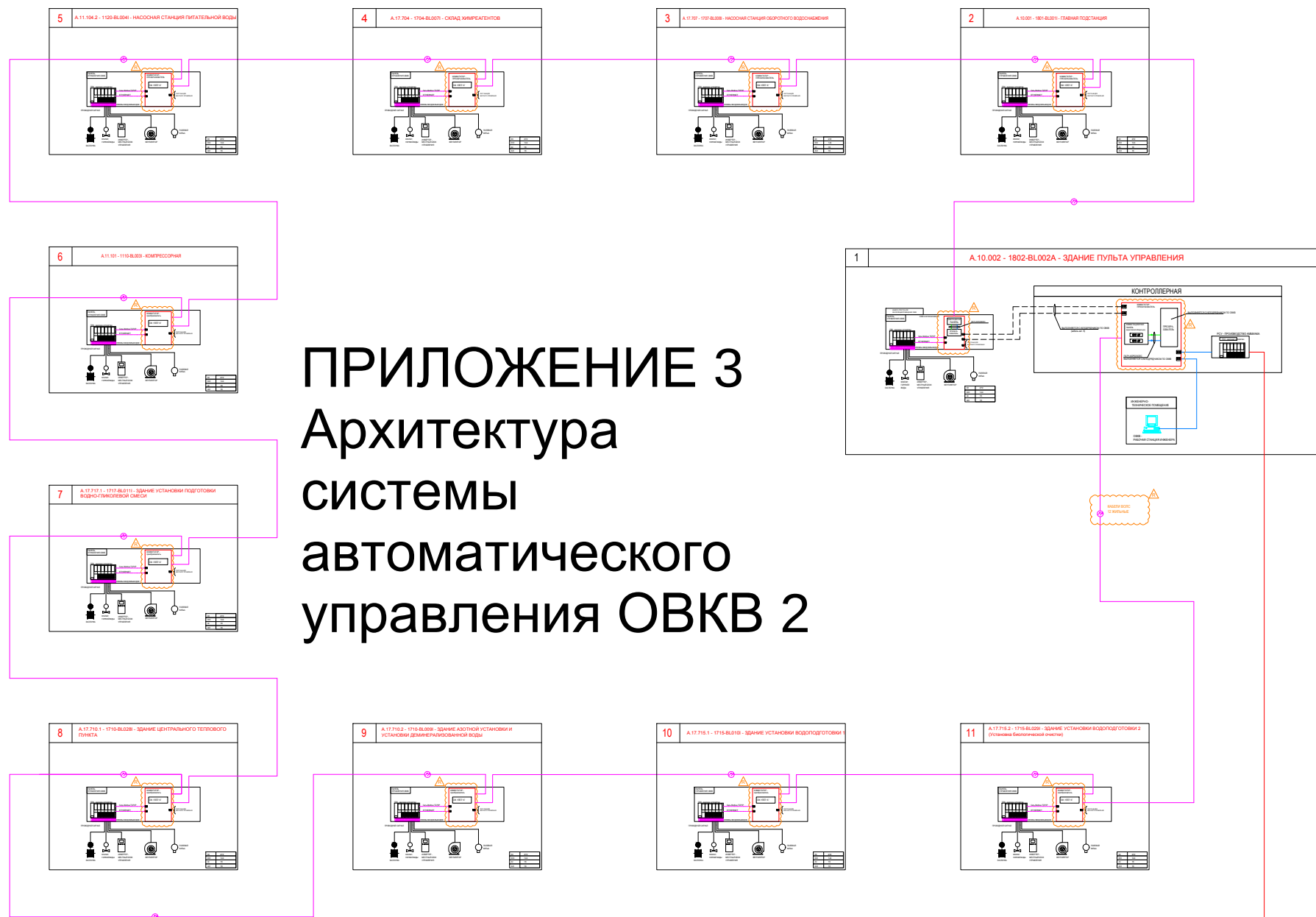
ПРИЛОЖЕНИЕ 2 - Архитектура системы автоматического управления ОВКВ 1



ПРИМЕЧАНИЕ 1: ОДИН СИГНАЛ ДЛЯ КАЖДОГО ПОМЕЩЕНИЯ, ЗАЩИЩЕННОГО СОСТАВОМ ПОЖАРОТУШЕНИЯ «CLEAN AGENT»  
ПРИМЕЧАНИЕ 1: ПОРТ RJ45 ДЛЯ КАБЕЛЯ ETHERNET ДЛЯ ОБЕСПЕЧЕНИЯ ПРОВЕДЕНИЯ ТЕХНИЧЕСКОГО ОБСЛУЖИВАНИЯ И (ИЛИ) МЕСТНОГО ОБНАРУЖЕНИЯ ДАННЫХ ПОСРЕДСТВОМ ПОРТАТИВНОГО ПК.

|                    |                                                                                                         |            |
|--------------------|---------------------------------------------------------------------------------------------------------|------------|
| КОНТРАКТ-2         |                                                                                                         |            |
| ПРОЕКТ             | УСТАНОВКА ПО ПРОИЗВОДСТВУ АММИАКА ПРОИЗВОДИТЕЛЬНОСТЬЮ 3000 Т/СУТ<br>УСТАНОВКА ПАВА И ГРАДУАЦИИ КАРАМИДА |            |
| НАЗВАНИЕ ДОКУМЕНТА | АРХИТЕКТУРА СИСТЕМЫ АВТОМАТИЧЕСКОГО УПРАВЛЕНИЯ ОВКВ                                                     |            |
| НОМЕР ДОКУМЕНТА    | -                                                                                                       | 22-04-2021 |

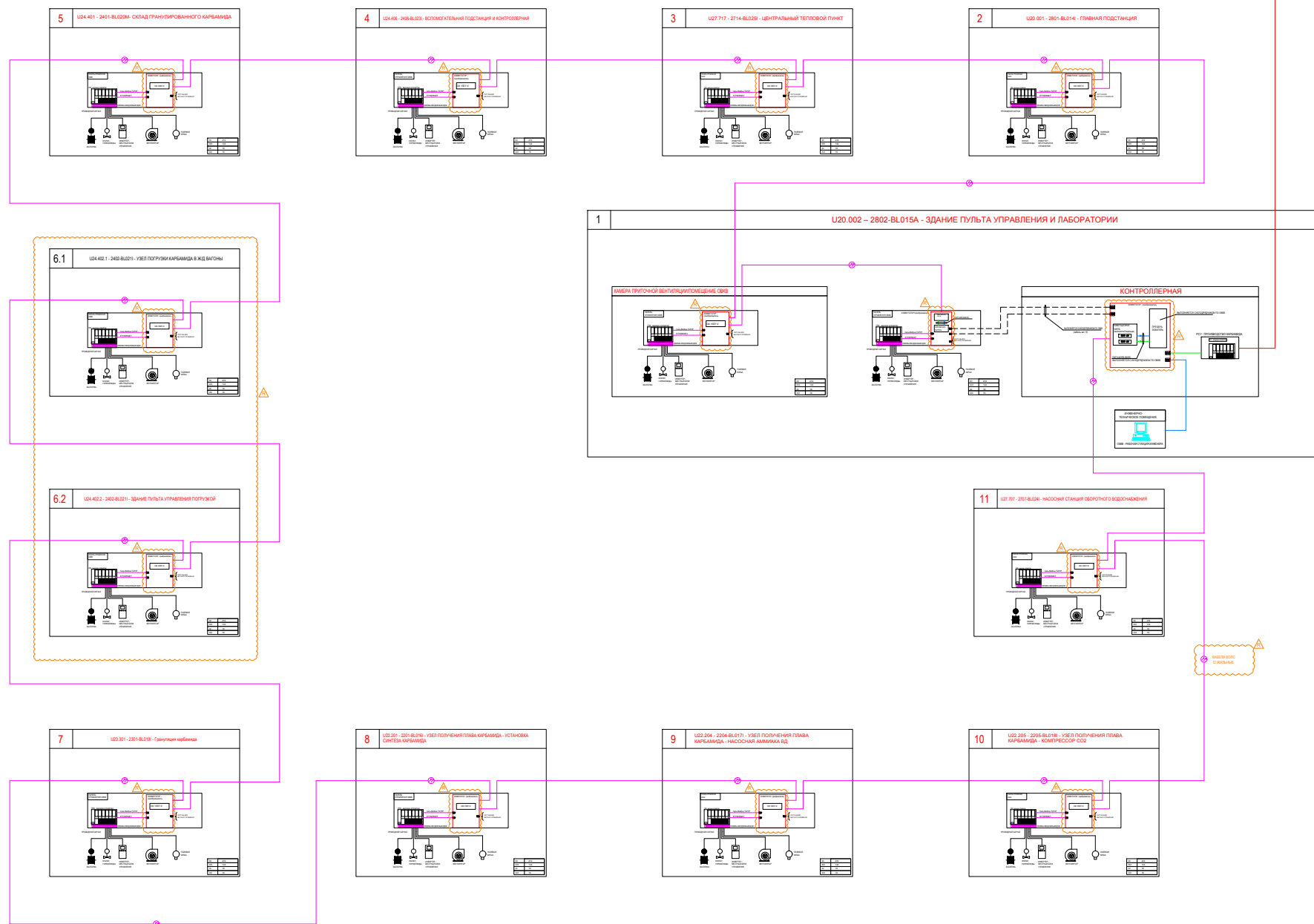
# УСТАНОВКА ПО ПРОИЗВОДСТВУ АММИАКА



## ПРИЛОЖЕНИЕ 3 Архитектура системы автоматического управления ОВКВ 2

СОЕДИНЕНИЕ ВОЛС МЕЖДУ РСУ УСТАНОВКИ ПО ПРОИЗВОДСТВУ АММИАКА И УСТАНОВКИ ПО ПРОИЗВОДСТВУ КАРБАМИДА

# УСТАНОВКА ПО ПРОИЗВОДСТВУ КАРБАМИДА

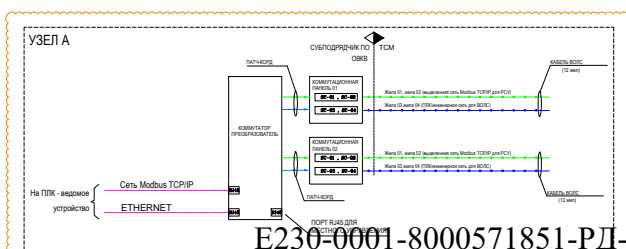


### УСЛОВНЫЕ ОБОЗНАЧЕНИЯ

|                                 |  |
|---------------------------------|--|
| ЖИЛЫ КАБЕЛЯ ВОЛС - РСУ          |  |
| ЖИЛЫ КАБЕЛЯ ВОЛС - ПИЩЕВАЯ СЕТЬ |  |
| КАБЕЛЬ ПРОВОДНОГО СИГНАЛА       |  |
| КАБЕЛЬ ВОЛС - 12 ЖИЛЫЕ          |  |
| Кабель cat. 6                   |  |

### ПРИМЕЧАНИЕ

Все последовательности и соединения зданий см. в документе:  
4124-КК-00-20000000 - ОБЩАЯ БЛОК-СХЕМА ОТОПЛОЧНЫХ СОЕДИНЕНИЙ

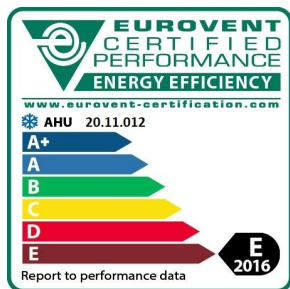


Р Редакция от 4 авг. 2021

СИСТЕМА ОВКВ - АРХИТЕКТУРА СИСТЕМЫ  
АВТОМАТИЧЕСКОГО УПРАВЛЕНИЯ

E230-0001-8000571851-РД-01-10.20.010-ОВ\_0\_0\_RU\_11.02.21.1.1.pdf

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                          |                                                                                               |                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------|
| Ассортимент прод<br>серия<br>конструкция агрегата<br>тип агрегата                                                                                                                                                                                                                                                                                                                                                                                                | <b>FLEXLINE<br/>FLNG<br/>приточный агрегат<br/>агрегат наружной установки</b>                                                                                                                                                                                            | Контроль Экодизайна 2016 / 2018<br>Удельная мощность вентилятора [W/(m3/s)]<br>общий вес [кг] | <b>да / Нет<br/>1 709<br/>~624</b> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>приточный</b>                                                                                                                                                                                                                                                         |                                                                                               |                                    |
| расход воздуха<br>модель<br>Внешнее Статическое Давление<br>Fan Model / Qty.<br>Fan Motor Power / Nominal Rpm<br>Подключение к сети<br>Cross Section Velocity<br>Coil Cross Section Velocity<br>Heat Recovery Capacity (Winter)<br>Heat Recovery Temp. Eff. (EN308)<br>Heat Recovery Humidity Eff. (EN308)<br>холодопроизво-сть<br>теплов. мощность при нагреве<br>Total Dimensions (H/W/L)<br>Расчетная зимняя температура наружн<br>Плотность воздуха / Высота | 3 800 [м/ч]<br>FLNG 20x30<br>450 [Па]<br>RH31C.CR/SM12-B24 / 1x1<br>2.2 [kW] (1x1) / 2875 [1/min]<br>3 ph / 400 V / 50 Hz<br>1,88 [м/с]<br>2.7 [м/с]<br>- [кВт]<br>[%]<br>- [%]<br>- [кВт]<br>43.32 [кВт]<br>842 / 1018 / 4731 [мм]<br>-24,00 [C]<br>1,20 [kg/m] / 0 [m] |                                                                                               |                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                          | Dampers Freeze Protection                                                                     | Dampers With Trace Heating         |

