

**Public Contract:**

**"High-efficient combined heat and power facility utilizing renewable sources (OHB II - line K1) "**

over-the-limit utilities contract for construction works awarded in a negotiated procedure with prior publication pursuant to the provisions of Section 60 of the PPA,

**Part 0.g FORMS FOR TECHNICAL DATA**

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| Part 0.g  Forms for Technical Data |

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# General

The Tenderer shall fill out the tables in this document and include as part of the Contractor’s design specifications.

All requirements of the Employer stated in Part III *Employer’s Requirements* shall at all times be fulfilled, but the tenderer is free to propose design specifications which are technically better than the Employer’s requirements.

| **Table 1** | **Technical Data** | Technical Data for | |  | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Evaluation | |  | | | |
|  |  | Supplier | |  | | | |
|  | **General Data** | stamp: | |  | | | |
| **Reference** |  |  | |  | | | |
| **A1** | **General Requirements** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | | ***Reference*** |
|  | Drawing of complete layout including space required for hoists, cranes, mainte­nan­ce areas and access roads | | | | |  |
|  | List of components which throughout the lifetime of the Line are foreseen to be lifted through the building shell, and confirmation that this can be done without removing primary steel structures in the building shell. | | | | |  |
|  | Process flow diagram (PFD) with process data of nominal mass/volume flows, energy flows (enthalpies), temperatures, pressures | | | | |  |
|  | Pressure loss table/diagram for the flue gas path (nominal and dimensioning) | | | | |  |
|  | Description of method, procedure and time consumption for start-up and shut-down of the Line, shown on a start-up curve. Duration and frequency of maintenance intervals must be included | | | | |  |
|  | Nominal water balance of Line | | | | |  |
|  | Heat balances for all turbine load points given in Appendix A13 *Process and Design Data*.  Heat balances shall include water/steam state (p,T,h,m) in all relevant steam cycle conditions including  - wheel chamber - all bleeds/extractions - all gland steam/balance piston flows | | | | |  |
| **A20** | Correction curves or equations that defines guarantee values applicable for all points in the capacity diagram and all operating conditions that are outside the Contractor’s control. Refer to A20 *Procedure for Guarantee tests.* | | | | |  |
| **A1** | Specification of wear parts | | | | |  |
| **A1** | Specification of strategic spare parts | | | | |  |
| **A1** | **Operation Conditions** | | | | | |
|  | ***Technical data:*** | | ***Unit*** | | ***Value/description*** | |
|  | Duration of maintenance intervals | | Hours | |  | |
|  | Frequency of maintenance intervals | | Days | |  | |

| **Table 2** | **Technical Data** | Technical Data for | |  | |
| --- | --- | --- | --- | --- | --- |
|  |  | Evaluation | |  | |
|  | **Administrative Requirements** | Supplier | |  | |
|  | **General Data** | stamp: | |  | |
| **Reference** |  |  | |  | |
|  | **Administrative Requirements** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
| **B7** | Standard for QA system used by Contractor, if applicable | | | |  |
| **B2** | Draft health and safety plan stipulating how the Contractor considers the aspects of health, safety and environment during the engineering, erection and commissioning phases, both in terms of future operation and maintenance and in the planning and execution of erection and commissioning works. | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | |
| **B6** | Needed electrical power supply on construction Site | kW |  | | |
| **B6** | Necessary construction area for storage and pre-erection, including Site logistic plan. | m² |  | | |

# Incinerator/Boiler

Please refer to Part III *Employers Requirement*, appendix A1 *Overall Scope of Works* and A2 *Technical Specifications for Incinerator/Boiler.*

| **Table 3** | **Technical Data** | Technical Data for | |  | | |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Evaluation | |  | | |
|  | **Incinerator/Boiler** | Supplier | |  | | |
|  | **General Data** | stamp: | |  | | |
| **Reference** |  |  | |  | | |
| **A1** | **Residues** | | | | | |
|  | ***Technical Data for each point 1-11 in appendix A13 Process and Design Data, capacity diagram (expected values)*** | | ***Unit*** | | | ***Reference*** |
|  | IBA: | | | | | |
|  | - Temperature before IBA extractor | | °C | | |  |
|  | - Quantity | | kg/h | | |  |
|  | - Water content of the quantity | | % | | |  |
|  | Grate riddling: | | | | | |
|  | - Quantity | | kg/h | | |  |
|  | Boiler ash: | | | | | |
|  | - Quantity | | kg/h | | |  |
|  | Wastewater: | | | | | |
|  | - Total quantity | | m³/h | | |  |
| **A1** | **Flue Gas** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** | |
|  | *Statement/confirmation that the design, dimensioning and operation of incinerator/boiler system including SNCR-system fit within the raw gas specification for raw flue gas downstream the boiler listed in appendix A13, Process And Design Data (Section 3, under Flue gas treatment), particularly with respect to dimensioning data for process and mechanical, respectively. It is acknowledged that the raw gas content of HCl, SO2, HF and Hg are governed primarily by the waste composition.* | | | | |  |
|  | ***Technical Data for each point 1-11 in Appendix A13 Process and Design Data, capacity diagram (expected values)*** | | ***Unit*** | | | ***Reference*** |
|  | Flue gas at economiser outlet, expected 24h average and ½-hour average (97%, 100%): | | | | | |
|  | - Flue gas flow | | Nm³/h | | |  |
|  | - Temperature | | °C | | |  |
|  | - O2 | | %, dry | | |  |
|  | - H2O | | % | | |  |
|  | - NOx (basis: 11% O2, dry flue gas) | | mg/Nm³ | | |  |
|  | - NH3 (basis: 11% O2, dry flue gas) | | mg/Nm³ | | |  |
|  | - Particles (basis: 11% O2, dry flue gas) | | mg/Nm³ | | |  |
|  | - Dioxin and furans (basis: 11% O2, dry flue gas) | | ng/Nm³ TEQ | | |  |
| **A1** | **Thermal efficiency** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | | ***Reference*** |
|  | Energy balances | | | | |  |
|  | ***Technical Data for each point 1-11 in appendix A13 Process and Design Data, capacity diagram (expected values).*** | | ***Unit*** | | | ***Reference*** |
|  | Specification of the efficiency guarantees: | | | | | |
|  | - Flue gas loss | | kW | | |  |
|  | - IBA heat loss | | kW | | |  |
|  | - Cooling of incinerator/boiler by water or air cooling | | kW | | |  |
|  | - Radiation and convection loss | | kW | | |  |
|  | - Other losses | | kW | | |  |
|  | - Safety margin | | kW | | |  |
|  | * Heat transferred to water steam cycle | | kW | | |  |
|  | * Heat transferred to DH circuit from other parts (chute, pusher, side walls etc.) if applicable | | kW | | |  |
|  | * Heat transferred to DH circuit from remaining parts (blow-down tank, air compressors etc.) | | kW | | |  |
| **A1** | **Line Arrangement** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | | ***Reference*** |
|  | Equipment for erection and repair plus special tools | | | | |  |
|  | Layout drawings | | | | |  |
| **A1** | **Other Equipment** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | | ***Reference*** |
|  | Quantity, type, make and specifications for fittings and valves | | | | |  |
|  | Quantity, type, make and specifications for main flow measurement devices | | | | |  |
|  | Quantity, type, make and specifications for main pumps | | | | |  |
|  | Quantity, type, make and specifications for main instruments | | | | |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 4** | **Technical Data** | Technical  Data for | |  |
|  |  | Evaluation | |  |
|  | **Incinerator/boiler** | Supplier | |  |
|  | **Supply Conditions** | stamp: | |  |
| **Reference** |  |  | |  |
| **A1** | **Fresh Water / Process water/ Clean condensate** | | | |
|  | ***Technical Data*** | ***Unit*** | ***Value/Description*** | |
|  |  |  | ***Nom. load point*** | ***Max load point*** |
|  | Water: | | | |
|  | - IBA extractor | m³/h |  |  |
|  | - to make-up water system | m³/h |  |  |
|  | - other | m³/h |  |  |
|  | Max. consumption during operation | m³/h |  |  |
|  | Nominal annual consumption | m³/a |  |  |
|  | Possible pressure requirements | bar |  |  |
| **A1** | **Electrical Supply** | | | |
|  | ***Technical Data*** | ***Unit*** | ***Value/Description*** | |
|  | Power consumption (400V): | | | |
|  | - Max. consumption | kW |  | |
|  | - Nominal consumption | kW |  | |
|  | - Nominal annual consumption | MWh |  | |
| **A1** | **Cooling Water Supply** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | General description of cooling water for Line | | |  |
|  | ***Technical Data*** | ***Unit*** | ***Value/Description*** | |
|  | Capacity | kW |  | |
|  | Supply temperature | C |  | |
|  | Required cooling water: | | | |
|  | - Max. | m³/h |  | |
|  | - Nominal | m³/h |  | |
|  | - Number of consumers | nos. |  | |