**Класс энергоэффективности**

**Mechanical Characteristics (EN1886)**

|                           |               |
|---------------------------|---------------|
| Прочность корпуса         | <b>D1(M)</b>  |
| Коэффициент теплопередачи | <b>T2(M)</b>  |
| Тепловой мост             | <b>TB2(M)</b> |
| Фильтр утечки байпаса     | <b>F9</b>     |
| Утечка воздуха в корпусе  | <b>L1(M)</b>  |

**Casing / Frame**

|                            |                                 | Supply Side                                 |  |
|----------------------------|---------------------------------|---------------------------------------------|--|
| п<br>а<br>н<br>е<br>л<br>ь | толщина                         | 50,0 [мм]                                   |  |
|                            | Тип изоляции / Плотность        | Каменная вата 70кг/м3                       |  |
|                            | External Sheet Metal            | Z275 Steel + Polyester Painted (0,80mm)     |  |
|                            | Internal Sheet Metal            | Z275 Steel + Polyester Painted (0,80mm)     |  |
|                            | Изоляция базовой панели         | Каменная вата 70кг/м3                       |  |
|                            | Base Panel Internal Sheet Metal | Z275 Steel + Polyester Painted (0,80mm)     |  |
|                            | Frame Type                      | Z275 + Epoxy Primer Polyester Painted Steel |  |
|                            | Model Box: FL NG                |                                             |  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                             |                                                                                               |                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------|
| Ассортимент прод<br>серия<br>конструкция агрегата<br>тип агрегата                                                                                                                                                                                                                                                                                                                                                                                                | <b>FLEXLINE</b><br><b>FLNG</b><br><b>приточный агрегат</b><br><b>агрегат наружной установки</b>                                                                                                                                                                             | Контроль Экодизайна 2016 / 2018<br>Удельная мощность вентилятора [W/(m3/s)]<br>общий вес [кг] | да / Нет<br>1 690<br>~2 363 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>приточный</b>                                                                                                                                                                                                                                                            |                                                                                               |                             |
| расход воздуха<br>модель<br>Внешнее Статическое Давление<br>Fan Model / Qty.<br>Fan Motor Power / Nominal Rpm<br>Подключение к сети<br>Cross Section Velocity<br>Coil Cross Section Velocity<br>Heat Recovery Capacity (Winter)<br>Heat Recovery Temp. Eff. (EN308)<br>Heat Recovery Humidity Eff. (EN308)<br>холодопроизво-сть<br>теплов. мощность при нагреве<br>Total Dimensions (H/W/L)<br>Расчетная зимняя температура наружн<br>Плотность воздуха / Высота | 46 340 [м/ч]<br>FLNG 60x80<br>450 [Па]<br>RH63C.CR/SM25-B42 / 2x1<br>15 [kW] (2x1) / 1466 [1/min]<br>3 ph / 400 V / 50 Hz<br>2,80 [м/с]<br>2.28 [м/с]<br>- [кВт]<br>[%]<br>- [%]<br>- [кВт]<br>492.48 [кВт]<br>2066 / 2608 / 5800 [мм]<br>-24,00 [C]<br>1,20 [kg/m] / 0 [m] |                                                                                               |                             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                             | Dampers Freeze Protection                                                                     | Dampers With Trace Heating  |

Класс энергоэффективности



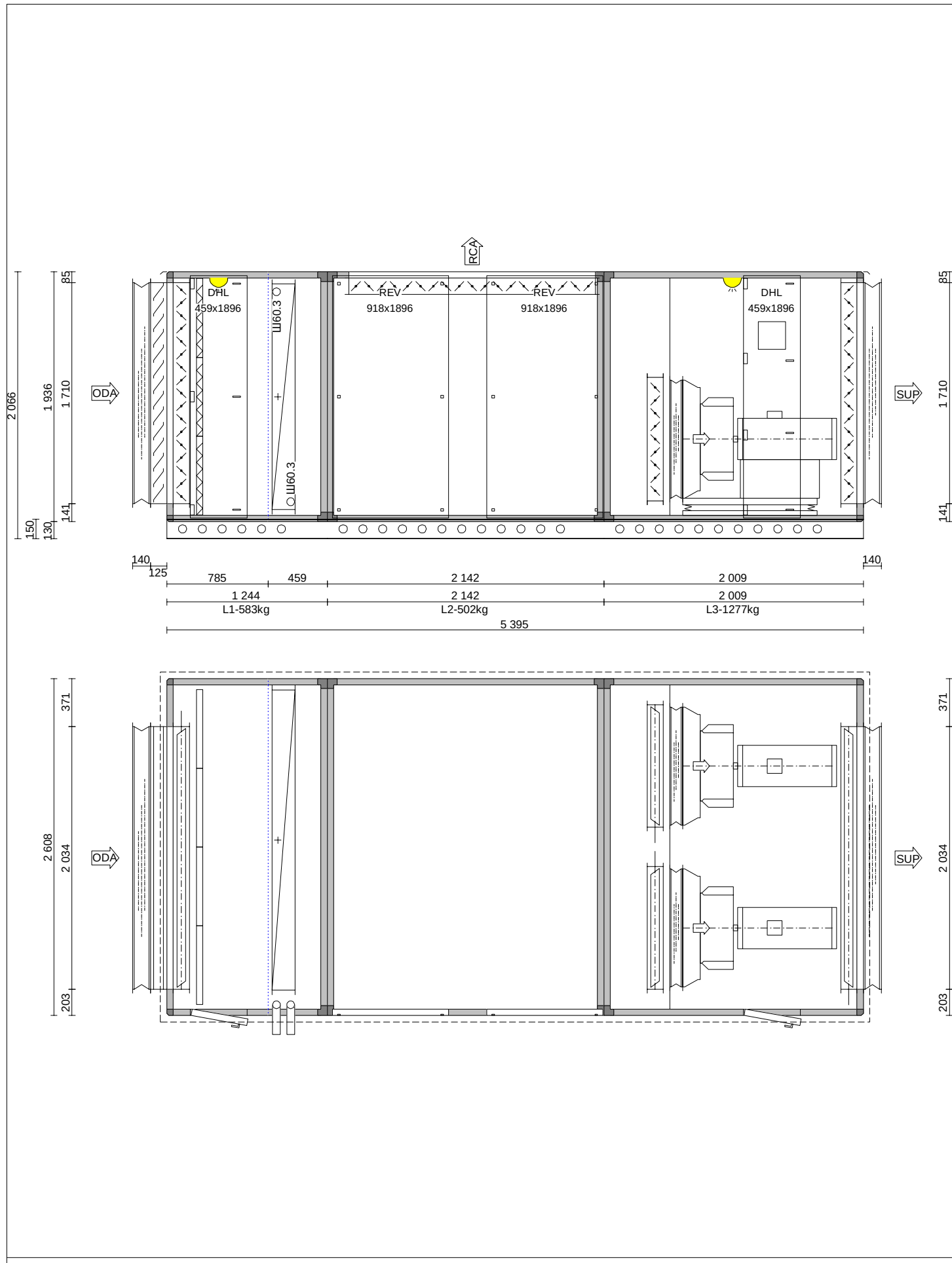
Mechanical Characteristics (EN1886)

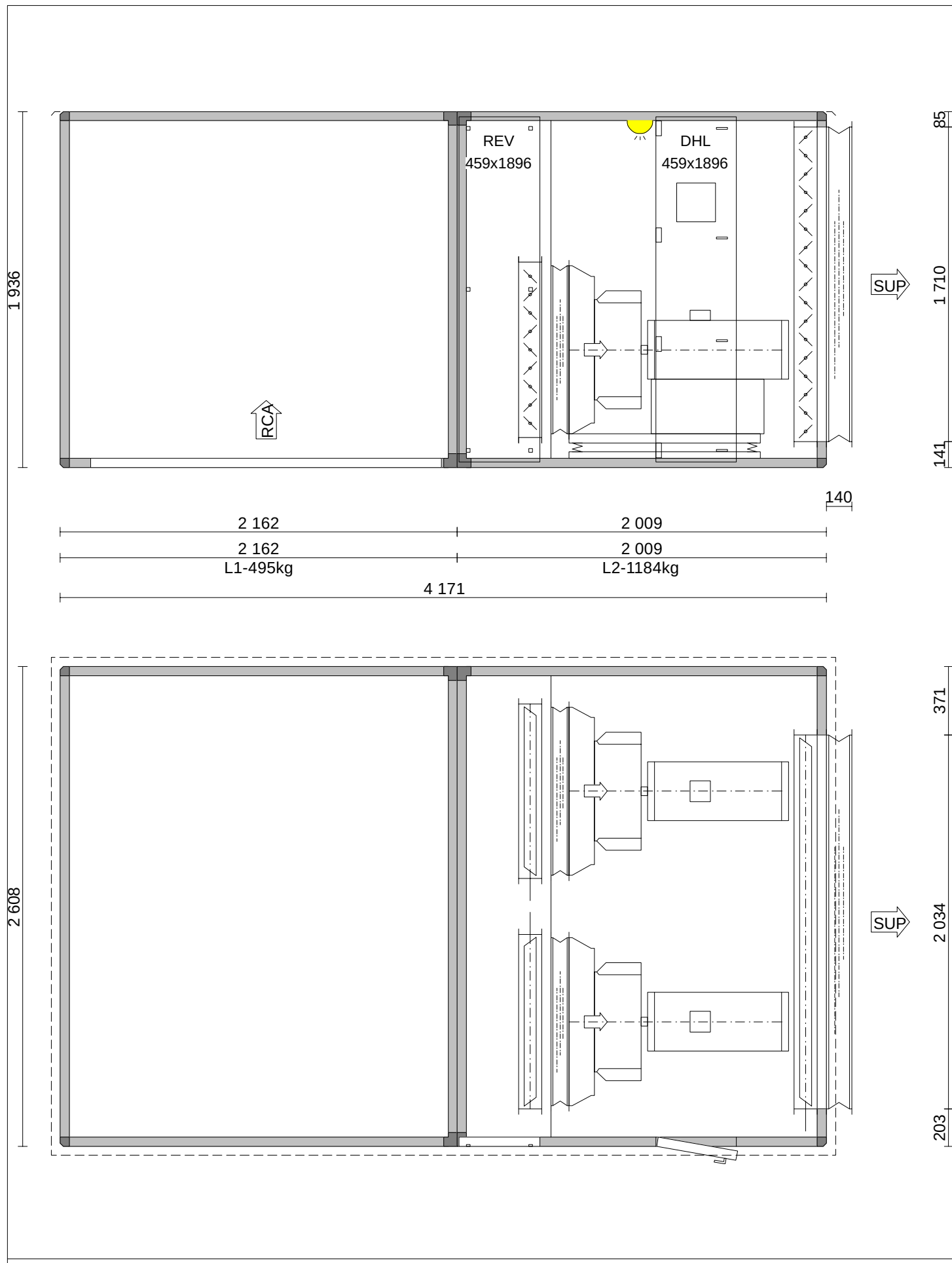
|                           |        |
|---------------------------|--------|
| Прочность корпуса         | D1(M)  |
| Коэффициент теплопередачи | T2(M)  |
| Тепловой мост             | TB2(M) |
| Фильтр утечки байпаса     | F9     |
| Утечка воздуха в корпусе  | L1(M)  |

| Casing / Frame             |                                                                                                                                                   |                                                                                                                                                                                              |  |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                            |                                                                                                                                                   | Supply Side                                                                                                                                                                                  |  |
| п<br>а<br>н<br>е<br>л<br>ь | толщина<br>Тип изоляции / Плотность<br>External Sheet Metal<br>Internal Sheet Metal<br>Изоляция базовой панели<br>Base Panel Internal Sheet Metal | 50,0 [мм]<br>Каменная вата 70кг/м3<br>Z275 Steel + Polyester Painted (0,80mm)<br>Z275 Steel + Polyester Painted (0,80mm)<br>Каменная вата 70кг/м3<br>Z275 Steel + Polyester Painted (0,80mm) |  |
|                            | Frame Type                                                                                                                                        | Z275 + Epoxy Primer Polyester Painted Steel                                                                                                                                                  |  |
|                            | Model Box: FL NG                                                                                                                                  |                                                                                                                                                                                              |  |



| Экодизайн - Контроль                                           |                                                       |                    |               |           |                    |               |
|----------------------------------------------------------------|-------------------------------------------------------|--------------------|---------------|-----------|--------------------|---------------|
| Non-Residential Ventilation Unit,_UVU                          | 2016                                                  |                    |               | 2018      |                    |               |
|                                                                | проверять                                             | значение           | Предел        | проверять | значение           | Предел        |
| Вентилятор с приводом с регулиру                               | предупре                                              | Intended to be use | Обязательн    | предупре  | Intended to be use | Обязательн    |
| Манометр для фильтров                                          | Одобрено                                              | никакой            | Не требуется  | Неудачно  | никакой            | Обязательн    |
| Внутр. Удельная мощн. W/(m/s)                                  | Одобрено                                              | 186 [W/(m/s)]      | 250 [W/(m/s)] | Одобрено  | 186 [W/(m/s)]      | 230 [W/(m/s)] |
| Эффективность статической систе                                | Одобрено                                              | 56,35              | 54,3          | Неудачно  | 56,35              | 61,3          |
|                                                                |                                                       |                    |               |           |                    |               |
|                                                                |                                                       |                    |               |           |                    |               |
| Тотальный контроль                                             | Одобрено                                              |                    |               | Неудачно  |                    |               |
|                                                                |                                                       |                    |               |           |                    |               |
| Экодизайн - Технические данные                                 |                                                       |                    |               |           |                    |               |
| Производитель                                                  | Головной офис.                                        |                    |               |           |                    |               |
| Типология                                                      | NRVU, _UVU                                            |                    |               |           |                    |               |
| модель                                                         | FLNG 60x80                                            |                    |               |           |                    | -             |
| Type of Heat Recovery System                                   | никакой                                               |                    |               |           |                    |               |
| Тепловая эффективность системы рекуперации тепла (EN 308)      | - [%]                                                 |                    |               |           |                    |               |
| Максимальная внутренняя утечка (± 250 Па, EN 308)              | -                                                     |                    |               |           |                    |               |
| Максимальная внешняя утечка                                    | Leakage Class Rate 1,6% at +400Pa and 1,25% at -400Pa |                    |               |           |                    |               |
|                                                                | приточный                                             |                    |               |           | вытяжк             |               |
| расход воздуха                                                 | 46 340 [м/ч]                                          |                    |               |           | -                  |               |
| Face Velocity at Design Flow Rate                              | 2,80 [м/с]                                            |                    |               |           | -                  |               |
| Мощность двигателя для энерг. класса, включая VSD              | 22,431 [кВт]                                          |                    |               |           | -                  |               |
|                                                                |                                                       |                    |               |           |                    |               |
| Статическая эффективность вентилятора (1253/2014)              | 56,35 [%]                                             |                    |               |           | 0 [%]              |               |
| Эффективность статической системы (1253/2014)                  | 56,35 [%]                                             |                    |               |           | -                  |               |
| Энергетический класс для фильтров                              | Нет классификации                                     |                    |               |           | -                  |               |
| Падение внут. Стат. давления компонентов вентиляции            | 105 [Па]                                              |                    |               |           | -                  |               |
| Падение полного статического давления в расчетных условиях     | 982 [Па]                                              |                    |               |           | 0 [Па]             |               |
| Падение внеш. Стат. Дав.                                       | 450 [Па]                                              |                    |               |           | 0                  |               |
|                                                                |                                                       |                    |               |           |                    |               |
| SFPint, Внутр. Удель. Мощ. Вен. в Экодизайн Реф. Конфиг.       | 186 [W/(m/s)]                                         |                    |               |           | 0 [W/(m/s)]        |               |
| SFPint Общ, Общ. Внутр. Удель. Мощ. Вен. в Экодизайн Реф. Конф | 186 [W/(m/s)]                                         |                    |               |           |                    |               |
| Удельная мощность вентилятора, 2016 предельное знач.           | 250 [W/(m/s)]                                         |                    |               |           |                    |               |
| Удельная мощность вентилятора, 2018 предельное знач.           | 230 [W/(m/s)]                                         |                    |               |           |                    |               |





|                                                                                  |                 |              |            |                   |
|----------------------------------------------------------------------------------|-----------------|--------------|------------|-------------------|
|  | проект          | проверка дат | 24.11.2023 |                   |
|                                                                                  | Ссылка на бло   | A17 P1       | Дизайнер   | Mikhail Shishulin |
|                                                                                  | Воздушный поток | [ 46 340     | модель     | FLNG 60x80        |

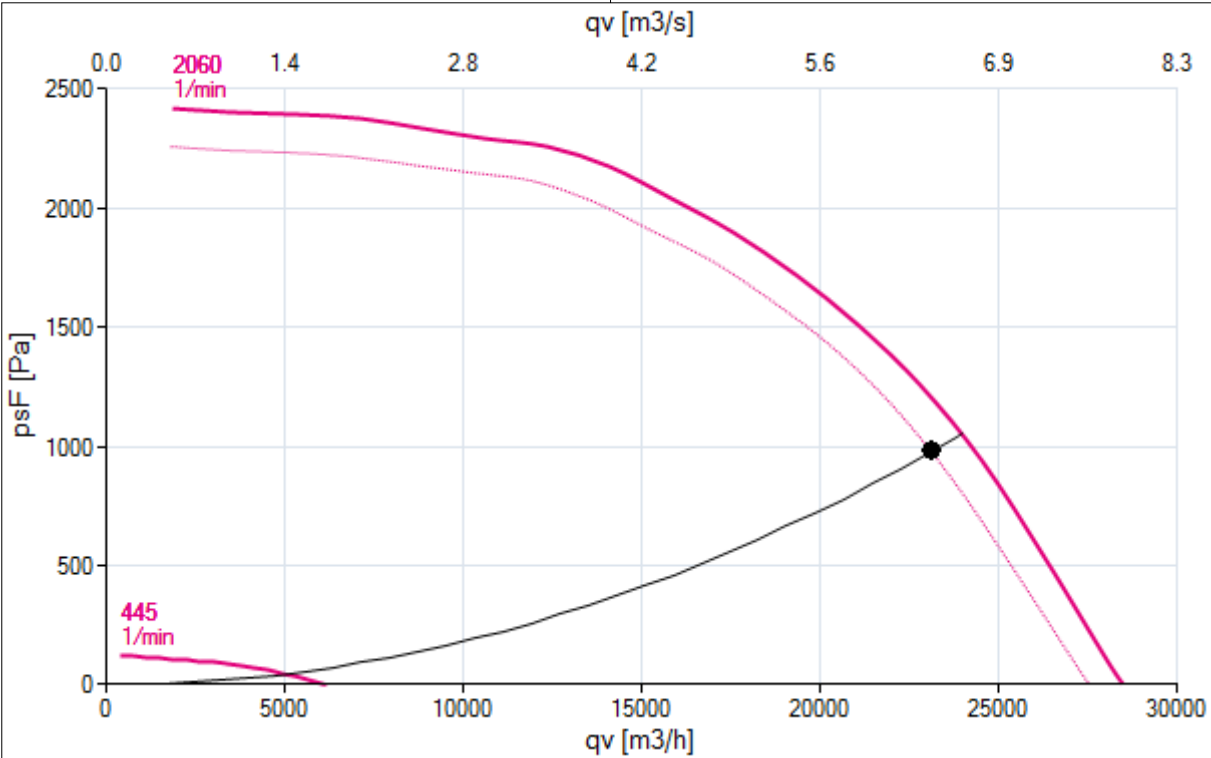
|                                      |  |                             |  |                           |  |                                    |  |                           |  |     |  |
|--------------------------------------|--|-----------------------------|--|---------------------------|--|------------------------------------|--|---------------------------|--|-----|--|
| фильтр                               |  | приточн. воз                |  | Длина секции [мм]         |  | 785,0                              |  | потери давления [Па]      |  | 187 |  |
| тип                                  |  | панельный фильтр            |  |                           |  |                                    |  |                           |  |     |  |
| установка                            |  | со стороны - выдвижной      |  |                           |  | поверх. фильтра [                  |  | 7,20                      |  |     |  |
| Класс производительности (EN 779)    |  | G4                          |  |                           |  | Размер и количество<br>WxHxD & pcs |  | 592,0 x 592,0 x 48,0 - 12 |  |     |  |
| Первый dP [Па]                       |  | 105                         |  |                           |  |                                    |  |                           |  |     |  |
| Средний dP                           |  | 130                         |  |                           |  |                                    |  |                           |  |     |  |
| последний dP [Па]                    |  | 155                         |  |                           |  |                                    |  |                           |  |     |  |
| Класс ISO 16890                      |  | Грубый %60                  |  |                           |  |                                    |  |                           |  |     |  |
| Скорость секции фильтра [м/с]        |  | 3,06                        |  |                           |  |                                    |  |                           |  |     |  |
| Класс энергии фильтра                |  | Нет классификации           |  |                           |  |                                    |  |                           |  |     |  |
| Дверь с шарниром и рычажным замком   |  |                             |  |                           |  | Размеры GxY [мм]                   |  | 459,0 x 1 896,0           |  |     |  |
| <u>клапан:</u>                       |  |                             |  |                           |  | размеры [мм]                       |  | 1 710,0 x 2 034,0 x 125,  |  |     |  |
| привод. в действие поготов к приводу |  | расход воздуха [м/ч]        |  | 46 340                    |  | рама                               |  | алюминий                  |  |     |  |
| кол. уровней                         |  | 1 скорость воздуха [м/с]    |  | 3,70                      |  | лопасти                            |  | алюминий                  |  |     |  |
| крутящий момент [Nm]                 |  | 20,000 потери давления [Па] |  | 11                        |  | воздушная изол                     |  | стандартный               |  |     |  |
| <u>жалюзи защитные от погоды</u>     |  |                             |  |                           |  | размеры [мм]                       |  | 1 710,0 x 2 034,0 x 125,0 |  |     |  |
| тип WL                               |  | материал                    |  | Z275 Steel + Polyster Pai |  |                                    |  |                           |  |     |  |
| <u>гибкая вставка</u>                |  | Z275 Steel                  |  | Temp. max 80,0            |  | размеры [мм]                       |  | 1 710,0 x 2 034,0 x 140,0 |  |     |  |
| фланец [мм]                          |  | 30,0                        |  |                           |  |                                    |  |                           |  |     |  |
| <u>освещение</u>                     |  | Лампа - Стандартная         |  |                           |  |                                    |  |                           |  |     |  |

|                                                             |  |              |  |                       |  |                     |  |                      |  |    |  |
|-------------------------------------------------------------|--|--------------|--|-----------------------|--|---------------------|--|----------------------|--|----|--|
| т/о нагреватель                                             |  | приточн. воз |  | Длина секции [мм]     |  | 459,0               |  | потери давления [Па] |  | 25 |  |
| Воздушная с                                                 |  |              |  |                       |  | Жидкая стор         |  |                      |  |    |  |
| Поток [м/ч]                                                 |  | 33 380       |  | Жидкость              |  | Вода                |  |                      |  |    |  |
| Скорость на катушке [м/с]                                   |  | 2,28         |  | Поток [л/с]           |  | 2,7430              |  |                      |  |    |  |
| Вход DB [C]                                                 |  | -24,00       |  | Вход RH [%]           |  | 84,0                |  |                      |  |    |  |
| Выход DB [C]                                                |  | 20,00        |  | Выход RH [%]          |  | 2,5                 |  |                      |  |    |  |
| производительность [кВт]                                    |  | 492,48       |  | Вход жидкости [C]     |  | 115,00              |  |                      |  |    |  |
| потери давления [Па]                                        |  | 25           |  | Выход жидкости [C]    |  | 70,00               |  |                      |  |    |  |
|                                                             |  |              |  | потери давления [кПа] |  | 19,72               |  |                      |  |    |  |
| Код катушки F 32x28-12 C S 55T 2R 2325A 3.2P 23NC (.12/.32) |  |              |  |                       |  | материалы:          |  |                      |  |    |  |
| Порядковый номер                                            |  | 2            |  | ребра                 |  | алюминий (0,120 mm) |  |                      |  |    |  |
| Схема №                                                     |  | 23           |  | трубы                 |  | медная (0,320 mm)   |  |                      |  |    |  |
| шаг ребер [мм]                                              |  | 3,20         |  | коллектор             |  | стальная окрашенная |  |                      |  |    |  |
| Площадь с крылом [m]                                        |  | 131,13       |  | рамы                  |  | Z275 Steel          |  |                      |  |    |  |
| Внутренний объем [lt]                                       |  | 37,160       |  | защита ребер          |  | -                   |  |                      |  |    |  |
| Шланг №                                                     |  | 55           |  |                       |  |                     |  |                      |  |    |  |
| Ширина с крылом [мм]                                        |  | 2 325,0      |  |                       |  |                     |  |                      |  |    |  |
| Вход Подключени                                             |  | 2 0/0"       |  |                       |  |                     |  |                      |  |    |  |
| Выход подключения                                           |  | 2 0/0"       |  |                       |  |                     |  |                      |  |    |  |

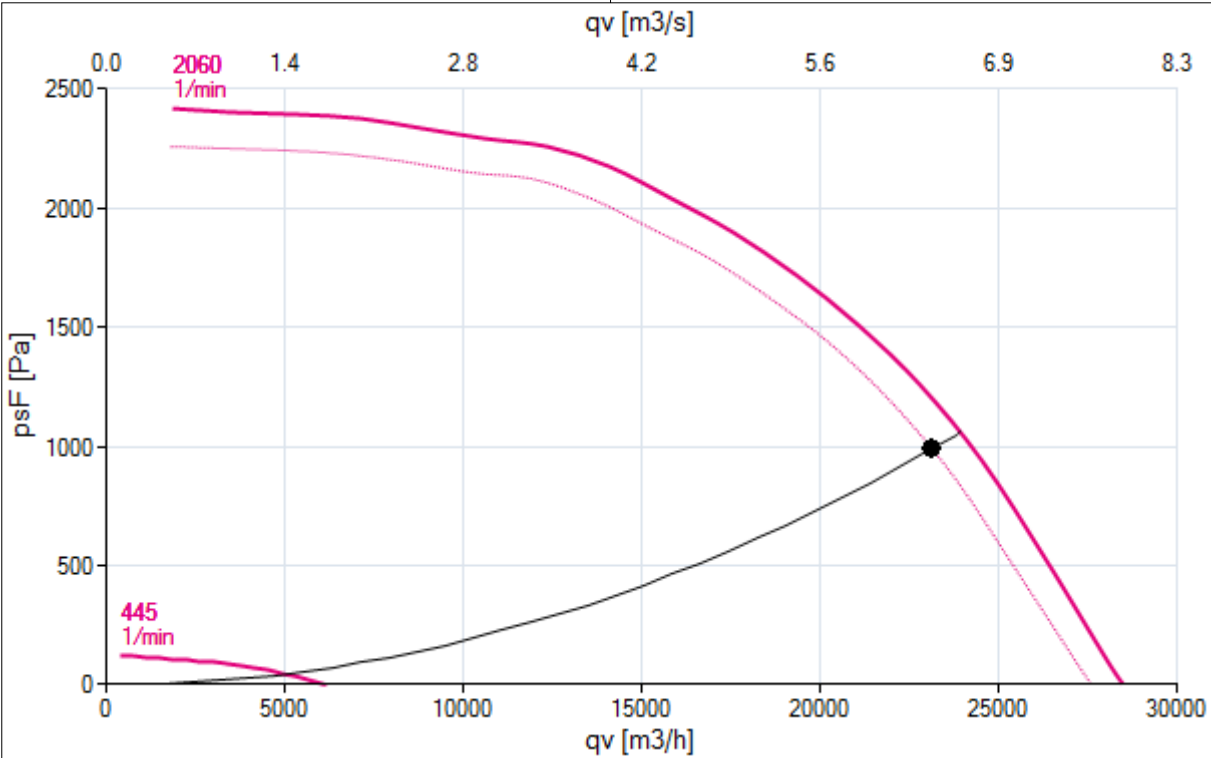
|                                                                                  |                   |              |                   |
|----------------------------------------------------------------------------------|-------------------|--------------|-------------------|
|  | проект            | проверка дат | 24.11.2023        |
|                                                                                  | Ссылка на бло     | Дизайнер     | Mikhail Shishulin |
|                                                                                  | Воздушный поток [ | модель       | FLNG 60x80        |