| **Table 5** | **Technical Data** | | | Technical  Data for | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | Evaluation | | | | |  |
|  | **Incinerator/boiler** | | | Supplier | | | | |  |
|  | **Feeding System and Grate** | | | stamp: | | | | |  |
| **Reference** |  | | |  | | | | |  |
| **A2 sec. 2** | | **Feeding System** | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | | ***Reference*** |
|  | | Description and technical specifications of construction | | | | | | |  |
|  | | Description of function, design and control | | | | | | |  |
|  | | ***Technical Data:*** | ***Unit*** | | | | ***Value/Description*** | | |
|  | | Total weight load of feed hopper, chute and pusher arrangement on hopper deck | tons | | | |  | | |
| **A2 sec. 2.1** | | **Feed Hopper** | | | | | | | |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | |
|  | | Main dimensions | | | m x m x m |  | | | |
|  | | Volume | | | m³ |  | | | |
|  | | Material and material thickness (steel plates etc.) | | | mm |  | | | |
|  | | Slope angels of the sides of the hopper | | | ° |  | | | |
| **A2 sec. 2.2** | | **Waste Chute** | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | | ***Reference*** |
|  | | Specification of if the cut-off gate shall be used for breaking of possible clogs / bridges | | | | | | |  |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | |
|  | | Main dimensions | | | m x m |  | | | |
|  | | Feed chute dimensions, top | | | m x m |  | | | |
|  | | Feed chute dimensions, bottom | | | m x m |  | | | |
|  | | Height of chute | | | m |  | | | |
|  | | Max. possible height of chute | | | m |  | | | |
|  | | Material and material thickness (steel plates etc.) | | | mm |  | | | |
|  | | Type and size of cut-off gate | | |  |  | | | |
|  | | Cooling of feed chute | | |  |  | | | |
|  | | Equipment for monitoring of the cooling system | | |  |  | | | |
| **A2 sec. 2.3** | | **Level Measurements in Hopper and Chute** | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | | ***Reference*** |
|  | | Level measuring equipment, type, number and make | | | | | | |  |
| **A2 sec. 2.4** | | **Waste Feeder** | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | ***Reference*** | |
|  | | Description of the feeding principle with explanation of handling of a situation where the pusher is stuck | | | | | |  | |
|  | | Materials, steel structure, wear plates etc. | | | | | |  | |
|  | | Description of how waste is removed from this area | | | | | |  | |
|  | | Specification of the need for cooling | | | | | |  | |
|  | | Description of arrangement and control system | | | | | |  | |
|  | | Equipment for control and monitoring of cooling system | | | | | |  | |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | |
|  | | Number of pusher sections | | | Nos. |  | | | |
|  | | Dimensions of pusher section | | | mm |  | | | |
|  | | Transport capacity | | | kg/h |  | | | |
|  | | Max. stroke length | | | mm |  | | | |
|  | | Number of work strokes per hour | | | | | | | |
|  | | - Minimum | | | stroke/h |  | | | |
|  | | - Maximum | | | stroke/h |  | | | |
|  | | Possible need for cooling | | | kW |  | | | |
| **A2 sec. 3** | | **Grate** | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | ***Reference*** | |
|  | | Detailed description of working principle and the automatic combustion control system | | | | | |  | |
|  | | Detailed description of construction, size and design | | | | | |  | |
|  | | Geometry of grate and driving mechanism | | | | | |  | |
|  | | Description of driving mechanism | | | | | |  | |
|  | | Description of concept of the transition joint between the grate and the mem­brane walls and special precautions made to minimise the main­tenance costs of the transition joint | | | | | |  | |
|  | | Proposing air cooled or water-cooled grate [air cooled required] | | | | | |  | |
|  | | Description of alloy and manufacturer of grate bars | | | | | |  | |
|  | | Description of maintenance of grate. | | | | | |  | |
|  | | Clarification [Yes/No] if the grate can be retrofitted to become a water-cooled grate, in the case the waste characteristics change within the lifetime of the Line. If yes, a description of how this can be done and the implications it has on the grate, furnace and operation, shall be includes. | | | | | |  | |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | |
|  | | Number of parallel grate tracks | | | nos. |  | | | |
|  | | Number of air-cooled grate zones | | | nos. |  | | | |
|  | | Slope of grate | | | ° |  | | | |
|  | | Grate area (effective) | | | m² |  | | | |
|  | | Grate area (combustion loaded part) | | | m² |  | | | |
|  | | Length (effective) | | | m |  | | | |
|  | | Clear width | | | m |  | | | |
|  | | Max. stroke of the grate | | | mm |  | | | |
|  | | Stroke frequency | | | 1/min. |  | | | |
|  | | Number of hoses | | | nos. |  | | | |
|  | | Number of tubes | | | nos. |  | | | |
|  | | Thermal grate load per area | | | MW/m² |  | | | |
|  | | Static grate load per area | | | kg/(m²\*h) |  | | | |
|  | | Thermal grate load per width | | | MW/m |  | | | |
|  | | Static grate load per width | | | kg/(m\*h) |  | | | |
|  | | Max. acceptable grate temperature | | | °C |  | | | |
|  | | Pressure drop across empty, clean grate | | | Pa |  | | | |
|  | | Pressure drop across empty grate after 8,000 hours of operation | | | Pa |  | | | |
|  | | Material composition of grate components | | | - |  | | | |
|  | | Total number of grate bars | | | nos. |  | | | |
|  | | Expected replacement of grate bars after: | | | | | | | |
|  | | 8,000 hours | | | % |  | | | |
|  | | 16,000 hours | | | % |  | | | |
|  | | 24,000 hours | | | % |  | | | |
|  | | 32,000 hours | | | % |  | | | |
|  | | 40,000 hours | | | % |  | | | |
|  | | Operating time before 100% replacement | | | years |  | | | |

| **Table 6** | **Technical Data** | | Technical  Data for | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | Evaluation | | | | | |  |
|  | **Incinerator/boiler** | | Supplier | | | | | |  |
|  | **Air Systems** | | stamp: | | | | | |  |
| **Reference** |  | |  | | | | | |  |
| **A2 sec. 4.1**  **A2 sec. 4.4** | | **Combustion Air System and Fans** | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | | ***Reference*** |
|  | | Description of the distribution of the primary air, control parameters, division of air zones and fan control. | | | | | | |  |
|  | | Details on control parameters. | | | | | | |  |
|  | | Description of nozzle arrangement and air supply velocities in nozzles. | | | | | | |  |
|  | | Data on the design of the fans including sound power emission in compliance with A14.3 *Acoustic Noise and Vibrations*. Furthermore, the system efficiency of the fans and their power consumption in relation to the air flow shall be stated. | | | | | | |  |
|  | | ***Technical Data:*** | | | ***Unit*** | | ***Value/Description*** | | |
|  | | Max. air velocity | | | m/s | |  | | |
|  | | Number of air zones | | | - | |  | | |
|  | | Material and thickness of material | | | mm | |  | | |
| **A2 sec. 4.2** | | **Primary Combustion Air** | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | | ***Reference*** |
|  | | Description of arrangement | | | | | | |  |
|  | | Description of air distribution and control of air distribution including flow measuring principles, type and make. | | | | | | |  |
|  | | Description of type, construction, materials and dimensions of fan | | | | | | |  |
|  | | ***Technical Data:*** | | ***Unit*** | | ***Value/Description*** | | | |
|  | | Number of individually controlled air zones in the longitudinal direction of the grate. | | nos. | |  | | | |
|  | | Number of individually controlled air zones in the transverse direction of the grate. | | nos. | |  | | | |
|  | | Dimension of primary air intake  (W x H) | | m x m | |  | | | |
|  | | Fan: | | | | | | | |
|  | | - Max. air flow, pressure difference | | m³/h, Pa | |  | | | |
|  | | - Nom. air flow, pressure difference | | m³/h, Pa | |  | | | |
|  | | - Nom. speed | | rpm | |  | | | |
|  | | - Efficiency at nominal load | | % | |  | | | |
|  | | - Noise level according to A14.3 *Acoustic Noise and Vibrations* | | dB | |  | | | |
|  | | - Noise attenuation measures, if any | | dB | |  | | | |
|  | | - Power consumption at nominal load | | kW | |  | | | |
|  | | - Equipment for vibration measurements, type | | - | |  | | | |
| **A2 sec. 4.3** | | **Secondary Combustion Air** | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | ***Reference*** | |
|  | | Description of arrangement | | | | | |  | |
|  | | Description of air distribution and control including measuring principle, type and make | | | | | |  | |
|  | | Description of type, construction, materials and dimensions of fan | | | | | |  | |
|  | | ***Technical Data:*** | | ***Unit*** | | ***Value/Description*** | | | |
|  | | Number of air injection zones | | nos. | |  | | | |
|  | | Number of nozzles for air injection | | nos. | |  | | | |
|  | | Velocity of air injection | | m/s | |  | | | |
|  | | Nozzle constructions | | - | |  | | | |
|  | | Dimension of secondary air intake  (W x H) | | m x m | |  | | | |
|  | | Fan: | | | | | | | |
|  | | - Max. air flow, pressure difference | | m³/h, Pa | |  | | | |
|  | | - Nom. air flow, pressure difference | | m³/h, Pa | |  | | | |
|  | | - Nom. speed | | rpm | |  | | | |
|  | | - Efficiency at nominal load | | % | |  | | | |
|  | | - Noise level according to Appendix A14.3 *Acoustic Noise and Vibrations* | | dB | |  | | | |
|  | | - Noise attenuation measures, if any | | dB | |  | | | |
|  | | - Power consumption at nominal load | | kW | |  | | | |
| **A2 sec. 4.5** | | **Combustion Air Preheater** | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | ***Reference*** | |
|  | | Method for cleaning, frequency for cleaning | | | | | |  | |
|  | | Method for protection against freezing | | | | | |  | |
|  | | Detailed description and technical specification of air preheater bypass system. | | | | | |  | |
|  | | ***Technical Data:*** | | ***Unit*** | | ***Value/Description*** | | | |
|  | | Type, construction | | - | |  | | | |
|  | | Number of steps in air pre-heater | | Nos. | |  | | | |
|  | | Media(s) used for preheating of air | | - | |  | | | |
|  | | Steam consumption | | kg/h | |  | | | |
|  | | Steam pressure | | bar | |  | | | |
|  | | Steam temperature | | °C | |  | | | |
|  | | Heating surface area | | m² | |  | | | |
|  | | Dimension. L x W x H | | m x m x m | |  | | | |
|  | | Tube dimensions and tube pitching | | mm | |  | | | |

| **Table 7** | **Technical Data** | | Technical  Data for | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | Evaluation | | | |  |
|  | **Incinerator/boiler** | | Supplier | | | |  |
|  | **Incinerator** | | stamp: | | | |  |
| **Reference** |  | |  | | | |  |
| **A2 sec. 6** | | **Furnace Chamber** | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | ***Reference*** | |
|  | | Description of control concept, automatic combustion control and description of starting up times | | | |  | |
|  | | Measures taken to ensure compliance with noise requirements. | | | |  | |
|  | | Description of procedure to be applied in the event of power failure and the need for emergency power supply etc. | | | |  | |
|  | | Description of amount work during inspections in the period stated below | | | |  | |
|  | | Description of the procedure to be applied for cleaning of the furnace chamber and for maintenance of refractory or corrosion proof alloy cladding in the furnace chamber | | | |  | |
|  | | ***Technical Data:*** | | ***Unit*** | ***Value/Description*** | | |
|  | | Duration of inspection incl. specification of working time per day | | days |  | | |
|  | | Main dimensions of incinerator | | m |  | | |
|  | | Gross weight for furnace incl. galleries and auxiliary equipment when ready for operation | | tons |  | | |
| **A2 sec. 7** | | **Afterburning Chamber** | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | ***Reference*** | |
|  | | Description of thermal load in the primary combustion chamber. | | | |  | |
|  | | Explanation of how an effective turbulence of the flue gas at the inlet to the afterburning chamber is ensured at any load apart from start-up and shutdown. | | | |  | |
|  | | Description of method for establishing a protection ceiling during shut down of the incinerator unit to protect personnel against down falling IBA deposits when being inside the furnace | | | |  | |
|  | | Description of method for easy erection of scaffolding in the 1st pass of the boiler which shall ensure possibility to carry out simultaneous maintenance work on the grate and up in the 1st pass | | | |  | |
|  | | ***Technical Data:*** | | ***Unit*** | ***Value/Description*** | | |
|  | | Flue gas flow, design basis | | Nm³/h, dry |  | | |
|  | | Max. flue gas temperature in areas without protective refractory lining | | °C |  | | |
|  | | Air cooled area | | m² |  | | |
|  | | Boiler cooled area | | m² |  | | |
|  | | Dimension of access doors to the furnace chamber (min. two doors) | | m x m |  | | |
| **A2 sec. 8** | | **Refractory/Ceramic lining/Corrosion Proof Alloy cladding** | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | ***Reference*** |
|  | | Detailed description including all technical specifications of the complete refractory/ceramic lining concept including the technical data below and:  - layout drawing showing type, extent and location of refractory/cladding  - listing of all areas with different types of refractory/ceramic lining - List of pros and cons of system | | | | |  |
|  | | ***Technical Data:*** | | ***Unit*** | ***Value/Description*** | | |
|  | | Material of corrosion proof alloy cladding | | - |  | | |
|  | | Calculated surface temperatures of the refractory/ceramic lining/cladding | | °C |  | | |
|  | | Number of cladding layers | | - |  | | |
|  | | Thickness of cladding | | mm |  | | |
| **A2 sec. 9** | | **Insulation and Casing** | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | ***Reference*** |
|  | | Parts of the Contract Object with surface temperature > 45 °C which should not be insulated according to the Contractor’s advice and experience | | | | |  |
|  | | Means for limiting heat loss by radiation/convection and maintaining low surface temperature | | | | |  |
|  | | ***Technical Data:*** | | ***Unit*** | ***Value/Description*** | | |
|  | | Insulation: | | | | | |
|  | | - Material | | - |  | | |
|  | | - Thickness | | mm |  | | |
|  | | - K-value | | W/m2/oC |  | | |
|  | | - Construction/design | | - |  | | |
|  | | - Radiation/convection loss estimate (at 25 °C ambient) | | kW |  | | |
|  | | Casing: | | | | | |
|  | | - Material | | - |  | | |
|  | | - Thickness | | mm |  | | |
|  | | - Construction/design | | - |  | | |