|                                        |  |                             |                   |                          |                      |   |
|----------------------------------------|--|-----------------------------|-------------------|--------------------------|----------------------|---|
| Mixing Section                         |  | приточн. воз                | Длина секции [мм] | 2 142,0                  | потери давления [Па] | 9 |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
| Ревизионная панель с поворотным болтом |  |                             | Размеры GxY [мм]  | 918,0 x 1 896,0          |                      |   |
| Ревизионная панель с поворотным болтом |  |                             | Размеры GxY [мм]  | 918,0 x 1 896,0          |                      |   |
| <u>клапан:</u>                         |  |                             | размеры [мм]      | 2 034,0 x 1 910,0 x 125, |                      |   |
| привод. в действие поготов к приводу   |  | расход воздуха [м/ч]        | 46 340            | рама                     | алюминий             |   |
| кол. уровней                           |  | 1 скорость воздуха [м/с]    | 3,31              | лопасти                  | алюминий             |   |
| крутящий момент [Nm]                   |  | 20,000 потери давления [Па] | 9                 | воздушная изол           | стандартный          |   |

|                                       |  |      |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
|---------------------------------------|--|------|------|--------------|------|-----------------------------------|------|-------------------|--|--|--|---------------------------------------|--|--|--|----------------------|--|---------------------------|--|-----|--|--|--|
| безулиточный вентилятор               |  |      |      | приточн. воз |      |                                   |      | Длина секции [мм] |  |  |  | 2 009,0                               |  |  |  | потери давления [Па] |  |                           |  | 311 |  |  |  |
| Данные вент                           |  |      |      |              |      |                                   |      |                   |  |  |  | Характеристи                          |  |  |  |                      |  |                           |  |     |  |  |  |
| расход воздуха [м/ч]                  |  |      |      |              |      | 46 340                            |      |                   |  |  |  |                                       |  |  |  |                      |  | 1xRun 1xStandBy           |  |     |  |  |  |
| тип                                   |  |      |      |              |      | Plug                              |      |                   |  |  |  | Fan Arrangement                       |  |  |  |                      |  |                           |  |     |  |  |  |
| Поставщик / Модель / Количество в ШхВ |  |      |      |              |      | ZA-RH63C.CR/SM25-B42-367274 / 2x1 |      |                   |  |  |  | Модель, Бренд                         |  |  |  |                      |  | стандартный               |  |     |  |  |  |
|                                       |  |      |      |              |      |                                   |      |                   |  |  |  | Модель / Количество в ШхВ             |  |  |  |                      |  | Std-IE3-50-160-4-15 / 2x1 |  |     |  |  |  |
| Падение внут. Стат. Дав. [Па]         |  |      |      |              |      | 532                               |      |                   |  |  |  | Номинальная мощность [кВт]            |  |  |  |                      |  | 15,000 x (2x1)            |  |     |  |  |  |
| Падение внеш. Стат. Дав. [Па]         |  |      |      |              |      | 450                               |      |                   |  |  |  | ном. частота вращения (RPM) [1/min]   |  |  |  |                      |  | 1 466                     |  |     |  |  |  |
| Падение дав. в уст. вент. [Па]        |  |      |      |              |      |                                   |      |                   |  |  |  | Фаза / Напряжение / Частота           |  |  |  |                      |  | 3x400 V / 50 Hz           |  |     |  |  |  |
| Total Static Pressure Drop [Па]       |  |      |      |              |      | 982                               |      |                   |  |  |  | Класс производительности              |  |  |  |                      |  | IE3                       |  |     |  |  |  |
| Динамическое Дав. Вен. [Па]           |  |      |      |              |      | 176                               |      |                   |  |  |  | КПД двигателя при полной нагрузке [%] |  |  |  |                      |  | 92,1                      |  |     |  |  |  |
| Общее давление вентилятора [Па]       |  |      |      |              |      | 1 158                             |      |                   |  |  |  | Номинальный Ток [А]                   |  |  |  |                      |  | 28,30                     |  |     |  |  |  |
| Frequency Operation / Max [Hz]        |  |      |      |              |      | 67,4 / 70                         |      |                   |  |  |  | Класс защиты / изоляции и темпера     |  |  |  |                      |  | IP55/ F                   |  |     |  |  |  |
| об/мин Вен. / Макс. [1/min]           |  |      |      |              |      | 1 982 / 2 060                     |      |                   |  |  |  | Взрывобезоп. Мот. (да / нет)          |  |  |  |                      |  | Нет                       |  |     |  |  |  |
| Мощность на валу [кВт]                |  |      |      |              |      | 10,020                            |      |                   |  |  |  | Общ. потр. Мощ., иск. ВСД [кВт]       |  |  |  |                      |  | 21,7581                   |  |     |  |  |  |
| Impeller Efficiency Static/Total [%]  |  |      |      |              |      | 63,1 / 74,3                       |      |                   |  |  |  | Общ. потр. Мощ., вкл. ВСД [кВт]       |  |  |  |                      |  | 22,431                    |  |     |  |  |  |
| Общая производительность [%]          |  |      |      |              |      | 70,7                              |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| К-фактор (ρ = 1,2 кг / м3)            |  |      |      |              |      | 381                               |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| Уровень Звук.Мощ. вход/выход          |  |      |      |              |      | 91,7 / 97,4 db(A)                 |      |                   |  |  |  | Информация о AV изо                   |  |  |  |                      |  | Spring AV Isolator        |  |     |  |  |  |
| Искробезоп. Вен. (да / нет)           |  |      |      |              |      | Нет                               |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| Звук. мощн. вентил-ра по окт.част.    |  |      |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| октав. часто                          |  | 125  | 250  | 500          | 1000 | 2000                              | 4000 | 8000              |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| входной                               |  | 83,0 | 92,0 | 83,0         | 83,0 | 82,0                              | 86,0 | 85,0              |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| выход                                 |  | 86,0 | 94,0 | 94,0         | 92,0 | 88,0                              | 90,0 | 86,0              |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
|                                       |  |      |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| ур. звук. мощности [dB (A             |  | 97,3 |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| звук. мощность [dB]                   |  | 99,6 |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |



|                                       |  |      |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
|---------------------------------------|--|------|------|--------------|------|-----------------------------------|------|-------------------|--|--|--|---------------------------------------|--|--|--|----------------------|--|---------------------------|--|-----|--|--|--|
| безулиточный вентилятор               |  |      |      | приточн. воз |      |                                   |      | Длина секции [мм] |  |  |  | 2 009,0                               |  |  |  | потери давления [Па] |  |                           |  | 311 |  |  |  |
| Данные вент                           |  |      |      |              |      |                                   |      |                   |  |  |  | Характеристи                          |  |  |  |                      |  |                           |  |     |  |  |  |
| расход воздуха [м/ч]                  |  |      |      |              |      | 46 340                            |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| тип                                   |  |      |      |              |      | Plug                              |      |                   |  |  |  | Fan Arrangement                       |  |  |  |                      |  | 1xRun 1xStandBy           |  |     |  |  |  |
| Поставщик / Модель / Количество в ШхВ |  |      |      |              |      | ZA-RH63C.CR/SM25-B42-367274 / 2x1 |      |                   |  |  |  | Модель, Бренд                         |  |  |  |                      |  | стандартный               |  |     |  |  |  |
|                                       |  |      |      |              |      |                                   |      |                   |  |  |  | Модель / Количество в ШхВ             |  |  |  |                      |  | Std-IE3-50-160-4-15 / 2x1 |  |     |  |  |  |
| Падение внут. Стат. Дав. [Па]         |  |      |      |              |      | 311                               |      |                   |  |  |  | Номинальная мощность [кВт]            |  |  |  |                      |  | 15,000 x (2x1)            |  |     |  |  |  |
| Падение внеш. Стат. Дав. [Па]         |  |      |      |              |      | 680                               |      |                   |  |  |  | ном. частота вращения (RPM) [1/min]   |  |  |  |                      |  | 1 466                     |  |     |  |  |  |
| Падение дав. в уст. вент. [Па]        |  |      |      |              |      |                                   |      |                   |  |  |  | Фаза / Напряжение / Частота           |  |  |  |                      |  | 3x400 V / 50 Hz           |  |     |  |  |  |
| Total Static Pressure Drop [Па]       |  |      |      |              |      | 991                               |      |                   |  |  |  | Класс производительности              |  |  |  |                      |  | IE3                       |  |     |  |  |  |
| Динамическое Дав. Вен. [Па]           |  |      |      |              |      | 176                               |      |                   |  |  |  | КПД двигателя при полной нагрузке [%] |  |  |  |                      |  | 92,1                      |  |     |  |  |  |
| Общее давление вентилятора [Па]       |  |      |      |              |      | 1 167                             |      |                   |  |  |  | Номинальный Ток [А]                   |  |  |  |                      |  | 28,30                     |  |     |  |  |  |
| Frequency Operation / Max [Hz]        |  |      |      |              |      | 67,5 / 70                         |      |                   |  |  |  | Класс защиты / изоляции и темпера     |  |  |  |                      |  | IP55/ F                   |  |     |  |  |  |
| об/мин Вен. / Макс. [1/min]           |  |      |      |              |      | 1 984 / 2 060                     |      |                   |  |  |  | Взрывобезоп. Мот. (да / нет)          |  |  |  |                      |  | Нет                       |  |     |  |  |  |
| Мощность на валу [кВт]                |  |      |      |              |      | 10,080                            |      |                   |  |  |  | Общ. потр. Мощ., иск. ВСД [кВт]       |  |  |  |                      |  | 21,8881                   |  |     |  |  |  |
| Impeller Efficiency Static/Total [%]  |  |      |      |              |      | 63,3 / 74,5                       |      |                   |  |  |  | Общ. потр. Мощ., вкл. ВСД [кВт]       |  |  |  |                      |  | 22,565                    |  |     |  |  |  |
| Общая производительность [%]          |  |      |      |              |      | 70,7                              |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| К-фактор (ρ = 1,2 кг / м3)            |  |      |      |              |      | 381                               |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| Уровень Звук.Мощ. вход/выход          |  |      |      |              |      | 91,7 / 97,4 db(A)                 |      |                   |  |  |  | Информация о AV изо                   |  |  |  |                      |  | Spring AV Isolator        |  |     |  |  |  |
| Искробезоп. Вен. (да / нет)           |  |      |      |              |      | Нет                               |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| Звук. мощн. вентил-ра по окт.част.    |  |      |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| октав. часто                          |  | 125  | 250  | 500          | 1000 | 2000                              | 4000 | 8000              |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| входной                               |  | 83,0 | 92,0 | 83,0         | 83,0 | 82,0                              | 86,0 | 85,0              |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| выход                                 |  | 86,0 | 94,0 | 94,0         | 92,0 | 88,0                              | 90,0 | 86,0              |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
|                                       |  |      |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| ур. звук. мощности [dB (A             |  | 97,3 |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| звук. мощность [dB]                   |  | 99,6 |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |



|                                        |                  |                 |
|----------------------------------------|------------------|-----------------|
| Ревизионная панель с поворотным болтом | Размеры GxY [мм] | 459,0 x 1 896,0 |
| Дверь с шарниром и рычажным замком     | Размеры GxY [мм] | 459,0 x 1 896,0 |



|                                                                                  |                 |              |                   |
|----------------------------------------------------------------------------------|-----------------|--------------|-------------------|
|  | проект          | проверка дат | 24.11.2023        |
|                                                                                  | Ссылка на бло   | Дизайнер     | Mikhail Shishulin |
|                                                                                  | Воздушный поток | модель       | FLNG 60x80        |
| A17 P1                                                                           |                 |              |                   |
| 46 340                                                                           |                 |              |                   |

|                                     |                      |                        |              |                  |                          |                           |
|-------------------------------------|----------------------|------------------------|--------------|------------------|--------------------------|---------------------------|
| <u>клапан:</u>                      |                      |                        | размеры [мм] |                  | 2 034,0 x 1 710,0 x 125, |                           |
| привод. в действие пготов к приводу | расход воздуха [м/ч] | 46 340                 | рама         | алюминий         |                          |                           |
| кол. уровней                        | 1                    | скорость воздуха [м/с] | 3,70         | лопасти          |                          |                           |
| крутящий момент [Nm]                | 20,000               | потери давления [Па]   | 11           | воздушная изол   |                          |                           |
|                                     |                      |                        | стандартный  |                  |                          |                           |
| <u>гибкая вставка</u>               |                      | Z275 Steel             | Temp. max    | 80,0             | размеры [мм]             | 2 034,0 x 1 710,0 x 140,0 |
| <u>фланец [мм]</u>                  |                      | 30,0                   |              |                  |                          |                           |
| <u>клапан:</u>                      |                      |                        | размеры [мм] |                  | 949,0 x 955,0 x 125,0    |                           |
| привод. в действие пготов к приводу | расход воздуха [м/ч] | 46 340                 | рама         | алюминий         |                          |                           |
| кол. уровней                        | 1                    | скорость воздуха [м/с] | 7,10         | лопасти          |                          |                           |
| крутящий момент [Nm]                | 10,000               | потери давления [Па]   | 300          | воздушная изол   |                          |                           |
|                                     |                      |                        | стандартный  |                  |                          |                           |
| <u>клапан:</u>                      |                      |                        | размеры [мм] |                  | 949,0 x 955,0 x 125,0    |                           |
| привод. в действие пготов к приводу | расход воздуха [м/ч] | 46 340                 | рама         | алюминий         |                          |                           |
| кол. уровней                        | 1                    | скорость воздуха [м/с] | 7,10         | лопасти          |                          |                           |
| крутящий момент [Nm]                | 10,000               | потери давления [Па]   | 300          | воздушная изол   |                          |                           |
|                                     |                      |                        | стандартный  |                  |                          |                           |
| <u>инспекц. окошко</u>              |                      | угловой                |              | Размеры GxY [мм] |                          | 212,0 x 212,0             |
| <u>освещение</u>                    |                      | Лампа - Стандартная    |              |                  |                          |                           |

|                                |      |      |      |      |      |      |      |               |                               |
|--------------------------------|------|------|------|------|------|------|------|---------------|-------------------------------|
| расчет шум. характеристик      |      |      |      |      |      |      |      |               |                               |
| мощность звука [dB]            |      |      |      |      |      |      |      |               |                               |
| частота Г                      | 125  | 250  | 500  | 1000 | 2000 | 4000 | 8000 | сумма [dB(A)] |                               |
| входной                        | 85,0 | 93,0 | 84,0 | 84,0 | 82,0 | 85,0 | 84,0 | 91,6          |                               |
| выход                          | 89,0 | 97,0 | 97,0 | 95,0 | 91,0 | 93,0 | 89,0 | 100,4         |                               |
| корпус                         | 71,0 | 71,0 | 65,0 | 62,0 | 58,0 | 57,0 | 45,0 | 68,7          |                               |
| ур. звук. давления [dB]        |      |      |      |      |      |      |      |               |                               |
| частота Г                      | 125  | 250  | 500  | 1000 | 2000 | 4000 | 8000 | сумма [dB(A)] | Точка измерения 3 m расстояни |
| корпус                         | 53,5 | 53,5 | 47,5 | 44,5 | 40,5 | 39,5 | 27,5 | 51,2          |                               |
| Допустимое отклонение +/- 3 dB |      |      |      |      |      |      |      |               |                               |

|                          |      |             |                           |               |     |
|--------------------------|------|-------------|---------------------------|---------------|-----|
| <u>базовая рама</u>      | BASE | материал    | Z275 Steel + Polyster Pai | изолированный | Нет |
| Отверстие для крана [мм] | 63,2 | высота [мм] | 150,0                     | паянный       | Нет |
| 1 устано крыша           |      |             |                           |               |     |
| 1 устано Crate           |      |             |                           |               |     |

|                            |         |         |         |          |     |
|----------------------------|---------|---------|---------|----------|-----|
| <u>поставляемые секции</u> | нет     | длина   | ширина  | высота   | вес |
| 1                          | 1 244,0 | 2 608,0 | 1 936,0 | 583,00   |     |
| 2                          | 2 142,0 | 2 608,0 | 1 936,0 | 502,00   |     |
| 3                          | 2 009,0 | 2 608,0 | 1 936,0 | 1 277,00 |     |

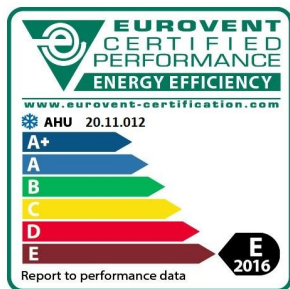
|                                                                                  |                          |              |                   |
|----------------------------------------------------------------------------------|--------------------------|--------------|-------------------|
|  | проект                   | проверка дат | 24.11.2023        |
|                                                                                  | Ссылка на бло            | Дизайнер     | Mikhail Shishulin |
|                                                                                  | Воздушный поток [ 46 340 | модель       | FLNG 60x80        |
| A17 P1R                                                                          |                          |              |                   |

|                                      |                      |                        |                  |                            |                           |              |
|--------------------------------------|----------------------|------------------------|------------------|----------------------------|---------------------------|--------------|
| <u>клапан:</u>                       |                      |                        | размеры [мм]     |                            | 2 034,0 x 1 710,0 x 125,  |              |
| привод. в действие поготов к приводу | расход воздуха [м/ч] | 46 340                 | рама             | алюминий                   |                           |              |
| кол. уровней                         | 1                    | скорость воздуха [м/с] | 3,70             | лопасти                    |                           |              |
| крутящий момент [Nm]                 | 20,000               | потери давления [Па]   | 11               | воздушная изол стандартный |                           |              |
| <u>гибкая вставка</u>                |                      |                        | Z275 Steel       | Temp. max                  | 80,0                      | размеры [мм] |
| фланец [мм]                          |                      |                        | 30,0             |                            | 2 034,0 x 1 710,0 x 140,0 |              |
| <u>клапан:</u>                       |                      |                        | размеры [мм]     |                            | 949,0 x 955,0 x 125,0     |              |
| привод. в действие поготов к приводу | расход воздуха [м/ч] | 46 340                 | рама             | алюминий                   |                           |              |
| кол. уровней                         | 1                    | скорость воздуха [м/с] | 7,10             | лопасти                    |                           |              |
| крутящий момент [Nm]                 | 10,000               | потери давления [Па]   | 300              | воздушная изол стандартный |                           |              |
| <u>клапан:</u>                       |                      |                        | размеры [мм]     |                            | 949,0 x 955,0 x 125,0     |              |
| привод. в действие поготов к приводу | расход воздуха [м/ч] | 46 340                 | рама             | алюминий                   |                           |              |
| кол. уровней                         | 1                    | скорость воздуха [м/с] | 7,10             | лопасти                    |                           |              |
| крутящий момент [Nm]                 | 10,000               | потери давления [Па]   | 300              | воздушная изол стандартный |                           |              |
| <u>инспекц. окошко</u>               | угловой              |                        | Размеры GxY [мм] |                            | 212,0 x 212,0             |              |
| <u>освещение</u>                     | Лампа - Стандартная  |                        |                  |                            |                           |              |

|                                |      |      |      |      |      |      |      |               |                               |
|--------------------------------|------|------|------|------|------|------|------|---------------|-------------------------------|
| расчет шум. характеристик      |      |      |      |      |      |      |      |               |                               |
| мощность звука [dB]            |      |      |      |      |      |      |      |               |                               |
| частота Г                      | 125  | 250  | 500  | 1000 | 2000 | 4000 | 8000 | сумма [dB(A)] |                               |
| входной                        | 86,0 | 95,0 | 86,0 | 86,0 | 85,0 | 89,0 | 88,0 | 94,7          |                               |
| выход                          | 89,0 | 97,0 | 97,0 | 95,0 | 91,0 | 93,0 | 89,0 | 100,4         |                               |
| корпус                         | 71,0 | 71,0 | 65,0 | 62,0 | 58,0 | 57,0 | 45,0 | 68,7          |                               |
| ур. звук. давления [dB]        |      |      |      |      |      |      |      |               |                               |
| частота Г                      | 125  | 250  | 500  | 1000 | 2000 | 4000 | 8000 | сумма [dB(A)] | Точка измерения 3 m расстояни |
| корпус                         | 53,5 | 53,5 | 47,5 | 44,5 | 40,5 | 39,5 | 27,5 | 51,2          |                               |
| Допустимое отклонение +/- 3 dB |      |      |      |      |      |      |      |               |                               |

|                            |       |         |         |         |          |
|----------------------------|-------|---------|---------|---------|----------|
| 1 устано                   | крыша |         |         |         |          |
| 1 устано                   | Crate |         |         |         |          |
| <u>поставляемые секции</u> |       |         |         |         |          |
|                            | нет   | длина   | ширина  | высота  | вес      |
|                            | 1     | 2 162,0 | 2 608,0 | 1 936,0 | 495,00   |
|                            | 2     | 2 009,0 | 2 608,0 | 1 936,0 | 1 184,00 |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                             |                                                                                               |                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Ассортимент прод<br>серия<br>конструкция агрегата<br>тип агрегата                                                                                                                                                                                                                                                                                                                                                                                                | <b>FLEXLINE</b><br><b>FLNG</b><br><b>приточный агрегат</b><br><b>агрегат наружной установки</b>                                                                                                                                                                             | Контроль Экодизайна 2016 / 2018<br>Удельная мощность вентилятора [W/(m3/s)]<br>общий вес [кг] | <b>да</b> / <b>Нет</b><br><b>1 537</b><br><b>~2 110</b> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>приточный</b>                                                                                                                                                                                                                                                            |                                                                                               |                                                         |
| расход воздуха<br>модель<br>Внешнее Статическое Давление<br>Fan Model / Qty.<br>Fan Motor Power / Nominal Rpm<br>Подключение к сети<br>Cross Section Velocity<br>Coil Cross Section Velocity<br>Heat Recovery Capacity (Winter)<br>Heat Recovery Temp. Eff. (EN308)<br>Heat Recovery Humidity Eff. (EN308)<br>холодопроизво-сть<br>теплов. мощность при нагреве<br>Total Dimensions (H/W/L)<br>Расчетная зимняя температура наружн<br>Плотность воздуха / Высота | 36 500 [м/ч]<br>FLNG 50x80<br>450 [Па]<br>RH63C.CR/SM25-B42 / 2x1<br>11 [kW] (2x1) / 1466 [1/min]<br>3 ph / 400 V / 50 Hz<br>2,64 [м/с]<br>3.05 [м/с]<br>- [кВт]<br>[%]<br>- [%]<br>- [кВт]<br>538.52 [кВт]<br>1760 / 2608 / 5341 [мм]<br>-24,00 [C]<br>1,20 [kg/m] / 0 [m] |                                                                                               |                                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                             | Dampers Freeze Protection                                                                     | Dampers With Trace Heating                              |