| **Table 8** | **Technical Data** | | | Technical  Data for | | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | Evaluation | | | | | |  |
|  | **Incinerator/boiler** | | | Supplier | | | | | |  |
|  | **Steam Boiler** | | | stamp: | | | | | |  |
| **Reference** |  | | |  | | | | | |  |
| **A2 sec. 10.1** | | **General** | | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | | | ***Reference*** |
|  | | Main dimensions for the boiler unit including boiler drawing in scale | | | | | | | |  |
|  | | Documentation of the circulation and flow conditions in the boiler | | | | | | | |  |
|  | | Connections in the water/steam system including connections of superheater sections | | | | | | | |  |
|  | | Description of flue gas outlet temperature control | | | | | | | |  |
|  | | Description of feed water flow control and drum level control | | | | | | | |  |
|  | | Layout and drawings of the boiler unit | | | | | | | |  |
|  | | The chosen design criteria for the start-up burners | | | | | | | |  |
|  | | Description of method for replacement of each of the bundles taking into account the geometry of installation and surrounding building. | | | | | | | |  |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Manufacturer | | | - |  | | | | |
|  | | Weight of the boiler with and without water (including all installations; without auxiliary equipment and galleries) | | | tons |  | | | | |
|  | | Dry weight of the radiation part with and without refractory and insulation | | | tons |  | | | | |
|  | | Dry weight of the convection part | | | tons |  | | | | |
|  | | Auxiliary equipment | | | tons |  | | | | |
|  | | Weight of galleries | | | tons |  | | | | |
|  | | Area of galleries | | | m² |  | | | | |
|  | | Ratio between energy recovery in radiation part and energy recovery in convection part | | | - |  | | | | |
|  | | Circulation ratios (ratio between circulated steam and water) | | | - |  | | | | |
|  | | Fouling factor in each particular part of the boiler | | | m2 oC/W |  | | | | |
| **A2 sec. 10.2** | | **Radiation Passes** | | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | | ***Reference*** | |
|  | | Specification of how the boiler/furnace/grate is supported and how thermal expansions are handled | | | | | | |  | |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Number of empty passes | | | nos. |  | | | | |
|  | | Number of grids (screen tubes) | | | nos. |  | | | | |
| **A2 sec. 10.3** | | **Convection Pass** | | | | | | | | |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Number of evaporator sections | | | nos. |  | | | | |
|  | | Number of superheater sections | | | nos. |  | | | | |
|  | | Number of economizer sections | | | nos. |  | | | | |
|  | | Number of injection coolers for steam temperature control | | | nos. |  | | | | |
|  | | Flow velocity of water (steam) for each section | | | m/s |  | | | | |
| **A2 sec. 10.4** | | **SNCR System** | | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | ***Reference*** | | |
|  | | Description of the nozzle arrangement | | | | | |  | | |
|  | | Description of distribution and dosing system | | | | | |  | | |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Number of nozzles rows | | | nos. |  | | | | |
|  | | Number of Nozzles | | | nos. |  | | | | |
| **A2 sec. 10** | | **Steam boiler construction details** | | | | | | | | |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Heating surface areas, values to be stated as projected and actual | | | m2/m2 |  | | | | |
|  | | Heating surface, boiler tube membrane walls excl. membrane walls with lining | | | m² |  | | | | |
|  | | Lined heating surface, total | | | m² |  | | | | |
|  | | Heating surface, evaporator sections, total | | | m² |  | | | | |
|  | | Heating surface, superheater sections, total | | | m² |  | | | | |
|  | | Heating surface, economizer sections, total | | | m² |  | | | | |
|  | | Total heating surface on flue gas side | | | m² |  | | | | |
|  | | Water volume in tubes and steam drum | | | m3 |  | | | | |
|  | | Boiler | | | m³ |  | | | | |
|  | | Boiler drum (up to set point level) | | | m³ |  | | | | |
|  | | Dimensions and material thickness of tubes: | | | | | | | | |
|  | | - Evaporator walls | | | mm x mm |  | | | | |
|  | | - Evaporator sections | | | mm x mm |  | | | | |
|  | | - Last superheater | | | mm x mm |  | | | | |
|  | | - Remaining superheaters | | | mm x mm |  | | | | |
|  | | - Economizer | | | mm x mm |  | | | | |
|  | | - Boiler drum | | | mm x mm |  | | | | |
|  | | Transverse tube pitching: | | | | | | | | |
|  | | - Economizer | | | mm |  | | | | |
|  | | - Water tube sections | | | mm |  | | | | |
|  | | - Last superheater | | | mm |  | | | | |
|  | | - Remaining superheaters | | | mm |  | | | | |
|  | | Longitudinal tube pitching: | | | | | | | | |
|  | | - Evaporator sections | | | mm |  | | | | |
|  | | - Water tube sections | | | mm |  | | | | |
|  | | - Last superheater | | | mm |  | | | | |
|  | | - Remaining superheaters | | | mm |  | | | | |
|  | | - Economizer | | | mm |  | | | | |
|  | | Tube pitching in membrane walls | | | mm |  | | | | |
|  | | Empty flue gas cross sections: | | | | | | | | |
|  | | - Inlet in first boiler pass | | | m² |  | | | | |
|  | | - Transition between first and second boiler pass | | | m² |  | | | | |
|  | | - Inlet last superheater | | | m² |  | | | | |
|  | | - Inlet economizer | | | m² |  | | | | |
|  | | Net volume drain tank / blow-down tank | | | m³ |  | | | | |
|  | | Minimum bending radius of tubes:   * Tube diameter <33 mm * Tube diameter 33-38 mm * Tube diameter >38 mm   For parts of the boiler which are expected to be changed during the lifetime of the boiler, the Employer prefers tube dimensions which can be manufactured and repaired with short response time. Due to local manufacturing capabilities for maintenance works, the Employer therefore prefers minimum bending radius of 50 mm for tube diameters below 33 mm and 55 mm for tube diameters between 33 and 38 mm. | | | mm  mm  mm |  | | | | |
| **A2 sec. 10** | | **Materials** | | | | | | | | |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Evaporator walls | | | - |  | | | | |
|  | | Evaporator section | | | - |  | | | | |
|  | | Lined heating surfaces | | | - |  | | | | |
|  | | Collectors | | | - |  | | | | |
|  | | Last superheater | | | - |  | | | | |
|  | | First superheater | | | - |  | | | | |
|  | | Economizer | | | - |  | | | | |
|  | | Boiler drum | | | - |  | | | | |
| **A2 sec. 10** | | **Performance data** | | | | | | | | |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Steam coolers water injection flow | | | tons/h |  | | | | |
|  | | Steam drum load at maximum continuous load | | | m³/m³h |  | | | | |
|  | | Acceptable steam drum load at specified live steam parameters and the actual drum size | | | m³/m³h |  | | | | |
|  | | Steam production, max. | | | tons/h |  | | | | |
|  | | Steam production, min. | | | tons/h |  | | | | |
| **A2 sec. 10** | | **Maintenance** | | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | | | ***Reference*** |
|  | | Description of arrangement for inspection of first pass and second pass of the boiler | | | | | | | |  |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Replacement of the superheater section: | | | | | | | | |
|  | | - Duration | | | h |  | | | | |
|  | | - Number of persons required | | | - |  | | | | |
|  | | - Total working hours required | | | h |  | | | | |
|  | | Reference to latest replacement of a superheater performed by the Contractor at a similar Line | | | - |  | | | | |
|  | | Number of access doors | | | nos. |  | | | | |
| **A2 sec. 10** | | **Temperature Conditions** | | | | | | | | |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Maximum tube surface temperature in superheaters and other highly loaded parts of the boiler | | | C |  | | | | |
|  | | Steam temperature downstream each heating surface section | | | C |  | | | | |
|  | | Flue gas outlet temperature from boiler: | | | | | | | | |
|  | | - At max. load (to be specified) and at the end of the guaranteed continuous operation period. | | | C |  | | | | |
|  | | - At min. load and max. load (to be specified) and at clean boiler | | | C |  | | | | |
|  | | - Average over the guaranteed continuous operation period | | | C |  | | | | |
|  | | Flue gas temperatures at inlet first and second boiler pass | | | C |  | | | | |
| **A2 sec. 10** | | **Pressure** | | | | | | | | |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Set pressure of the safety valves: | | | | | | | | |
|  | | - Boiler drum | | | bar |  | | | | |
|  | | - Superheater | | | bar |  | | | | |
|  | | Gas-side pressure loss at nominal flue gas flow with a clean heating surface | | | Pa |  | | | | |
|  | | Gas-side pressure loss at design flue gas flow and fouled heating surface at the end of the travel time | | | Pa |  | | | | |
| **A2 sec. 10** | | **Velocity Conditions** | | | | | | | | |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Flue gas velocity at nominal load: | | | | | | | | |
|  | | - Furnace chamber | | | m/s |  | | | | |
|  | | - Inlet at first boiler pass | | | m/s |  | | | | |
|  | | - First pass | | | m/s |  | | | | |
|  | | - Second pass | | | m/s |  | | | | |
|  | | - Each section of the convection part | | | m/s |  | | | | |
|  | | - Economizer part | | | m/s |  | | | | |
| **A2 sec. 10** | | **Cleaning Systems** | | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | | | ***Reference*** |
|  | | Description of cleaning of radiation passes during operation | | | | | | | |  |
|  | | Description of spray water cleaning system for 1st and 2nd pass | | | | | | | |  |
|  | | ***Technical Data:*** | ***Unit*** | | | | ***Value/Description*** | | | |
|  | | Number of rapping motors/vibrators in the convection part | nos. | | | |  | | | |
| **A2 sec. 10.9**  **A2 sec. 10.11** | | **Make-up Water System and Sampling System** | | | | | | | | |
| ***Descriptions to be included in Tender:*** | | | | | | | | ***Reference*** |
|  | | Specification of design | | | | | | | |  |
|  | | Description of equipment for preparation and monitoring of the water quality | | | | | | | |  |
|  | | Definition of which, if any, other chemical than those mentioned in the tender material are being proposed. | | | | | | | |  |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Type, make | | |  |  | | | | |
|  | | Tank volume | | | m3 |  | | | | |
|  | | Capacity | | | tons/h |  | | | | |
|  | | **NaOH tank** | | | | | | | | |
|  | | ***Technical data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | NaOH concentration | | | % |  | | | | |
|  | | Net volume | | | m³ |  | | | | |
|  | | - Pump, type | | | - |  | | | | |
|  | | - Pump, capacity | | | - |  | | | | |
|  | | - Number of pumps | | | - |  | | | | |
|  | | **Ammonia water tank** | | | | | | | | |
|  | | ***Technical data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Ammonia concentration | | | % |  | | | | |
|  | | Net volume | | | m³ |  | | | | |
|  | | - Pump, type | | | - |  | | | | |
|  | | - Pump, capacity | | | - |  | | | | |
|  | | - Number of pumps | | | - |  | | | | |
| **A2 sec. 10.8** | | **Auxiliary and Start-up Burners** | | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | | | ***Reference*** |
|  | | Description of control principle | | | | | | | |  |
|  | | Description or drawing showing burner positions and height. | | | | | | | |  |
|  | | ***Technical Data:*** | | | ***Unit*** | ***Value/Description*** | | | | |
|  | | Number of burners | | | nos. |  | | | | |
|  | | Capacity per burner: | | | | | | | | |
|  | | - maximum | | | kW |  | | | | |
|  | | - nominal | | | kW |  | | | | |
|  | | - minimum | | | kW |  | | | | |
|  | | Natural gas consumption, nominal per burner | | | kg/h |  | | | | |
|  | | Noise level according to Appendix A14.3 *Acoustic Noise and Vibrations* | | | dB |  | | | | |