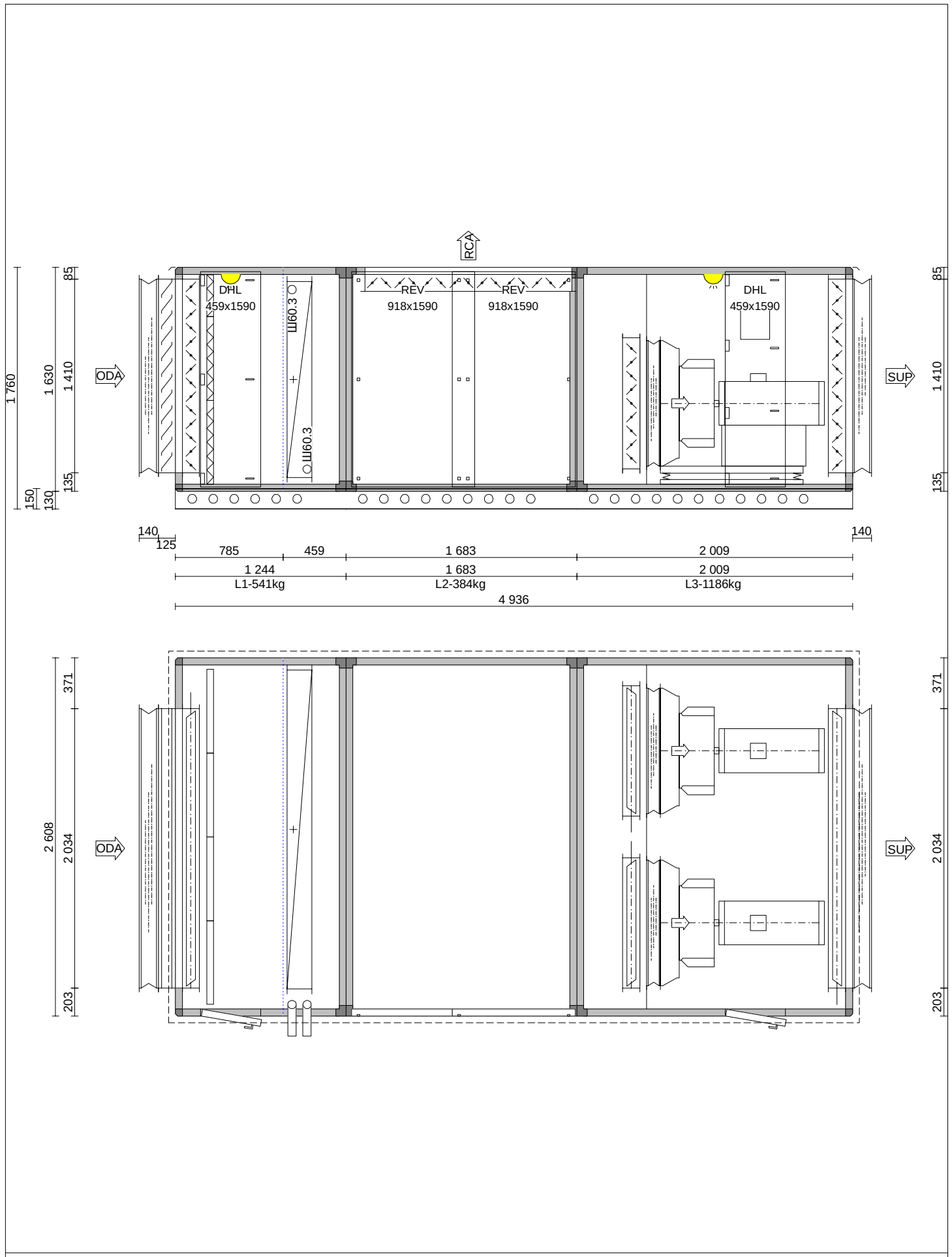
**Класс энергоэффективности**

**Mechanical Characteristics (EN1886)**

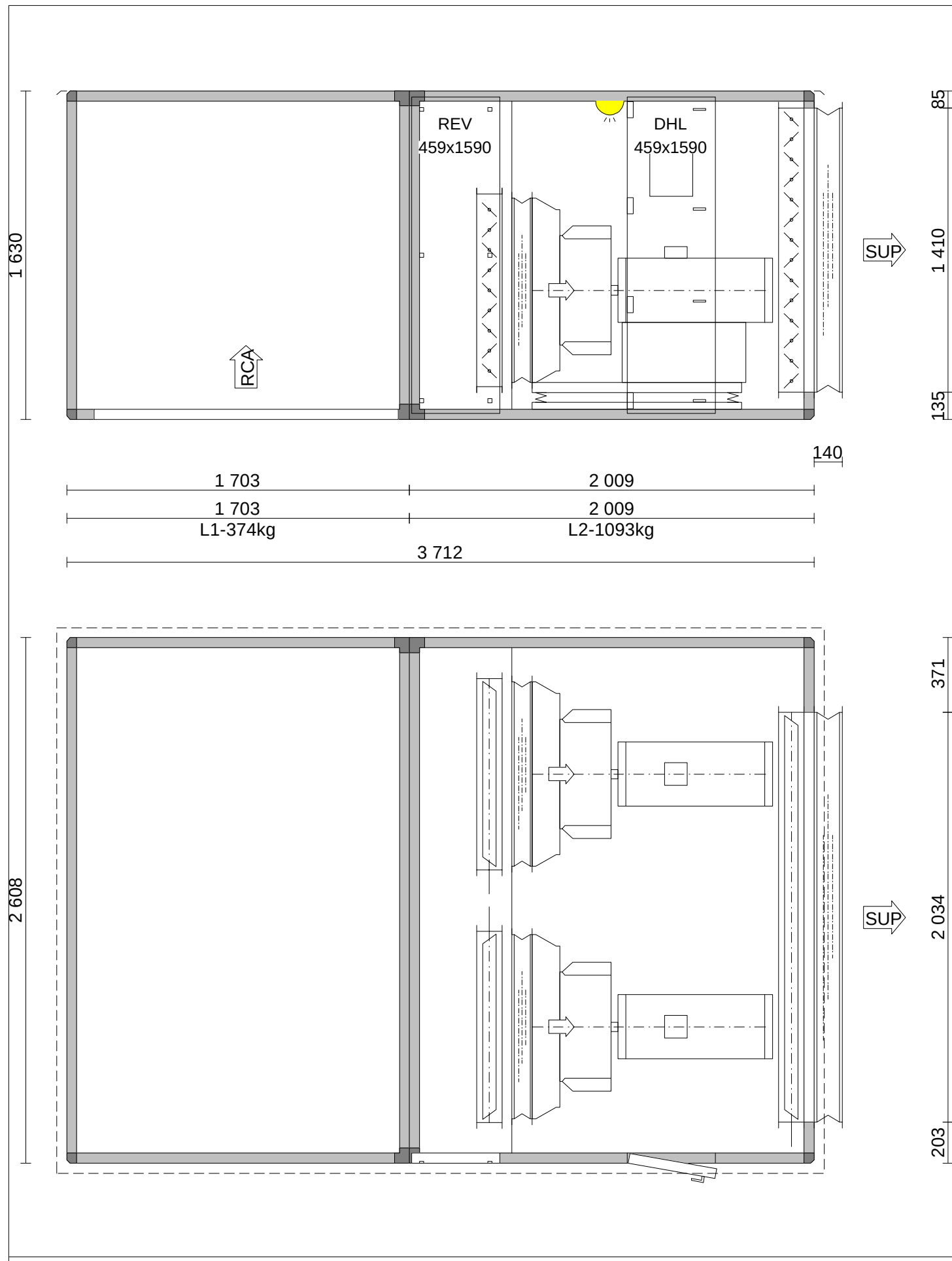
|                           |               |
|---------------------------|---------------|
| Прочность корпуса         | <b>D1(M)</b>  |
| Коэффициент теплопередачи | <b>T2(M)</b>  |
| Тепловой мост             | <b>TB2(M)</b> |
| Фильтр утечки байпаса     | <b>F9</b>     |
| Утечка воздуха в корпусе  | <b>L1(M)</b>  |

| Casing / Frame             |                                                                                                                                                   |                                                                                                                                                                                              |  |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                            |                                                                                                                                                   | <b>Supply Side</b>                                                                                                                                                                           |  |
| п<br>а<br>н<br>е<br>л<br>ь | толщина<br>Тип изоляции / Плотность<br>External Sheet Metal<br>Internal Sheet Metal<br>Изоляция базовой панели<br>Base Panel Internal Sheet Metal | 50,0 [мм]<br>Каменная вата 70кг/м3<br>Z275 Steel + Polyester Painted (0,80mm)<br>Z275 Steel + Polyester Painted (0,80mm)<br>Каменная вата 70кг/м3<br>Z275 Steel + Polyester Painted (0,80mm) |  |
|                            | Frame Type                                                                                                                                        | Z275 + Epoxy Primer Polyester Painted Steel                                                                                                                                                  |  |
|                            | Model Box: FL NG                                                                                                                                  |                                                                                                                                                                                              |  |

| Экодизайн - Контроль                   |           |                    |               |           |                    |               |
|----------------------------------------|-----------|--------------------|---------------|-----------|--------------------|---------------|
| Non-Residential Ventilation Unit, _UVU | 2016      |                    |               | 2018      |                    |               |
|                                        | проверять | значение           | Предел        | проверять | значение           | Предел        |
| Вентилятор с приводом с регулиру       | предупре  | Intended to be use | Обязательн    | предупре  | Intended to be use | Обязательн    |
| Манометр для фильтров                  | Одобрено  | никакой            | Не требуется  | Неудачно  | никакой            | Обязательн    |
| Внутр. Удельная мощн. W/(m/s)          | Одобрено  | 157 [W/(m/s)]      | 250 [W/(m/s)] | Одобрено  | 157 [W/(m/s)]      | 230 [W/(m/s)] |
| Эффективность статической систе        | Одобрено  | 62,43              | 52,2          | Одобрено  | 62,43              | 59,2          |
|                                        |           |                    |               |           |                    |               |
| Тотальный контроль                     | Одобрено  |                    |               | Неудачно  |                    |               |

| Экодизайн - Технические данные                                 |                                                       |             |
|----------------------------------------------------------------|-------------------------------------------------------|-------------|
| Производитель                                                  | Головной офис.                                        |             |
| Типология                                                      | NRVU, _UVU                                            |             |
| модель                                                         | FLNG 50x80                                            | -           |
| Type of Heat Recovery System                                   | никакой                                               |             |
| Тепловая эффективность системы рекуперации тепла (EN 308)      | - [%]                                                 |             |
| Максимальная внутренняя утечка (± 250 Па, EN 308)              | -                                                     |             |
| Максимальная внешняя утечка                                    | Leakage Class Rate 1,6% at +400Pa and 1,25% at -400Pa |             |
|                                                                | приточный                                             | вытяжк      |
| расход воздуха                                                 | 36 500 [м/ч]                                          | -           |
| Face Velocity at Design Flow Rate                              | 2,64 [м/с]                                            | -           |
| Мощность двигателя для энерг. класса, включая VSD              | 16,061 [кВт]                                          | -           |
|                                                                |                                                       |             |
| Статическая эффективность вентилятора (1253/2014)              | 62,43 [%]                                             | 0 [%]       |
| Эффективность статической системы (1253/2014)                  | 62,43 [%]                                             | -           |
| Энергетический класс для фильтров                              | Нет классификации                                     |             |
| Падение внут. Стат. давления компонентов вентиляции            | 98 [Па]                                               | -           |
| Падение полного статического давления в расчетных условиях     | 989 [Па]                                              | 0 [Па]      |
| Падение внеш. Стат. Дав.                                       | 450 [Па]                                              | 0           |
|                                                                |                                                       |             |
| SFPint, Внутр. Удель. Мощ. Вен. в Экодизайн Реф. Конфиг.       | 157 [W/(m/s)]                                         | 0 [W/(m/s)] |
| SFPint Общ, Общ. Внутр. Удель. Мощ. Вен. в Экодизайн Реф. Конф | 157 [W/(m/s)]                                         |             |
| Удельная мощность вентилятора, 2016 предельное знач.           | 250 [W/(m/s)]                                         |             |
| Удельная мощность вентилятора, 2018 предельное знач.           | 230 [W/(m/s)]                                         |             |





|                                                                                  |                          |              |            |                   |
|----------------------------------------------------------------------------------|--------------------------|--------------|------------|-------------------|
|  | проект                   | проверка дат | 24.11.2023 |                   |
|                                                                                  | Ссылка на бло            | A17 P2       | Дизайнер   | Mikhail Shishulin |
|                                                                                  | Воздушный поток [ 36 500 | модель       | FLNG 50x80 |                   |

|                                                           |                                    |                   |                                    |                           |             |
|-----------------------------------------------------------|------------------------------------|-------------------|------------------------------------|---------------------------|-------------|
| фильтр                                                    | приточн. воз                       | Длина секции [мм] | 785,0                              | потери давления [Па]      | 175         |
| тип                                                       | панельный фильтр                   |                   |                                    |                           |             |
| установка                                                 | со стороны - выдвижной             |                   | поверх. фильтра [                  | 5,96                      |             |
| Класс производительности (EN 779)                         | G4                                 |                   | Размер и количество<br>WxHxD & pcs | 592,0 x 592,0 x 48,0      | 8           |
| Первый dP [Па]                                            | 98                                 |                   |                                    | 287,0 x 592,0 x 48,0      | 4           |
| Средний dP                                                | 123                                |                   |                                    |                           |             |
| последний dP [Па]                                         | 148                                |                   |                                    |                           |             |
| Класс ISO 16890                                           | Грубый %60                         |                   |                                    |                           |             |
| Скорость секции фильтра [м/с]                             | 2,91                               |                   |                                    |                           |             |
| Класс энергии фильтра                                     | Нет классификации                  |                   |                                    |                           |             |
| Дверь с шарниром и рычажным замком                        |                                    |                   | Размеры GxY [мм]                   | 459,0 x 1 590,0           |             |
| <u>клапан:</u>                                            |                                    |                   | размеры [мм]                       | 1 410,0 x 2 034,0 x 125,  |             |
| привод. в действие поготов к приводу расход воздуха [м/ч] |                                    |                   | 36 500                             | рама                      | алюминий    |
| кол. уровней 1 скорость воздуха [м/с]                     |                                    |                   | 3,54                               | лопасти                   | алюминий    |
| крутящий момент [Nm] 10,000 потери давления [Па]          |                                    |                   | 10                                 | воздушная изол            | стандартный |
| <u>жалюзи защитные от погоды</u>                          |                                    |                   | размеры [мм]                       | 1 410,0 x 2 034,0 x 125,0 |             |
| тип WL                                                    | материал Z275 Steel + Polyster Pai |                   |                                    |                           |             |
| <u>гибкая вставка</u>                                     |                                    |                   | размеры [мм]                       | 1 410,0 x 2 034,0 x 140,0 |             |
| фланец [мм] 30,0                                          |                                    |                   |                                    |                           |             |
| <u>освещение</u>                                          |                                    |                   | Лампа - Стандартная                |                           |             |