| **Table 9** | **Technical Data** | | | Technical  Data for | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | Evaluation | | | | |  |
|  | **Incinerator/boiler** | | | Supplier | | | | |  |
|  | **Feed Water System** | | | stamp: | | | | |  |
| **Reference** |  | | |  | | | | |  |
| **A2 sec. 11** | | **De-aerator / feed water tank** | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | | ***Reference*** |
|  | | Principle of operation | | | | | | |  |
|  | | ***Technical Data:*** | | | ***Unit*** | | ***Value/Description*** | | |
|  | | Tank Capacity | | | m³ | |  | | |
|  | | Net volume | | | m³ | |  | | |
| **A2 sec. 12** | | **Feed Pump System** | | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | | ***Reference*** |
|  | | Description of pump construction, including impellers, housing, axial equalization, bearings, coupling, materials, gland seals, basement etc. | | | | | | |  |
|  | | ***Technical Data:*** | | | ***Unit*** | | ***Value/Description*** | | |
|  | | Electrically driven and direct diesel engine driven pumps: | | | | | | | |
|  | | - Type and make of pumps | | |  | |  | | |
|  | | - Make of control equipment | | |  | |  | | |
|  | | - Any stand-still heating system | | |  | |  | | |
|  | | - Cooling system | | |  | |  | | |
|  | | - Pump data at 50%, 75%, 100% and max. load (head and quantity):   * Pressure rise * Speed * Feed water flow * Shaft power * Efficiency * NPSH | **Unit**  bar  rpm  m³/h  kW  %  bar | | *50%* | *75%* | | *100%* | *Max.* |
| **A2 sec. 11** | | **Live Steam** | | | | | | | |
|  | | ***Technical Data:*** | | | ***Unit*** | | ***Value/Description*** | | |
|  | | Pressure loss in live steam pipe | | | bar | |  | | |

| **Table 10** | **Technical Data** | Technical  Data for | | |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Evaluation | | |  |
|  | **Incinerator/boiler** | Supplier | | |  |
|  | **Component Cooling System** | stamp: | | |  |
| **Reference** |  |  | | |  |
| **A2 sec. 13** | **Component Cooling System** | | | | |
|  | ***Technical Data:*** | | ***Unit*** | ***Value/Description*** | |
|  | Rated minimum cooling capacity at design capacity | | MW |  | |
|  | Redundancy in cooling capacity | | MW |  | |
|  | Dimensions of component cooler | |  |  | |
|  | - Width | | m |  | |
|  | - Height | | m |  | |
|  | - Length | | m |  | |
|  | Weight | | kg |  | |
|  | Fans | |  |  | |
|  | - Number of | | - |  | |
|  | - Electrical Power Consumption by Motor terminals per fan | | KW |  | |
|  | Cooling elements | |  |  | |
|  | - Material | | - |  | |
|  | Circulation pumps | |  |  | |
|  | - Capacity | | m3/h |  | |

| **Table 11** | **Technical Data** | | Technical  Data for | | | | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | Evaluation | | | | |  |
|  | **Incinerator/boiler** | | Supplier | | | | |  |
|  | **Ash and IBA Handling System** | | stamp: | | | | |  |
| **Reference** |  | |  | | | | |  |
| **A2 sec. 14**  **A2 sec. 15** | | **General information** | | | | | | |
| ***Descriptions to be included in Tender:*** | | | | | | ***Reference*** |
|  | | Principle diagram and description of control system | | | | | |  |
|  | | Description of the transport systems, capacity and transport quantities | | | | | |  |
|  | | Description of extraction system, including handling of displacement air | | | | | |  |
|  | | Requirements for ash silo | | | | | |  |
| **A2 sec. 14** | | **Boiler ash** | | | | | | |
|  | | ***Technical Data:*** | | ***Unit*** | | ***Value/Description*** | | |
|  | | Quantity | | kg/h | |  | | |
|  | | Consumption of compressed air | | Nm3/h | |  | | |
|  | | Number of injector vessels | | - | |  | | |
|  | | Number of transport pipes | | - | |  | | |
|  | | Hoppers: | | | | | | |
|  | | - Number | | nos. | |  | | |
|  | | - Volume per hopper | | m³ | |  | | |
|  | | - Type of gates | | - | |  | | |
|  | | Mechanical and/or pneumatic transport of boiler ash: | | | | | | |
|  | | - Type | | - | |  | | |
|  | | - Number of units, length per unit | | nos./m | |  | | |
|  | | Capacity | | kg/h | |  | | |
|  | | Crusher, type and make | | - | |  | | |
| **A2 sec. 3.1** | | **Grate riddlings** | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | ***Reference*** |
|  | | Description of extraction system | | | | | |  |
|  | | Description of transport system | | | | | |  |
|  | | Description of maintenance procedure | | | | | |  |
|  | | ***Technical Data:*** | | | ***Unit*** | | ***Value/Description*** | |
|  | | Expected quantity of grate riddlings | | | kg/h | |  | |
|  | | Type | | | - | |  | |
|  | | Make | | | - | |  | |
|  | | Transport capacity | | | kg/h | |  | |
| **A2 sec. 15.1** | | **IBA Handling System** | | | | | | |
|  | | ***Descriptions to be included in Tender:*** | | | | | | ***Reference*** |
|  | | General information including description of IBA extraction system and control system. | | | | | |  |
|  | | Construction drawing of IBA extractor and control principle | | | | | |  |
|  | | Description on system for each IBA extractor for giving representative IBA samples | | | | | |  |
|  | | Description of inspection openings for closed IBA handling components including number and location of openings. | | | | | |  |
|  | | ***Technical Data:*** | | ***Unit*** | | ***Value/Description*** | | |
|  | | Main dimensions | | - | |  | | |
|  | | Capacity (max.) | | tons/h | |  | | |
|  | | Water consumption (max.) | | m³/h | |  | | |
|  | | Weight of total IBA extraction system | | tons/h | |  | | |
|  | | Number of extractors | | nos. | |  | | |
|  | | Dimensions of extraction sections | | mm | |  | | |
|  | | Driving mechanism | | - | |  | | |
|  | | Transport capacity | | tons/h | |  | | |
|  | | Expected lifetime | | years | |  | | |
|  | | Water content in IBA downstream extractor | | % | |  | | |
|  | | Type of water level measurement in IBA extractor | | - | |  | | |
|  | | Exhaust from IBA extractor | | - | |  | | |
|  | | Principle (e. g. part of secondary air intake) | | - | |  | | |
| **A2 sec. 15.2** | | **IBA Transport System** | | | | | | |
|  | | ***Technical Data:*** | | ***Unit*** | | ***Value/Description*** | | |
|  | | Type of conveyors | | - | |  | | |
|  | | Make | | - | |  | | |
|  | | Width | | mm | |  | | |
|  | | Length | | mm | |  | | |
|  | | Transport capacity | | tons/h | |  | | |
|  | | Lifting height | | m | |  | | |
|  | | Driving power | | kW | |  | | |
|  | | Additional conveyance equipment | | - | |  | | |
|  | | Water consumption | | - | |  | | |

| **Table 12** | **Technical Data** | | Technical  Data for | | |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | | Evaluation | | |  |
|  | **Incinerator/boiler** | | Supplier | | |  |
|  | **Auxiliary Systems** | | stamp: | | |  |
| **Reference** |  | |  | | |  |
| **A2 sec. 18.1** | | **Flue Gas Ducts** | | | | |
|  | | ***Technical Data:*** | | ***Unit*** | ***Value/Description*** | |
|  | | Max. flue gas velocity | | m/s |  | |
|  | | Materials and thickness of material | | mm |  | |
| **A2 sec. 18.2** | | **Measurement of Flue Gas Concentrations** | | | | |
|  | | ***Technical Data:*** | | ***Unit*** | ***Value/Description*** | |
|  | | Type | | **-** |  | |
|  | | Description of equipment | | **-** |  | |
| **A2 sec. 18.3** | | **Automatic and Central grease lubrication** | | | | |
|  | | ***Technical Data:*** | | ***Unit*** | ***Value/Description*** | |
|  | | Type | | **-** |  | |
|  | | Make | | **-** |  | |
| **A2 sec. 18.4** | | **Hydraulic System** | | | | |
|  | | ***Technical Data:*** | | ***Unit*** | ***Value/Description*** | |
|  | | Type | | - |  | |
|  | | Make | | - |  | |

# Flue Gas Treatment

Please refer to Part III *Employers Requirement*, appendix A1 *Overall Scope of Works* and A3 *Technical Specifications for Flue Gas Treatment System.*

| **Table 13** | **Technical Data** | | Technical Data for Evaluation: |  | |
| --- | --- | --- | --- | --- | --- |
|  | **Flue Gas Treatment**  **General Data** | | Supplier stamp: |  | |
| **Reference** |  | |  |  | |
| **A3 Sec. 1** | **General Concept** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Process Flow-diagrams (PFD) including nominal process data throughout (flows, temperatures, pressures, flue gas moisture content etc.) | | | |  |
|  | Nominal\*\* process data, expected, characterising main components with respect to flow/mass flow, temperature, pressure, concentrations (expected values) | | | |  |
|  | ***Technical data:\**** | | | ***Reference*** | |
|  | Raw gas inlet (as listed in Appendix A13 *Process and Design Data*) – please list nominal and dimensioning data | | |  | |
|  | \* \*The dimensioning data given shall – as a minimum - refer to the dimensioning data given for raw gas inlet in Appendix A13 *Process and Design Data*. Higher values may be stated considering the Tenderer’s safety margin and that there may be short term peaks exceeding the data derived from dimensioning input. | | | | |
|  | \*\* \*\*The term “nominal” refers to point 1 of the capacity diagram and nominal inlet data as listed in Appendix A13 *Process and Design Data*. | | | | |
|  | **Compressed Air** | | | | |
|  | ***Technical data:*** | ***Unit*** | | ***Value/description*** | |
|  | Instrument air consumption: | | | | |
|  | * Max. | m3/min | |  | |
|  | * Nominal annual consumption | m3/h | |  | |
|  | Process air consumption: | | | | |
|  | * Max. | m3/min | |  | |
|  | * Nominal annual consumption | m3/h | |  | |
|  | **Electrical Supply** | | | | |
|  | ***Technical data:*** | ***Unit*** | | ***Value/description*** | |
|  | Power consumption (400V) *(State with and without option 1)* | | | | |
|  | * Max. consumption | kW | |  | |
|  | * Nominal consumption | kW | |  | |
|  | * Nominal annual consumption | MWh | |  | |

| **Table 14** | **Technical Data** | Technical Data for Evaluation: |  | |
| --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment**  **Quencher/Reactor** | Supplier stamp: |  | |
| **A3 Sec. 2.2** | **General** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | Drawing and description of quencher/reactor | | |  |
| **A3 Sec. 2.2** | **Nominal Process Data** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Inlet flue gas temperature | °C |  | |
|  | Water injection | m3/h |  | |
|  | Outlet flue gas flow rate, wet gas | Nm³/h |  | |
|  | Outlet flue gas temperature | °C |  | |
|  | Outlet flue gas moisture content | Vol% |  | |
|  | Injection of HOK/activated carbon | kg/h |  | |
|  | Injection of absorbent (lime) | kg/h |  | |
|  | Injection of recirculated residue | kg/h |  | |
| **A3 Sec. 2.2** | **Dimensioning Data** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Minimum pressure | Pa |  | |
|  | Maximum pressure | Pa |  | |
|  | Maximum inlet temperature | °C |  | |
|  | Inlet flue gas flow rate | Nm³/h |  | |
|  | Maximum injection of adsorbent | kg/h |  | |
|  | Maximum injection of absorbent | kg/h |  | |
|  | Maximum recirculation of residue | kg/h |  | |
| **A3 Sec. 2.2** | **Mechanical Data** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | Description of protection of the different areas, such as use of special metals or surface coating. | | |  |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Construction materials | - |  | |
| **A3 Sec. 2.2** | **Installation/Lay-out Information** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Position (standing, laying) | - |  | |
|  | Height (length, total) | m, m |  | |
|  | Width | m |  | |
|  | Diameter | m |  | |

| **Table 15** | **Technical Data** | Technical Data for Evaluation: |  | |
| --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment**  **Bag House Filter** | Supplier stamp: |  | |
| **A3 Sec. 2.3** | **General** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | Drawing and description of bag house filter. | | |  |
| **A3 Sec. 2.3** | **Nominal Process Data** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Inlet flue gas flow rate, wet gas | Nm³/h |  | |
|  | Inlet flue gas temperature | °C |  | |
|  | Air to cloth ratio | m3/m2/min |  | |
|  | Amount of residue | kg/h |  | |
|  | Expected bag lifetime | years |  | |
| **A3 Sec. 2.3** | **Dimensioning Data** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Inlet flue gas flow rate | Nm³/h, wet |  | |
|  | Minimum pressure | Pa |  | |
|  | Maximum pressure | Pa |  | |
|  | Maximum inlet temperature | °C |  | |
|  | Maximum raw gas dust concentration | mg/Nm3,dry |  | |
| **A3 Sec. 2.3** | **Concentration of Flue Gas at Outlet - Expected Values at Nominal Load, 11% O2, Dry** | | | |
|  | Particles | mg/Nm3 |  | |
|  | HCl | mg/Nm3 |  | |
|  | HF | mg/Nm3 |  | |
|  | SO2 | mg/Nm3 |  | |
|  | Hg | mg/Nm3 |  | |
|  | Dioxins and furans (in T eq) | mg/Nm3 |  | |
| **A3 Sec. 2.3** | **Mechanical Data** | | | |
|  | ***Descriptions to be included in tender:*** | | | ***Reference*** |
|  | 1. Description of control principle for water- and chemical injection and recirculation of residue. 2. Description of philosophy for cleaning of bags 3. Description of method to identify damaged bags. | | |  |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Bag house filter material | - |  | |
|  | Cage material | - |  | |
|  | Bag material | - |  | |
| **A3 Sec. 2.3** | **Installation/Lay-out Information** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Length | m |  | |
|  | Width | m |  | |
|  | Height | m |  | |
|  | Total height incl. extraction system | m |  | |
|  | Number of sections | - |  | |
| **A3 Sec. 2.3** | **Bag Cleaning** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Principle | - |  | |
|  | Frequency | h-1 |  | |
|  | Cleaning agent | - |  | |
|  | * Type | - |  | |
|  | * Consumption | Nm3/h |  | |
|  | * Pressure | bar |  | |
|  | * Temperature | °C |  | |
| **A3 Sec. 2.3** | **Removal of Spent Adsorbent/Absorbent** | | | |
|  | ***Mechanical data:*** | ***Unit*** | ***Value/description*** | |
|  | Extraction system, description and data |  |  | |
|  | * Dust retention in extraction system time in hoppers | tonnes |  | |
|  | * Trace heating | Yes/no/ where |  | |
|  | * Installed effect for heating | kW |  | |
|  | * Bridge-breaking equipment | Yes/no |  | |
|  | Locks |  |  | |
|  | * Number | - |  | |
|  | * Type | - |  | |
|  | Dampers |  |  | |
|  | * Number | - |  | |
|  | * Type | - |  | |
|  | Transport of spent material |  |  | |
|  | * Number of conveyors | - |  | |
|  | * Type | - |  | |
|  | * Enclosure | - |  | |
| **A3 Sec. 2.7** | **Re-injection of Used Absorbent/Adsorbent** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Recirculation of spent absorbent/adsorbent | Yes/no |  | |
| Addition of water to the recirculated material | Yes/no |  | |
| **A3 Sec. 2.3** | **Nominal Process Data** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Amount recirculated material | kg/h |  | |
|  | Amount of water added to recirculated material | m3/h |  | |
|  | **Dimensioning Data** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Amount recirculated material | kg/h |  | |
|  | Amount of water added to recirculated material | m3/h |  | |
|  | **Mechanical Data** |  |  | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Outtake from extraction system to recirculation |  |  | |
|  | * Type/description | - |  | |
|  | * Min-max capacity | kg/h |  | |
|  | Transport system for recirculation |  |  | |
|  | * Type | - |  | |
|  | * Capacity, min-max | kg/h |  | |
|  | * Construction material | - |  | |

| **Table 16** | **Technical Data** | Technical Data for Evaluation: |  | |
| --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment**  **Low-temperature Economizer (option 1)** | Supplier stamp: |  | |
| **A3 Sec. 3** | **General** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | General description of District-heating economiser system, including: | | |  |
|  | * Diagram and drawing of economiser including connection to district-heating system, valves and shunts | | |  |
|  | * Cleaning procedure during operation | | |  |
|  | * Cleaning procedure during revisions | | |  |
| **A3 Sec. 3.2** | **Nominal Process Data** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Flue gas at inlet, nominal/expected: |  |  | |
|  | - Flue gas flow | Nm³/h, wet |  | |
|  | - Temperature | °C |  | |
|  | - H2O | % (v/v) |  | |
|  | - O2 | %, dry (v/v) |  | |
|  | - Flue gas negative pressure, inlet | Pa |  | |
|  | - Pressure drop, flue gas side | Pa |  | |
|  | - District-heating water flow | kg/h |  | |
|  | - Water temperature at inlet | °C |  | |
|  | - Temperature increase of water | °C |  | |
|  | - Pressure drop, water side | bar |  | |
|  | Flue gas at outlet, nominal/expected: |  |  | |
|  | - Flue gas temperature | °C |  | |
| **A3 Sec. 3.2** | **Dimensioning Data** | | | |
|  | ***Technical data:\**** | ***Unit*** | ***Value/description*** | |
|  | Maximum flue gas outlet temperature at maximum fouling (nominal flow) | °C |  | |
| **A3 Sec. 3.2** | **Installation/Lay-out Information** | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | |
|  | Height | m |  | |
|  | Length | m |  | |
|  | Width | m |  | |
|  | Weight (empty/in operation) | t |  | |
|  | Mechanical Data: | | | |
|  | - Construction material, casing | - |  | |
|  | - Lining, casing | - |  | |
|  | - Construction material, tubing | - |  | |
|  | - Corrosion protection, tubing | - |  | |
|  | Mechanical design flue gas pressure range (min/max), difference to ambient | Pa/Pa |  | |
|  | Tubing: | | | |
|  | - Heating surface area | m² |  | |
|  | - Tube diameter, outer | mm |  | |
|  | - Tube pitching | mm |  | |
|  | - Tubing arrangement (co-, counter, cross flow) | - |  | |
|  | - Fouling factor | m2˚C/W |  | |
| **A3 Sec. 3.2** | **Circulation Pumps** | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | |
|  | Number, total | - |  | |
|  | Number, standby | - |  | |
|  | Capacity per pump | m3/h |  | |
|  | Installed motor effect per pump | kW |  | |

| **Table 17** | **Technical Data** | Technical Data for Evaluation: |  | |
| --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment**  **Flue gas condensation – Quencher (option 1)** | Supplier stamp: |  | |
| **A3 Sec. 3** | **General** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | Drawing and description of flue gas condensation quencher, incl. internal equipment etc. | | |  |
| **A3 Sec. 3.3** | **Nominal Process Data** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Inlet flue gas flow rate, wet | Nm³/h |  | |
|  | Inlet flue gas temperature | °C |  | |
|  | Outlet flue gas temperature | °C |  | |
|  | Outlet flue gas moisture content | Vol% |  | |
|  | Water evaporation | m³ /h |  | |
| **A3 Sec. 3.3** | **Dimensioning Data** | | | |
|  | ***Technical data:\**** | ***Unit*** | ***Value/description*** | |
|  | Inlet flue gas flow rate, wet | Nm³/h |  | |
|  | Minimum pressure | Pa |  | |
|  | Maximum pressure | Pa |  | |
|  | Maximum inlet temperature | °C |  | |
| **A3 Sec. 3.3** | **Mechanical Data** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | Description of control principle for bleed discharge | | |  |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Construction materials: | | | |
|  | - Quencher (walls/lining) | - |  | |
|  | - Internals | - |  | |
|  | - Nozzles | - |  | |
| **A3 Sec. 3.3** | **Installation/Lay-out Information** | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | |
|  | Position (standing, laying) | - |  | |
|  | Height (length, total) | m, m |  | |
|  | Diameter | m |  | |
| **A3 Sec. 3.3** | **Circulation Pumps** | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | |
|  | Number, total | - |  | |
|  | Number, standby | - |  | |
|  | Capacity per pump | m3/h |  | |
|  | Pressure increase | bar |  | |
|  | Installed motor effect per pump | kW |  | |
| **A3 Sec. 3.3** | **Emergency System** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | Description of emergency cooling system | | |  |
|  | Location of emergency nozzles | | |  |
|  | Working principle and location of emergency water tank | | |  |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Emergency Cooling System, Dimensioning Data: | | | |
|  | - Quench inlet flue gas temperature | °C |  | |
|  | - Consumption when in use on emergency | m3/h |  | |
|  | - Minimum running time when no external water is available | min |  | |
|  | Emergency nozzles: | | | |
|  | - Number | **-** |  | |
|  | Emergency water tank: | | | |
|  | - Net volume | m3 |  | |

| **Table 18** | **Technical Data** | Technical Data for Evaluation: |  | |
| --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment**  **Condensing Section**  **(option 1)** | Supplier stamp: |  | |
| **A3 Sec. 3.3** | **General data** | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | |
|  | Number of stages | - |  | |
|  | Type (type of packing) | - |  | |
|  | pH adjustment additive if any (type and strength) | - |  | |
|  | Data for outlet: | | | |
|  | - Outlet flue gas flow rate, wet gas | Nm³/h |  | |
|  | - Outlet flue gas moisture content | Vol% |  | |
|  | Dimensioning data:\* | | | |
|  | - Maximum flue gas flow rate | Nm³/h |  | |
|  | - Minimum pressure | Pa |  | |
|  | - Maximum pressure | Pa |  | |
|  | - Pressure loss at max flow (condenser/demister) | Pa |  | |
| **A3 Sec.3.3** | **Concentrations of Flue Gas at Outlet, Expected Values at Nominal Load, 11% O2** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Particles | mg/Nm3 dry |  | |
|  | HCl | mg/Nm3 dry |  | |
|  | HF | mg/Nm3 dry |  | |
|  | SO2 | mg/Nm3 dry |  | |
|  | Hg | mg/Nm3 dry |  | |
|  | Dioxins and furans (Teq.) | ng/Nm3 dry |  | |
| **A3 Sec. 3.3** | **Mechanical Data** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | Description of control principle for bleed to reactor | | |  |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Construction materials (walls/lining) | - |  | |
|  | Construction materials, internals | - |  | |
|  | Active volume (i.e. volume covered by liquid spray) | m³ |  | |
| **A3 Sec. 3.3** | **Nozzles** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Number of nozzle layers | - |  | |
|  | Number of nozzles per layer | - |  | |
|  | Type | - |  | |
|  | Construction materials | - |  | |
| **A3 Sec. 3.3** | **Installation/Lay-out Information** | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | |
|  | Height, total | m |  | |
|  | Diameter | m |  | |
| **A3 Sec. 3.3** | **Circulation System and Pumps** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Liquid/gas-ratio | m³ /Nm³ |  | |
|  | Number of pumps, total | - |  | |
|  | Number of pumps, standby | - |  | |
|  | Type of pumps | - |  | |
|  | Capacity per pump | m3/h |  | |
|  | Pressure increase | bar |  | |
|  | Installed motor effect per pump | kW |  | |
| **A3 Sec. 3.4** | **Storage Tank for quench and condensing section** | | | |
|  | ***Technical data:*** |  |  | |
|  | Volume by Tenderer in order to minimum hold 100% of max liquid volume from polishing scrubber stage and flue gas condenser stage | m3 |  | |