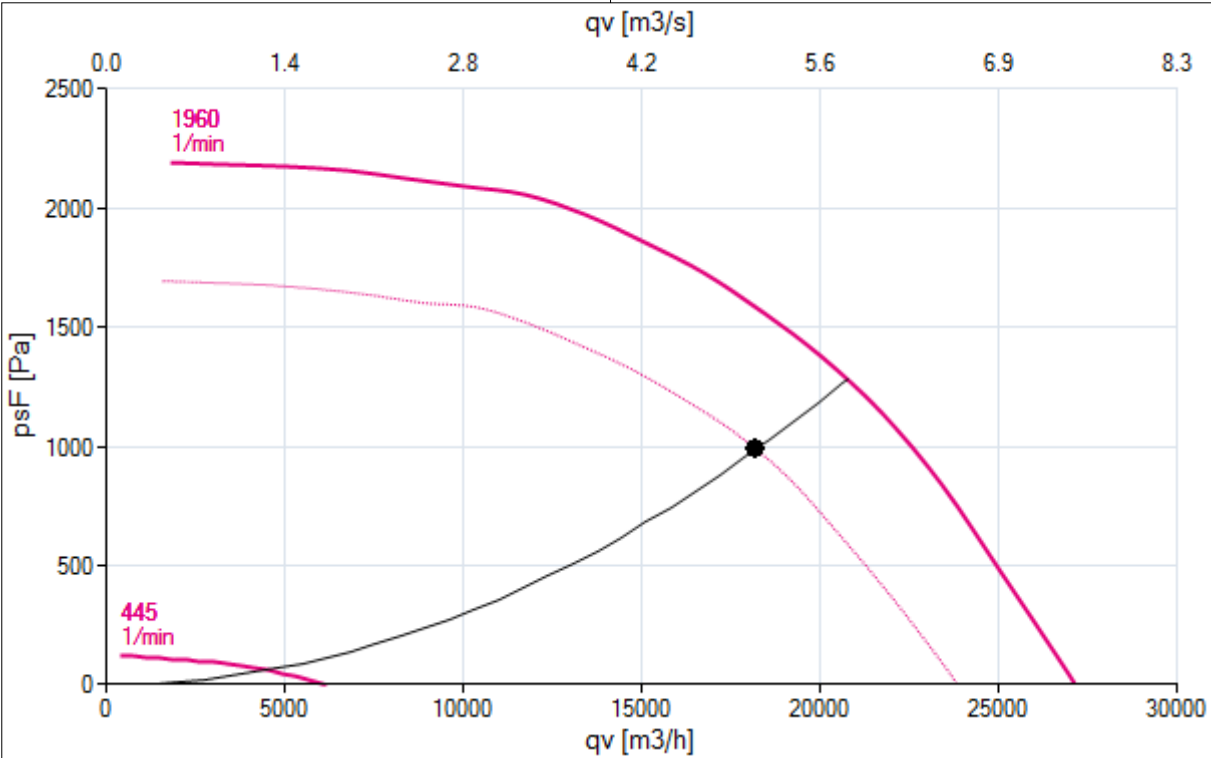
|                                                           |              |              |                   |                       |                      |    |
|-----------------------------------------------------------|--------------|--------------|-------------------|-----------------------|----------------------|----|
| т/о нагреватель                                           | приточн. воз |              | Длина секции [мм] | 459,0                 | потери давления [Па] | 45 |
| Воздушная с                                               |              |              | Жидкая стор       |                       |                      |    |
| Поток [м/ч]                                               | 36 500       |              | Жидкость          | Вода                  |                      |    |
| Скорость на катушке [м/с]                                 | 3,05         |              | Поток [л/с]       | 2,9990                |                      |    |
| Вход DB [C]                                               | -24,00       | Вход RH [%]  | 84,0              | скорость [м/с]        | 1,29                 |    |
| Выход DB [C]                                              | 20,00        | Выход RH [%] | 2,5               | Вход жидкости [C]     | 115,00               |    |
| производительность [кВт]                                  | 538,52       |              |                   | Выход жидкости [C]    | 70,00                |    |
| потери давления [Па]                                      | 45           |              |                   | потери давления [кПа] | 24,04                |    |
| Код катушки F 32x28-12 C S 45T 2R 2325A 3P 21NC (.12/.32) |              |              | материалы:        |                       |                      |    |
| Порядковый номер                                          | 2            |              | ребра             | алюминий (0,120 mm)   |                      |    |
| Схема №                                                   | 21           |              | трубы             | медная (0,320 mm)     |                      |    |
| шаг ребер [мм]                                            | 3,00         |              | коллектор         | стальная окрашенная   |                      |    |
| Площадь с крылом [m]                                      | 113,91       |              | рамы              | Z275 Steel            |                      |    |
| Внутренний объем [lt]                                     | 30,410       |              | защита ребер      | -                     |                      |    |
| Шланг №                                                   | 45           |              |                   |                       |                      |    |
| Ширина с крылом [мм]                                      | 2 325,0      |              |                   |                       |                      |    |
| Вход Подключени                                           | 2 0/0"       |              |                   |                       |                      |    |
| Выход подключения                                         | 2 0/0"       |              |                   |                       |                      |    |



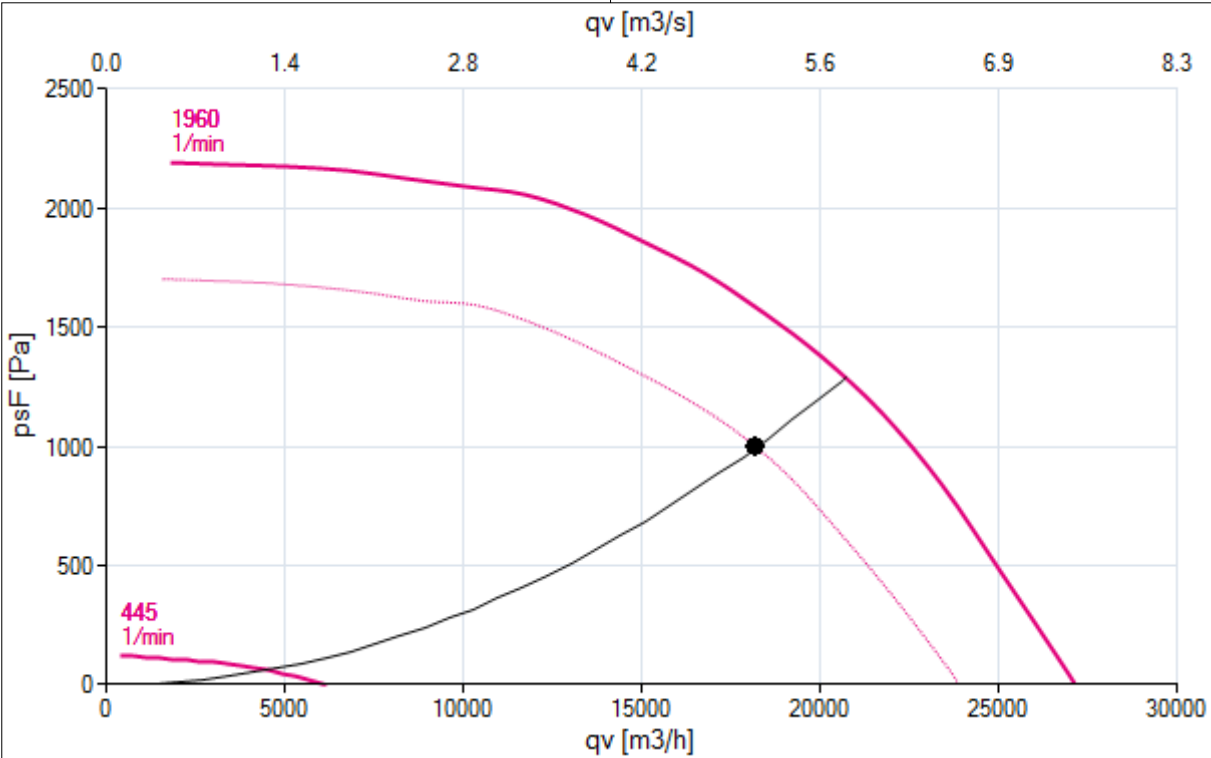
|                                                                                  |                          |              |                   |
|----------------------------------------------------------------------------------|--------------------------|--------------|-------------------|
|  | проект                   | проверка дат | 24.11.2023        |
|                                                                                  | Ссылка на бло            | Дизайнер     | Mikhail Shishulin |
|                                                                                  | Воздушный поток [ 36 500 | модель       | FLNG 50x80        |
|                                                                                  |                          |              |                   |

|                                        |  |                             |                   |                          |                      |   |
|----------------------------------------|--|-----------------------------|-------------------|--------------------------|----------------------|---|
| Mixing Section                         |  | приточн. воз                | Длина секции [мм] | 1 683,0                  | потери давления [Па] | 9 |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
|                                        |  |                             |                   |                          |                      |   |
| Ревизионная панель с поворотным болтом |  | Размеры GxY [мм]            |                   | 918,0 x 1 590,0          |                      |   |
| Ревизионная панель с поворотным болтом |  | Размеры GxY [мм]            |                   | 918,0 x 1 590,0          |                      |   |
| <u>клапан:</u>                         |  | размеры [мм]                |                   | 2 034,0 x 1 510,0 x 125, |                      |   |
| привод. в действие поготов к приводу   |  | расход воздуха [м/ч]        | 36 500            | рама                     | алюминий             |   |
| кол. уровней                           |  | 1 скорость воздуха [м/с]    | 3,30              | лопасти                  | алюминий             |   |
| крутящий момент [Nm]                   |  | 20,000 потери давления [Па] | 9                 | воздушная изол           | стандартный          |   |

|                                       |  |      |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
|---------------------------------------|--|------|------|--------------|------|-----------------------------------|------|-------------------|--|--|--|---------------------------------------|--|--|--|----------------------|--|---------------------------|--|-----|--|--|--|
| Безулиточный вентилятор               |  |      |      | приточн. воз |      |                                   |      | Длина секции [мм] |  |  |  | 2 009,0                               |  |  |  | потери давления [Па] |  |                           |  | 310 |  |  |  |
| Данные вент                           |  |      |      |              |      |                                   |      |                   |  |  |  | Характеристи                          |  |  |  |                      |  |                           |  |     |  |  |  |
| расход воздуха [м/ч]                  |  |      |      |              |      | 36 500                            |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| тип                                   |  |      |      |              |      | Plug                              |      |                   |  |  |  | Fan Arrangement                       |  |  |  |                      |  | 1xRun 1xStandBy           |  |     |  |  |  |
| Поставщик / Модель / Количество в ШхВ |  |      |      |              |      | ZA-RH63C.CR/SM25-B42-367274 / 2x1 |      |                   |  |  |  | Модель, Бренд                         |  |  |  |                      |  | стандартный               |  |     |  |  |  |
|                                       |  |      |      |              |      |                                   |      |                   |  |  |  | Модель / Количество в ШхВ             |  |  |  |                      |  | Std-IE3-50-160-4-11 / 2x1 |  |     |  |  |  |
| Падение внут. Стат. Дав. [Па]         |  |      |      |              |      | 539                               |      |                   |  |  |  | Номинальная мощность [кВт]            |  |  |  |                      |  | 11,000 x (2x1)            |  |     |  |  |  |
| Падение внеш. Стат. Дав. [Па]         |  |      |      |              |      | 450                               |      |                   |  |  |  | ном. частота вращения (RPM) [1/min]   |  |  |  |                      |  | 1 466                     |  |     |  |  |  |
| Падение дав. в уст. вент. [Па]        |  |      |      |              |      |                                   |      |                   |  |  |  | Фаза / Напряжение / Частота           |  |  |  |                      |  | 3x400 V / 50 Hz           |  |     |  |  |  |
| Total Static Pressure Drop [Па]       |  |      |      |              |      | 989                               |      |                   |  |  |  | Класс производительности              |  |  |  |                      |  | IE3                       |  |     |  |  |  |
| Динамическое Дав. Вен. [Па]           |  |      |      |              |      | 109                               |      |                   |  |  |  | КПД двигателя при полной нагрузке [%] |  |  |  |                      |  | 91,4                      |  |     |  |  |  |
| Общее давление вентилятора [Па]       |  |      |      |              |      | 1 098                             |      |                   |  |  |  | Номинальный Ток [А]                   |  |  |  |                      |  | 21,20                     |  |     |  |  |  |
| Frequency Operation / Max [Hz]        |  |      |      |              |      | 58,5 / 67                         |      |                   |  |  |  | Класс защиты / изоляции и темпера     |  |  |  |                      |  | IP55/ F                   |  |     |  |  |  |
| об/мин Вен. / Макс. [1/min]           |  |      |      |              |      | 1 715 / 1 960                     |      |                   |  |  |  | Взрывобезоп. Мот. (да / нет)          |  |  |  |                      |  | Нет                       |  |     |  |  |  |
| Мощность на валу [кВт]                |  |      |      |              |      | 7,120                             |      |                   |  |  |  | Общ. потр. Мощ., иск. ВСД [кВт]       |  |  |  |                      |  | 15,5792                   |  |     |  |  |  |
| Impeller Efficiency Static/Total [%]  |  |      |      |              |      | 70,4 / 78,1                       |      |                   |  |  |  | Общ. потр. Мощ., вкл. ВСД [кВт]       |  |  |  |                      |  | 16,061                    |  |     |  |  |  |
| Общая производительность [%]          |  |      |      |              |      | 70,2                              |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| К-фактор (ρ = 1,2 кг / м3)            |  |      |      |              |      | 381                               |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| Уровень Звук.Мощ. вход/выход          |  |      |      |              |      | 85,2 / 91,1 db(A)                 |      |                   |  |  |  | Информация о AV изо                   |  |  |  |                      |  | Spring AV Isolator        |  |     |  |  |  |
| Искробезоп. Вен. (да / нет)           |  |      |      |              |      | Нет                               |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| Звук. мощн. вентил-ра по окт.част.    |  |      |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| октав. часто                          |  | 125  | 250  | 500          | 1000 | 2000                              | 4000 | 8000              |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| входной                               |  | 79,0 | 85,0 | 77,0         | 79,0 | 77,0                              | 78,0 | 77,0              |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| выход                                 |  | 81,0 | 87,0 | 88,0         | 86,0 | 82,0                              | 83,0 | 78,0              |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
|                                       |  |      |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| ур. звук. мощности [dB (A             |  | 91,2 |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |
| звук. мощность [dB]                   |  | 93,3 |      |              |      |                                   |      |                   |  |  |  |                                       |  |  |  |                      |  |                           |  |     |  |  |  |