| **Table 19** | **Technical Data** | Technical Data for Evaluation: |  | |
| --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment**  **Heat pump section**  **(option 1)** | Supplier stamp: |  | |
| **A3 Sec. 3.5** | **Heat pump system** | | | |
|  | ***Descriptions to be included in the Tender:*** | | | ***Reference*** |
|  | PFD of each heat pump unit type | | |  |
|  | PFD of heat pump system, including process data of the load cases of appendix A13 *Process and Design Data*. Single/double effect | | |  |
|  | Refrigerant circuit plot in a temperature-concentration diagram with indicated crystallization limits | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | |
|  | Number of heat pump units | - |  | |
|  | Heat pump type | - |  | |
|  | Driving force (media) | - |  | |
|  | Consumption of driving force media | - |  | |
|  | Rated capacity (chilling power) of each heat pump unit | MWh/h |  | |
|  | Turndown / Control ratio | - |  | |
|  | Minimal load | MWh/h |  | |
|  | Parasitic load | MWh/h |  | |
|  | Refrigerant | - |  | |
|  | Corrosion inhibitor and concentration | mg/L |  | |
|  | Measures to avoid corrosion during vacuum breaking maintenance and long-term shut-downs | - |  | |
|  | Heat pump unit dimensions (H/L/W) | m/m/m |  | |
|  | Design COP factor for each heat pump | - |  | |
|  | Design COP factor for each heat pump system | - |  | |
|  | Vacuum vapor purge system(s) type | - |  | |
|  | Material of internal heat exchangers | - |  | |
|  | Material of shell | - |  | |
|  | Vacuum in evaporators/absorbers | - |  | |
|  | Weight per heat pump unit (with normal filling) | ton |  | |

| **Table 20** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment** **Reheater (option 1)** | Supplier stamp: | |  | |
| **A3 Sec. 3.6** | **General Data** | | | | |
|  | ***Descriptions to be included in the Tender:*** | | | | ***Reference*** |
|  | Description of technical solution for avoidance of droplet fallout from the flue gas | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | Make | - |  | | |
|  | Type | - |  | | |
|  | **Nominal process data** | | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | Operating Temperatures, flue gas: | | | | |
|  | - Inlet | °C |  | | |
|  | - Outlet | °C |  | | |
|  | Heating media, in: | | | | |
|  | - Type  (DH water / Steam / Water from intermediate cycle of the LT ECO) | - |  | | |
|  | - Temperature | °C |  | | |
|  | - Pressure | bara |  | | |
|  | - Consumption | kg/h |  | | |
|  | Heating media, out: | | | | |
|  | - Type (DH water / condensate) | - |  | | |
|  | - Temperature | °C |  | | |
|  | - Pressure | bara |  | | |
| A3 Sec. 3.6 | **Dimensioning data** | | | | |
|  | ***Technical Data:\**** | ***Unit*** | ***Value/description*** | | |
|  | Dimensioning flue gas flow rate, wet | Nm³/h |  | | |
|  | Max. obtainable flue gas temperature | °C |  | | |
|  | Transferred heat | kW |  | | |
|  | Heating media, in: | | | | |
|  | - Max. consumption | kg/h |  | | |
|  | Heating media, out: | | | | |
|  | - Min. / Max. temperature | °C/°C |  | | |
|  | - Min. / Max. pressure | bara/bara |  | | |
| A3 Sec. 3.6 | **Mechanical data** | | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | Construction materials, heat exchanger | - |  | | |
|  | Construction materials, heat casing | - |  | | |
|  | Heating surface area | m² |  | | |
| A3 Sec. 3.6 | **Installation/lay-out information (approximate values)** | | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | Height | m |  | | |
|  | Length | m |  | | |
|  | Width | m |  | | |
|  | Weight (in operation) | t |  | | |

| **Table 21** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment**  **Flue Gas Condensate  (option 1)** | Supplier stamp: | |  | |
| **A3** | **Flue Gas Condensate System** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Description of principles used to optimise water balance. | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | - Expected data of condensate from direct condensation (nominal): | | | | |
|  | - pH | - |  | | |
|  | - Temperature | °C |  | | |
|  | - Suspended solids | mg/L |  | | |
|  | - Cl- | mg/L |  | | |
|  | - F- | mg/L |  | | |
|  | - SO42- | mg/L |  | | |
|  | - SO32- | mg/L |  | | |
|  | - Hg | µg/L |  | | |
|  | - Heavy metals (Cd, Tl, As, Pb, Co, Cr, Cu, Mn, Ni, Sb, V, Zn) | µg/L |  | | |
|  | - Dioxins and furans (Teq.) | ng/L |  | | |
|  | - Expected data of condensate from subcooled (HP) condensation (nominal): | | | | |
|  | - pH | - |  | | |
|  | - Temperature | °C |  | | |
|  | - Suspended solids | mg/L |  | | |
|  | - Cl- | mg/L |  | | |
|  | - F- | mg/L |  | | |
|  | - SO42- | mg/L |  | | |
|  | - SO32- | mg/L |  | | |
|  | - Hg | µg/L |  | | |
|  | - Heavy metals (Cd, Tl, As, Pb, Co, Cr, Cu, Mn, Ni, Sb, V, Zn) | µg/L |  | | |
|  | - Dioxins and furans (Teq.) | ng/L |  | | |

| **Table 22** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment Flue gas condensate treatment (option 1)** | Supplier stamp: | |  | |
| A3 Sec. 10.2 | **Flue gas condensate treatment** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | General description of working principles of condensate treatment and discussion of choice of principles, redundancy, reject optimisation, back flushing principles and means of verifying effluent quality.  Flow diagram, nominal and dimensioning flows, expected composition through system, nominal, i.e. pH, Cl, SO4, Hg, suspended solids.  The description shall include information about each treatment step including, but not limited to:   * Type of each step (e.g. filtration, reverse osmosis, ion exchange, neutralization) * Number of units, filters, tanks and pumps for each step * Inlet and reject flows * Cycle efficiencies and batch times * Inlet temperatures (e.g. maximum) * Retention time * pH value * Chemical consumptions | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | Nominal inlet flow | m³/h |  | | |
|  | Dimensioning inlet flow (range) | m³/h |  | | |
|  | No of polishing steps | - |  | | |
| A3 Sec. 10.2 | **Cleaned condensate Control** | | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | Nominal outlet flow | m³/h |  | | |
|  | Dimensioning outlet flow | m³/h |  | | |
|  | Size | m3 |  | | |
|  | Construction material | - |  | | |
|  | Agitation | y/n |  | | |
|  | Number of effluent pumps | - |  | | |
|  | Capacity of effluent pumps, each | m³/h |  | | |
|  | Outlet pressure of effluent pumps | barg |  | | |
|  | Control parameters: | | | | |
|  | - pH | Yes/no |  | | |
|  | - Turbidity | Yes/no |  | | |
|  | - Conductivity | Yes/no |  | | |
|  | - Temperature | Yes/no |  | | |
|  | - Flow to discharge | Yes/no |  | | |
|  | - Flow to other consumers outside Contract Object | Yes/no |  | | |
|  | - Other, please specify | - |  | | |
|  | **Water Discharge** | | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | Max. flow | m3/h |  | | |
|  | Nominal quantity (annual) | m3 |  | | |
|  | Max. temperature | ⸰C |  | | |

| **Table 23** | **Technical Data** | Technical Data for Evaluation: | |  |
| --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment**  **Induced Draught Fan** | Supplier stamp: | |  |
| **A3 Sec. 4** | **General Data** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Make | - |  | |
|  | Type (e.g. radial, axial) | - |  | |
|  | Number of motors | - |  | |
| A3 Sec. 4 | **Nominal Process Data** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Flue gas flow rate, wet | Nm3/h |  | |
|  | Inlet temperature | °C |  | |
|  | Outlet temperature | ºC |  | |
|  | Inlet negative pressure | Pa |  | |
|  | Pressure increase | Pa |  | |
|  | Power consumption | kW |  | |
|  | Revolutions | min-1 |  | |
|  | Efficiency at nominal load | % |  | |
| A3 Sec. 4 | **Dimensioning Process Data** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Flue gas flow rate, wet | Nm3/h |  | |
|  | Min / Max permissible inlet temperature | °C/ºC |  | |
|  | Inlet negative pressure | Pa |  | |
|  | Pressure increase | Pa |  | |
|  | Power consumption at max. condition | kW |  | |
|  | Revolutions | min-1 |  | |
| A3 Sec. 4 | **Mechanical Data / Dimensions** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Construction materials: | | | |
|  | - Impeller | - |  | |
|  | - House | - |  | |
|  | - Insulation of house | - |  | |
|  | Noise mitigation measures | - |  | |
|  | Vibration damper: | | | |
|  | - Type | - |  | |
|  | Sound attenuator in duct damper: | | | |
|  | - Type/description | - |  | |

| **Table 24** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment**  **Flue Gas Monitoring** | Supplier stamp: | |  | |
| **A3 Sec. 5.2** | **Emission Monitoring Station** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of consumables at the emission monitoring station | | | |  |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | |
|  | Number of Emission monitoring units | - |  | | |
|  | Type of measuring equipment for: | | | | |
|  | - Barometric pressure | - |  | | |
|  | - Flue gas flow | - |  | | |
|  | - Flue gas temperature | - |  | | |
|  | - Flue gas pressure | - |  | | |
|  | - H2O | - |  | | |
|  | - O2 | - |  | | |
|  | - CO2 | - |  | | |
|  | - Dust | - |  | | |
|  | - HCl | - |  | | |
|  | - HF | - |  | | |
|  | - SO2 | - |  | | |
|  | - NOX (NO + NO2) | - |  | | |
|  | - NH3 | - |  | | |
|  | - TOC | - |  | | |
|  | - CO | - |  | | |
|  | - N2O | - |  | | |
|  | - Hg | - |  | | |
| A3 Sec. 5.1 | **Raw Gas Monitoring (Upstream Bag House Filter)** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of consumables at the raw gas monitoring station | | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | |
|  | Type of measuring equipment for: | | | | |
|  | - H2O | - |  | | |
|  | - O2 | - |  | | |
|  | - Dust | - |  | | |
|  | - HCl | - |  | | |
|  | - SO2 | - |  | | |
| A3 Sec. 5.1 | **Raw Gas Monitoring (Downstream Bag House Filter) – option 1** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of consumables at the raw gas monitoring station | | | |  |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | |
|  | Type of measuring equipment for: | | | | |
|  | - Dust | - |  | | |
|  | - HCl | - |  | | |
|  | - SO2 | - |  | | |

| **Table 25** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment**  **Ducts and Stack** | Supplier stamp: | |  | |
| **A3 Sec. 6.1** | **Flue Gas Ducts** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Description of the use of steel ducts | | | |  |
|  | Description of the use of ducts in other materials than steel, if any. Specify for each type of material. | | | |  |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | |
|  | Steel ducts: | | | | |
|  | - Dimensioning pressure (min/max) | Pa/Pa |  | | |
|  | - Temperature (min/max) | ºC/ºC |  | | |
|  | - Material | - |  | | |
|  | - Lining, type | - |  | | |
|  | - Diameter | m |  | | |
|  | - Thickness | mm |  | | |
|  | - Insulation, type | - |  | | |
|  | - Insulation, thickness and K-value | mm, W/m2/oC |  | | |
|  | - Cladding, type | - |  | | |
|  | Ducts on other materials than steel (specify for each type of material): | | | | |
|  | - Material, type 2 | - |  | | |
|  | - Dimensioning pressure (min/max) | Pa/Pa |  | | |
|  | - Temperature (min/max) | ºC/ºC |  | | |
|  | - Material | - |  | | |
|  | - Lining, type | - |  | | |
|  | - Diameter | m |  | | |
|  | - Thickness | mm |  | | |
|  | - Insulation, type | - |  | | |
|  | - Insulation, thickness and K-value | mm, W/m2/oC |  | | |
|  | - Cladding, type | - |  | | |
|  | Flue gas damper: | | | | |
|  | - No/dimension | -/mm |  | | |
|  | - Type | - |  | | |
|  | - Material (house, damper, sealing) | - |  | | |
|  | - Tightness | % |  | | |
|  | - Sealing air | y/n |  | | |
|  | - Opening time (0 – 100 %) | s |  | | |
|  | - Actuation (electr./pneum.) | - |  | | |
| **A3 Sec. 6.2** | **Stack** | | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | |
|  | Nominal process data: | | | | |
|  | - Flue gas velocity (no condensation) | m/s |  | | |
|  | - Flue gas velocity (full condensation) | m/s |  | | |
|  | Dimensioning process data: | | | | |
|  | - Flue gas velocity (no condensation, max. temperature) | m/s |  | | |
|  | - Flue gas velocity (full condensation) | m/s |  | | |
|  | Flue Gas Pipe construction: | | | | |
|  | - Pipe material | - |  | | |
|  | - Internal pipe diameter (top, main run) | m |  | | |
|  | - Thickness | mm |  | | |
|  | - Surface treatment | - |  | | |
|  | - Insulation, type | - |  | | |
|  | - Insulation, thickness and K-value | mm, W/m2/oC |  | | |
|  | - Cladding (type) | - |  | | |

| **Table 26** | **Technical Data** | Technical Data for Evaluation: | |  | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Reference** | **Flue Gas Treatment**  **Silos and Tanks for Consumables and Products** | Supplier stamp: | |  | | |
| **A3 Sec. 7.1** | **General Descriptions** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | | ***Reference*** |
|  | Description of general principle including weighing cells and bridge breaking equipment | | | | |  |
|  | Flow diagram | | | | |  |
|  | Description of measure methods for fire prevention, abatement, explosion prevention, control of function of ventilation silo-filter and possibly other equipment. | | | | |  |
| **A3 Sec. 7.2** | **Adsorbent (HOK/activated carbon)** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** | |
|  | Flow diagram, covering as a minimum storage, transport and distribution | | | |  | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | | |
|  | Type and brand name | - |  | | | |
|  | Composition | w/w% |  | | | |
|  | Carbon content | w/w% |  | | | |
|  | Nominal consumption | kg/h |  | | | |
| **A3 Sec. 7.2.2** | **Storage (HOK/activated carbon) – option 3** | | | | | |
|  | Construction materials | - |  | | | |
|  | Storage capacity (at nominal load) | days |  | | | |
|  | Volume Gross/Net | m3/m3 |  | | | |
|  | Dimensions (diameter x height) | m x m |  | | | |
|  | Weight (empty/full) | t/t |  | | | |
|  | Over and under pressure, max | Pa/Pa |  | | | |
|  | Type of level indicator | - |  | | | |
|  | Number of weighing cells | - |  | | | |
|  | Filter type | - |  | | | |
|  | Silo, lay-out information: |  |  | | | |
| **A3 Sec. 2.4** | **Transport System (HOK/activated carbon)** | | | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | | |
|  | Type | - |  | | | |
|  | Capacity, min – max | kg/h |  | | | |
| **A3 Sec. 2.3** | **Absorbent (hydrated lime)** – If used by Contractor | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** | |
|  | Flow diagram, covering as a minimum storage, transport and distribution | | | |  | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | | |
|  | Type and brand name | - |  | | | |
|  | Composition | w/w% |  | | | |
|  | Active absorbent content | w/w% |  | | | |
|  | Nominal consumption | kg/h |  | | | |
| **A3 Sec. 2.4** | **Transport System Fresh Absorbent (hydrated lime)** – If used by Contractor | | | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | | |
|  | Type | - |  | | | |
|  | Capacity, min – max | kg/h |  | | | |
| **A3 Sec. 7.3.2** | **Silo for Fresh Absorbent (hydrated lime)** – If used by Contractor | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** | |
|  | Description of general principle including weighing cells and bridge breaking equipment | | | |  | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | | |
|  | Construction materials | - |  | | | |
|  | Dimensions (diameter x height) | m/m |  | | | |
|  | Storage capacity (at nominal load) | days |  | | | |
|  | Volume Gross/Net | m3/m3 |  | | | |
|  | Weight (empty/full) | t/t |  | | | |
|  | Over and under pressure, max | Pa/Pa |  | | | |
|  | Type of level indicator | - |  | | | |
|  | Number of weighing cells | - |  | | | |
|  | Filter type | - |  | | | |
|  | Silo, lay-out information: |  |  | | | |
| **A3 Sec. 2.3** | **Absorbent (quick lime)** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** | |
|  | Flow diagram, covering as a minimum storage, transport and distribution | | | |  | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | | |
|  | Type and brand name | - |  | | | |
|  | Composition | w/w% |  | | | |
|  | Active absorbent content | w/w% |  | | | |
|  | Nominal consumption | kg/h |  | | | |
| **A3 Sec.2.4** | **Transport System Fresh Absorbent (quick lime)** | | | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | | |
|  | Type | - |  | | | |
|  | Capacity, min – max | kg/h |  | | | |
| **A3 Sec. 7.3.3** | **Silo Fresh Absorbent (quick lime) – option 4** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** | |
|  | Description of general principle including weighing cells and bridge breaking equipment | | | |  | |
|  | Silo, lay-out information | | | |  | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | | |
|  | Construction materials | - |  | | | |
|  | Dimensions (diameter x height) | m/m |  | | | |
|  | Storage capacity (at nominal load) | days |  | | | |
|  | Volume Gross/Net | m3/m3 |  | | | |
|  | Weight (empty/full) | t/t |  | | | |
|  | Over and under pressure, max | Pa/Pa |  | | | |
|  | Type of level indicator | - |  | | | |
|  | Number of weighing cells | - |  | | | |
|  | Filter type | - |  | | | |

# Turbine/Generator and DH Condensers

Please refer to Part III *Employers Requirement*, appendix A1 *Overall Scope of Works* and A4 *Technical Specifications for Turbine/Generator and Condensers.*

| **Table 27** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
|  | **Turbine/generator**  **General** | Supplier stamp: | |  | |
| **Reference** |  |  | |  | |
| **A4** | **General Requirements** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Description of method and procedure for start-up and shut-down of the Line showing that the turbine is able to start up with no steam flow over the roof. Start-up and shut-down curves must be included. | | | |  |
|  | Duration and frequency of maintenance intervals | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | |
|  | Start-up times to 100% load at: |  |  | | |
|  | * cold turbine | hrs. |  | | |
|  | * warm start-up (vacuum remained) | hrs. |  | | |
|  | Manufacture of main components: |  |  | | |
|  | * Turbine | - |  | | |
|  | * Generator | - |  | | |
|  | * Gearbox (if required) | - |  | | |
|  | * Condensers including condensate pumps |  |  | | |
|  | * By-pass system | - |  | | |
| **A4** | **Electrical and Cooling Supply** | | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | | |
|  | Power consumption (400V) | | | | |
|  | * Max. consumption | kW |  | | |
|  | * Nominal consumption | kW |  | | |
|  | * Nominal annual consumption | MWh |  | | |
|  | Component cooling | | | | |
|  | * Max. consumption | kW |  | | |
|  | * Nominal consumption | kW |  | | |

| **Table 28** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
|  | **Turbine/generator**  **Turbine** | Supplier stamp: | |  | |
| **Reference** |  |  | |  | |
| **A4 Sec 2+3** | **Steam Turbine, Turbine Bleed and Glands** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | A sectional drawing of the turbine | | | |  |
|  | A description of the gland steam system and its control. | | | |  |
|  | The number, type and location of safety devices at the turbine bleeds and their relief pressures. | | | |  |
|  | The gland steam consumption shall appear from the heat balances. | | | |  |
|  | Dimensions, design, weight, heating surface, water flow and pressure loss of the gland steam condenser. | | | |  |
|  | Descriptions of main components, e.g.:   * Turbine rotor * Turbine shell * Bearings * Emergency shut-off valve * Control valves | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | |
|  | The allowable range for the following parameters for the turbine: | | | | |
|  | live steam temperature range | ºC |  | | |
|  | live steam temperature gradients | ºC/min. |  | | |
|  | The allowable range for the following parameters with bypass: | | | | |
|  | live steam temperature range | ºC |  | | |
|  | live steam temperature gradients | ºC/min. |  | | |
|  | Live steam pressure at maximum load (110%) | bar(a) | 40 | | |
|  | Maximum allowable load gradients (up/down) | MW/min |  | | |
|  | No. of expansion stages |  |  | | |
|  | Live steam pressure regulation principle  (State throttling or regulation stage) | - |  | | |
|  | No. of regulating valves | - |  | | |
|  | Regulating valves actuating method (State hydraulic or pneumatic) | - |  | | |
|  | Regulating valves: common or singularly actuated | - |  | | |
|  | Nominal shaft speed | 1/min |  | | |
|  | Dimensions of deaeration steam bleed | mm |  | | |
|  | Dimensions of turbine bleed(s) | mm |  | | |
|  | Dimensions of concrete table plate | mm x mm |  | | |
| **A4 Sec. 4** | **Turbine Insulation (Noise and Heat)** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specifications of turbine insulation | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | |
|  | Supplier of turbine insulation. |  |  | | |
| **A4 Sec 7+9** | **Oil and Control System** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | The oil and control system design | | | |  |
|  | The design of the safety system and the equipment | | | |  |
| **A4 Sec. 11** | **Turbine Bypass System** | | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | |
|  | Type | - |  | | |
|  | Noise emission during nominal operation | - |  | | |
|  | Materials/alloys used | - |  | | |
|  | Detailed drawing of bypass reduction station | - |  | | |
|  | Design life (number of cycles and hours) | - |  | | |