|                                       |  |      |      |                                   |              |      |      |                   |                                       |         |  |                      |                           |     |  |
|---------------------------------------|--|------|------|-----------------------------------|--------------|------|------|-------------------|---------------------------------------|---------|--|----------------------|---------------------------|-----|--|
| безулиточный вентилятор               |  |      |      |                                   | приточн. воз |      |      | Длина секции [мм] |                                       | 2 009,0 |  | потери давления [Па] |                           | 310 |  |
| Данные вент                           |  |      |      |                                   |              |      |      |                   | Характеристи                          |         |  |                      |                           |     |  |
| расход воздуха [м/ч]                  |  |      |      | 36 500                            |              |      |      |                   |                                       |         |  |                      |                           |     |  |
| тип                                   |  |      |      | Plug                              |              |      |      |                   | Fan Arrangement                       |         |  |                      | 1xRun 1xStandBy           |     |  |
| Поставщик / Модель / Количество в ШхВ |  |      |      | ZA-RH63C.CR/SM25-B42-367274 / 2x1 |              |      |      |                   | Модель, Бренд                         |         |  |                      | стандартный               |     |  |
|                                       |  |      |      |                                   |              |      |      |                   | Модель / Количество в ШхВ             |         |  |                      | Std-IE3-50-160-4-11 / 2x1 |     |  |
| Падение внут. Стат. Дав. [Па]         |  |      |      | 310                               |              |      |      |                   | Номинальная мощность [кВт]            |         |  |                      | 11,000 x (2x1)            |     |  |
| Падение внеш. Стат. Дав. [Па]         |  |      |      | 690                               |              |      |      |                   | ном. частота вращения (RPM) [1/min]   |         |  |                      | 1 466                     |     |  |
| Падение дав. в уст. вент. [Па]        |  |      |      |                                   |              |      |      |                   | Фаза / Напряжение / Частота           |         |  |                      | 3x400 V / 50 Hz           |     |  |
| Total Static Pressure Drop [Па]       |  |      |      | 1 000                             |              |      |      |                   | Класс производительности              |         |  |                      | IE3                       |     |  |
| Динамическое Дав. Вен. [Па]           |  |      |      | 109                               |              |      |      |                   | КПД двигателя при полной нагрузке [%] |         |  |                      | 91,4                      |     |  |
| Общее давление вентилятора [Па]       |  |      |      | 1 109                             |              |      |      |                   | Номинальный Ток [А]                   |         |  |                      | 21,20                     |     |  |
| Frequency Operation / Max [Hz]        |  |      |      | 58,7 / 67                         |              |      |      |                   | Класс защиты / изоляции и темпера     |         |  |                      | IP55/ F                   |     |  |
| об/мин Вен. / Макс. [1/min]           |  |      |      | 1 719 / 1 960                     |              |      |      |                   | Взрывобезоп. Мот. (да / нет)          |         |  |                      | Нет                       |     |  |
| Мощность на валу [кВт]                |  |      |      | 7,190                             |              |      |      |                   | Общ. потр. Мощ., иск. ВСД [кВт]       |         |  |                      | 15,7324                   |     |  |
| Impeller Efficiency Static/Total [%]  |  |      |      | 70,5 / 78,2                       |              |      |      |                   | Общ. потр. Мощ., вкл. ВСД [кВт]       |         |  |                      | 16,219                    |     |  |
| Общая производительность [%]          |  |      |      | 70,2                              |              |      |      |                   |                                       |         |  |                      |                           |     |  |
| К-фактор (ρ = 1,2 кг / м3)            |  |      |      | 381                               |              |      |      |                   |                                       |         |  |                      |                           |     |  |
| Уровень Звук.Мощ. вход/выход          |  |      |      | 85,2 / 91,1 db(A)                 |              |      |      |                   | Информация о AV изо                   |         |  |                      | Spring AV Isolator        |     |  |
| Искробезоп. Вен. (да / нет)           |  |      |      | Нет                               |              |      |      |                   |                                       |         |  |                      |                           |     |  |
| Звук. мощн. вентил-ра по окт.част.    |  |      |      |                                   |              |      |      |                   |                                       |         |  |                      |                           |     |  |
| октав. часто                          |  | 125  | 250  | 500                               | 1000         | 2000 | 4000 | 8000              |                                       |         |  |                      |                           |     |  |
| входной                               |  | 79,0 | 85,0 | 77,0                              | 79,0         | 77,0 | 78,0 | 77,0              |                                       |         |  |                      |                           |     |  |
| выход                                 |  | 81,0 | 87,0 | 88,0                              | 86,0         | 82,0 | 83,0 | 78,0              |                                       |         |  |                      |                           |     |  |
|                                       |  |      |      |                                   |              |      |      |                   |                                       |         |  |                      |                           |     |  |
| ур. звук. мощности [dB (A             |  |      |      | 91,2                              |              |      |      |                   |                                       |         |  |                      |                           |     |  |
| звук. мощность [dB]                   |  |      |      | 93,3                              |              |      |      |                   |                                       |         |  |                      |                           |     |  |



|                                        |                  |                 |
|----------------------------------------|------------------|-----------------|
| Ревизионная панель с поворотным болтом | Размеры GxY [мм] | 459,0 x 1 590,0 |
| Дверь с шарниром и рычажным замком     | Размеры GxY [мм] | 459,0 x 1 590,0 |

|                                                                                  |                          |              |                   |
|----------------------------------------------------------------------------------|--------------------------|--------------|-------------------|
|  | проект                   | проверка дат | 24.11.2023        |
|                                                                                  | Ссылка на бло            | Дизайнер     | Mikhail Shishulin |
|                                                                                  | Воздушный поток [ 36 500 | модель       | FLNG 50x80        |
|                                                                                  |                          |              |                   |

|                                     |                      |                        |                  |                |                          |                           |
|-------------------------------------|----------------------|------------------------|------------------|----------------|--------------------------|---------------------------|
| <u>клапан:</u>                      |                      |                        | размеры [мм]     |                | 2 034,0 x 1 410,0 x 125, |                           |
| привод. в действие пготов к приводу | расход воздуха [м/ч] | 36 500                 | рама             | алюминий       |                          |                           |
| кол. уровней                        | 1                    | скорость воздуха [м/с] | 3,54             | лопасти        |                          |                           |
| крутящий момент [Nm]                | 20,000               | потери давления [Па]   | 10               | воздушная изол |                          |                           |
|                                     |                      |                        | стандартный      |                |                          |                           |
| <u>гибкая вставка</u>               |                      | Z275 Steel             | Temp. max        | 80,0           | размеры [мм]             | 2 034,0 x 1 410,0 x 140,0 |
| фланец [мм]                         |                      | 30,0                   |                  |                |                          |                           |
| <u>клапан:</u>                      |                      |                        | размеры [мм]     |                | 949,0 x 955,0 x 125,0    |                           |
| привод. в действие пготов к приводу | расход воздуха [м/ч] | 36 500                 | рама             | алюминий       |                          |                           |
| кол. уровней                        | 1                    | скорость воздуха [м/с] | 5,59             | лопасти        |                          |                           |
| крутящий момент [Nm]                | 10,000               | потери давления [Па]   | 300              | воздушная изол |                          |                           |
|                                     |                      |                        | стандартный      |                |                          |                           |
| <u>клапан:</u>                      |                      |                        | размеры [мм]     |                | 949,0 x 955,0 x 125,0    |                           |
| привод. в действие пготов к приводу | расход воздуха [м/ч] | 36 500                 | рама             | алюминий       |                          |                           |
| кол. уровней                        | 1                    | скорость воздуха [м/с] | 5,59             | лопасти        |                          |                           |
| крутящий момент [Nm]                | 10,000               | потери давления [Па]   | 300              | воздушная изол |                          |                           |
|                                     |                      |                        | стандартный      |                |                          |                           |
| <u>инспекц. окошко</u>              |                      | угловой                | Размеры GxY [мм] |                | 212,0 x 212,0            |                           |
| <u>освещение</u>                    |                      | Лампа - Стандартная    |                  |                |                          |                           |

|                                |      |      |      |      |      |      |      |               |                               |
|--------------------------------|------|------|------|------|------|------|------|---------------|-------------------------------|
| расчет шум. характеристик      |      |      |      |      |      |      |      |               |                               |
| мощность звука [dB]            |      |      |      |      |      |      |      |               |                               |
| частота Г                      | 125  | 250  | 500  | 1000 | 2000 | 4000 | 8000 | сумма [dB(A)] |                               |
| входной                        | 81,0 | 86,0 | 78,0 | 80,0 | 77,0 | 77,0 | 76,0 | 85,4          |                               |
| выход                          | 84,0 | 90,0 | 91,0 | 89,0 | 85,0 | 86,0 | 81,0 | 94,1          |                               |
| корпус                         | 66,0 | 64,0 | 59,0 | 56,0 | 52,0 | 50,0 | 37,0 | 62,4          |                               |
| ур. звук. давления [dB]        |      |      |      |      |      |      |      |               |                               |
| частота Г                      | 125  | 250  | 500  | 1000 | 2000 | 4000 | 8000 | сумма [dB(A)] | Точка измерения 3 m расстояни |
| корпус                         | 48,5 | 46,5 | 41,5 | 38,5 | 34,5 | 32,5 | 19,5 | 44,9          |                               |
| Допустимое отклонение +/- 3 dB |      |      |      |      |      |      |      |               |                               |

|                          |       |             |                           |               |     |
|--------------------------|-------|-------------|---------------------------|---------------|-----|
| <u>базовая рама</u>      | BASE  | материал    | Z275 Steel + Polyster Pai | изолированный | Нет |
| Отверстие для крана [мм] | 63,2  | высота [мм] | 150,0                     | паянный       | Нет |
| 1 устано                 | крыша |             |                           |               |     |
| 1 устано                 | Crate |             |                           |               |     |

|                            |         |         |         |          |     |
|----------------------------|---------|---------|---------|----------|-----|
| <u>поставляемые секции</u> | нет     | длина   | ширина  | высота   | вес |
| 1                          | 1 244,0 | 2 608,0 | 1 630,0 | 541,00   |     |
| 2                          | 1 683,0 | 2 608,0 | 1 630,0 | 384,00   |     |
| 3                          | 2 009,0 | 2 608,0 | 1 630,0 | 1 186,00 |     |

|                                                                                  |                          |              |                   |
|----------------------------------------------------------------------------------|--------------------------|--------------|-------------------|
|  | проект                   | проверка дат | 24.11.2023        |
|                                                                                  | Ссылка на бло            | Дизайнер     | Mikhail Shishulin |
|                                                                                  | Воздушный поток [ 36 500 | модель       | FLNG 50x80        |
| A17 P2R                                                                          |                          |              |                   |

|                                     |                      |                        |                  |                           |                          |              |
|-------------------------------------|----------------------|------------------------|------------------|---------------------------|--------------------------|--------------|
| <u>клапан:</u>                      |                      |                        | размеры [мм]     |                           | 2 034,0 x 1 410,0 x 125, |              |
| привод. в действие пготов к приводу | расход воздуха [м/ч] | 36 500                 | рама             | алюминий                  |                          |              |
| кол. уровней                        | 1                    | скорость воздуха [м/с] | 3,54             | лопасти                   |                          |              |
| крутящий момент [Nm]                | 20,000               | потери давления [Па]   | 10               | воздушная изол            |                          |              |
|                                     |                      |                        | стандартный      |                           |                          |              |
| <u>гибкая вставка</u>               |                      |                        | Z275 Steel       | Temp. max                 | 80,0                     | размеры [мм] |
| фланец [мм]                         |                      |                        | 30,0             | 2 034,0 x 1 410,0 x 140,0 |                          |              |
| <u>клапан:</u>                      |                      |                        | размеры [мм]     |                           | 949,0 x 955,0 x 125,0    |              |
| привод. в действие пготов к приводу | расход воздуха [м/ч] | 36 500                 | рама             | алюминий                  |                          |              |
| кол. уровней                        | 1                    | скорость воздуха [м/с] | 5,59             | лопасти                   |                          |              |
| крутящий момент [Nm]                | 10,000               | потери давления [Па]   | 300              | воздушная изол            |                          |              |
|                                     |                      |                        | стандартный      |                           |                          |              |
| <u>клапан:</u>                      |                      |                        | размеры [мм]     |                           | 949,0 x 955,0 x 125,0    |              |
| привод. в действие пготов к приводу | расход воздуха [м/ч] | 36 500                 | рама             | алюминий                  |                          |              |
| кол. уровней                        | 1                    | скорость воздуха [м/с] | 5,59             | лопасти                   |                          |              |
| крутящий момент [Nm]                | 10,000               | потери давления [Па]   | 300              | воздушная изол            |                          |              |
|                                     |                      |                        | стандартный      |                           |                          |              |
| <u>инспекц. окошко</u>              |                      | угловой                | Размеры GxY [мм] |                           | 212,0 x 212,0            |              |
| <u>освещение</u>                    |                      | Лампа - Стандартная    |                  |                           |                          |              |

|                                |      |      |      |      |      |      |      |               |                               |
|--------------------------------|------|------|------|------|------|------|------|---------------|-------------------------------|
| расчет шум. характеристик      |      |      |      |      |      |      |      |               |                               |
| мощность звука [dB]            |      |      |      |      |      |      |      |               |                               |
| частота Г                      | 125  | 250  | 500  | 1000 | 2000 | 4000 | 8000 | сумма [dB(A)] |                               |
| входной                        | 82,0 | 88,0 | 80,0 | 82,0 | 80,0 | 81,0 | 80,0 | 88,2          |                               |
| выход                          | 84,0 | 90,0 | 91,0 | 89,0 | 85,0 | 86,0 | 81,0 | 94,1          |                               |
| корпус                         | 66,0 | 64,0 | 59,0 | 56,0 | 52,0 | 50,0 | 37,0 | 62,4          |                               |
| ур. звук. давления [dB]        |      |      |      |      |      |      |      |               |                               |
| частота Г                      | 125  | 250  | 500  | 1000 | 2000 | 4000 | 8000 | сумма [dB(A)] | Точка измерения 3 m расстояни |
| корпус                         | 48,5 | 46,5 | 41,5 | 38,5 | 34,5 | 32,5 | 19,5 | 44,9          |                               |
| Допустимое отклонение +/- 3 dB |      |      |      |      |      |      |      |               |                               |

|                            |     |         |         |         |          |
|----------------------------|-----|---------|---------|---------|----------|
| 1 устано <b>крыша</b>      |     |         |         |         |          |
| 1 устано <b>Crate</b>      |     |         |         |         |          |
| <u>поставляемые секции</u> |     |         |         |         |          |
|                            | нет | длина   | ширина  | высота  | вес      |
|                            | 1   | 1 703,0 | 2 608,0 | 1 630,0 | 374,00   |
|                            | 2   | 2 009,0 | 2 608,0 | 1 630,0 | 1 093,00 |