| **Table 29** | **Technical Data** | Technical Data for Evaluation: | | |  | |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Turbine/generator**  **Generator** | Supplier stamp: | | |  | |
| **Reference** |  |  | | |  | |
| **A4 sec. 18** | **Synchronous Generator** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | | ***Reference*** |
|  | An exhaustive and detailed description of the offered generator including mechanical and electrical equipment and the following issues:   * Short circuit output of the generator * Type of the bearings and the lubrication system to be used | | | | |  |
|  | Description of how the co-ordination with the 22kV grid has been considered concerning:   * Protection relay functions for protection of generator as well as, the grid protection to the grid connection points * a full redundant protection system and backup. | | | | |  |
|  | System description, calculation basis and block diagram of the system. | | | | |  |
|  | The factory tests and the site tests to be made, and the norms on which the tests are to be based, including procedures and examples of test records. | | | | |  |
|  | Information on the structure of the offered rotor body. | | | | |  |
|  | Documentation stating that the cooling system can keep the stator and rotor within the guaranteed range of temperatures under all operation modes, including documentation for the cooling circuit (process diagram), cooling medium, mass flow and a list of temperatures before and after cooling. | | | | |  |
|  | A reference list of generators with a similar cooling system. | | | | |  |
|  | Specifications for the protection equipment proposed for the generator. | | | | |  |
|  | Description of the co-ordination and distribution between the suppliers of generator and switchboards concerning measuring transformers, protection etc. | | | | |  |
|  | Documentation and schematic diagrams for excitation system, and relay protection for the generator. | | | | |  |
|  | Curve sheets with no-load operation and short-circuit curves. | | | | |  |
|  | Curve of efficiency as a function of the load. | | | | |  |
|  | Confirmation that the proposal considers all conditions and operating situations, including any third harmonic currents, unsymmetrical load, and transient voltages and that the system is in full compliance with the requirements of the relevant grid code. | | | | |  |
|  | List of proposed spare parts. | | | | |  |
|  | ***Technical Data:*** | ***Unit*** | | | ***Value/Description*** | |
|  | No. of measuring cores provided for the generator protection and excitation equipment. | - | | |  | |
|  | Voltage- and current limitations of the excitation equipment. | kV | | |  | |
|  | The voltage increase at disconnection from full load and constant excitation current. | kV | | |  | |
| **A4 sec. 18** | **Data for three-phase synchronous generator** | | | | | |
|  | ***Technical Data:*** | | ***Unit*** | ***Value/Description*** | | |
|  | The generator in general: | | | | | |
|  | * Make | | - |  | | |
|  | - Type | | - |  | | |
|  | - Rated power | | MW |  | | |
|  | - At power factor | |  |  | | |
|  | - Absolute maximum power | | MW |  | | |
|  | - Rated voltage phase/phase kV | |  % |  | | |
|  | - Rated current | | A |  | | |
|  | - Rated frequency | | Hz |  | | |
|  | - Rated speed | | r/min. |  | | |
|  | - Standby losses by nominal voltage | | kW |  | | |
|  | - Load losses by nominal power | | kW |  | | |
|  | - Three-phase stationary short-circuit current at full load excitation | | kA |  | | |
|  | - Maximum asymmetrical three-phase short-circuit current | | kA |  | | |
|  | Resistance: | | | | | |
|  | - ra stator resistance per phase | |  |  | | |
|  | Reactances: | | | | | |
|  | - Xad stator dispersion reactance per phase | | % |  | | |
|  | - Xd | | % |  | | |
|  | - Xq | | % |  | | |
|  | - X’d (unsaturated) | | % |  | | |
|  | - X’q | | % |  | | |
|  | - X’’d (saturated) | | % |  | | |
|  | - X’’q | | % |  | | |
|  | - Xd | | % |  | | |
|  | - X2 | | % |  | | |
|  | - X0 | | % |  | | |
|  | Time constants: | | | | | |
|  | - Td0’ | | sec |  | | |
|  | - Td0’’ | | sec |  | | |
|  | - Td’ | | sec |  | | |
|  | - Td’’ | | sec |  | | |
|  | - Tq0’ | | sec |  | | |
|  | - Tq0’’ | | sec |  | | |
|  | - Ta | | sec |  | | |
|  | - Short-circuit ratio | | % |  | | |
|  | Stator: | | | | | |
|  | - Weight | | kg |  | | |
|  | - Maximum size of terminal | | mm2 |  | | |
|  | - Insulation class | | - |  | | |
|  | - Temperature rise at nominal load | | K |  | | |
|  | - Winding temperature detector type | | - |  | | |
|  | Rotor: | | | | | |
|  | - Weight | | kg |  | | |
|  | - Insulation class | | - |  | | |
|  | - Temperature rise at nominal load | | K |  | | |
|  | - Number of poles | | - |  | | |
|  | - Moment of inertia | | Kg/m2 |  | | |
|  | - Bearing temperature detector type | | - |  | | |
|  | Excitation equipment: | | | | | |
|  | - Make | | - |  | | |
|  | - Type | | - |  | | |
|  | Other: | | | | | |
|  | - Degree of protection for enclosures | | IP |  | | |
|  | - Cooling medium | | - |  | | |
|  | - Mass flow | | m3/h |  | | |
|  | - Voltage of anti-condensation heating | | V |  | | |
|  | - Output of anti-condensation heating | | kW |  | | |

| **Table 30** | **Technical Data** | Technical Data for Evaluation: | |  | | |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Turbine/generator**  **District Heat and Condensate** | Supplier stamp: | |  | | |
| **Reference** |  |  | |  | | |
| **A4 sec. 13** | **District Heating Condensers** | | | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | | |
|  | Number of district heat condensers | - |  | | | |
|  | Type of exchangers (U-tubes, straight tubes) | - |  | | | |
|  | Pressure loss on water side at max. flow | kPa |  | | | |
|  | Heating surface | m2 |  | | | |
|  | Max. water flow velocity | m/s |  | | | |
|  | Fouling factor | m2˚C/W |  | | | |
|  | Materials used (pipes, shell) | - |  | | | |
|  | No of pipes and dimensions | qty/mm |  | | | |
|  | Design pressure | bara |  | | | |
|  | Design temperature | ºC |  | | | |
|  | Design terminal temperature difference (TTD) at nominal load | ºC |  | | | |
|  | Weight and sketch of exchan­ger(s) incl. main dimensions showing e.g. the necessary ser­vice areas. | Kg |  | | | |
| **A4 sec. 14** | **Evacuation System** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | | ***Reference*** |
|  | Description of the offered system, e.g. by a diagram showing the equipment | | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | | |
|  | Evacuation time from atmospheric pressure to start-up pressure | hrs |  | | | |
| **A4 sec. 15** | **Condensate Pumps** | | | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | | |
|  | For each set of condensate pumps: | | | | | |
|  | Head | m |  | | | |
|  | NPSH | m |  | | | |
|  | Quantity | kg/s |  | | | |
|  | Power consumption | kW |  | | | |
| **A4 sec. 16** | **Drain Systems** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | **Reference** | |
|  | Design and mode of operation of the offered drain system as well as the valves used. | | | |  | |
| **A19** | **Summer coolers** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | **Reference** | |
|  | Energy and mass balances for all turbine load points given in appendix A13 *Process and Design Data*. The balances shall include states (p,T,h,m) for the DH water, water/glycol circuit and air. | | | |  | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | | |
|  | Dry air coolers |  |  | | | |
|  | * Number of modules | - |  | | | |
|  | * Cooling capacity per module | kW |  | | | |
|  | * No. of coils per module | - |  | | | |
|  | * Total surface area per module | m2 |  | | | |
|  | * Heat transfer coefficient | W/m2K |  | | | |
|  | * Design temperature | ºC |  | | | |
|  | * Design pressure | kPa |  | | | |
|  | * Total Sound pressure level at 1 m free field | dB(A) |  | | | |
|  | * Total dimensions (LxWxH) | m |  | | | |
|  | * Total weight | kg |  | | | |
|  | Water/glycol side |  |  | | | |
|  | * Nominal flow | kg/h |  | | | |
|  | * Nominal temperature in | ºC |  | | | |
|  | * Nominal temperature out | ºC |  | | | |
|  | * Nominal pressure loss | kPa |  | | | |
|  | Air side |  |  | | | |
|  | * Nominal flow | kg/h |  | | | |
|  | * Nominal temperature in | ºC |  | | | |
|  | * Nominal temperature out | ºC |  | | | |
|  | * Nominal pressure loss | kPa |  | | | |
|  | Fans and Motors |  |  | | | |
|  | * No. of fans per module | - |  | | | |
|  | * Air volume | m3/h |  | | | |
|  | * Pressure | Pa |  | | | |
|  | * Power consumption on shaft | kW |  | | | |
|  | * Nominal motor power | kW |  | | | |
|  | * Motor power consumption | kW |  | | | |
|  | * Voltage | V |  | | | |
|  | * Frequency | Hz |  | | | |
|  | * Current – Full load | A |  | | | |
|  | * Motor protection class | IP class |  | | | |
|  | Heat exchanger  (DH and water/glycol circuit) |  |  | | | |
|  | * Number of heat exchangers | - |  | | | |
|  | * Type of exchangers (Plate, U-tubes, straight tubes) | - |  | | | |
|  | * Pressure loss on water side at max. flow | kPa |  | | | |
|  | * Heating surface | m2 |  | | | |
|  | * Max. water flow velocity | m/s |  | | | |
|  | * Fouling factor assumed Glycol side Air side | m2˚C/W m2˚C/W |  | | | |
|  | * Materials used (pipes, shell) | - |  | | | |
|  | * No of pipes and dimensions | qty/mm |  | | | |
|  | * Design pressure | bara |  | | | |
|  | * Design temperature | ºC |  | | | |
|  | * Total weight (wet) | kg |  | | | |

# Auxillary Equipment

Please refer to Part III *Employers Requirement*, appendix A1 *Overall Scope of Works* and A5 *Technical Specifications for Auxiliary Equipment.*

| **Table 31** | **Technical Data** | Technical  Data for | |  |
| --- | --- | --- | --- | --- |
|  |  | Evaluation | |  |
|  | **Incinerator/boiler** | Supplier | |  |
|  | **Auxiliary Systems** | stamp: | |  |
| **Reference** |  |  | |  |
| **A5 sec. 4** | **Waste Cranes** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | Expected outage days and coordination with Employers planned annual revisions for Existing facility when replacing the existing waste cranes with new waste cranes. | | |  |
|  | References for the unmanned full automatic crane system capable of operating continuously for 24 hours in full automatic mode (unmanned).  The references shall be subject to the approval of the Employer. | | |  |
|  | Preliminary drawing for waste cranes | | |  |
|  | A drawing of the cranes operational area showing access ways, working and restricted areas for maintenance of the cranes | | |  |
|  | Calculations of mixing, recasting and feeding capacities including cycle time calculations for manual and unmanned full automatic operation mode (24 h/day) shall be submitted by the Contractor | | |  |
|  | Monorails for service of trolleys | | |  |
|  | Description of procedure for changing crane cable and grab (including demounting procedure) in an easy and safe way. | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | |
|  | Grab size | m3 |  | |
|  | The nominal carrying capacity of the cranes | m3/h |  | |
|  | Crane lifting capacity (MCR) | Tons |  | |
| **A5 sec. 5** | **Turbine Crane** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | Preliminary drawing for turbine cranes incl. hook height | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | |
|  | Crane lifting capacity (MCR) | tons |  | |
| **A5 sec. 7** | **Service Cranes** | | | |
|  | ***Descriptions to be included in Tender:*** | ***Reference*** |  | |
|  | Preliminary drawing for main service cranes |  |  | |
| **A5 sec. 7** | **Compressed Air Distribution System** | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | |
|  | Type and number of buffer tanks | ***-*** |  | |
|  | Capacity of buffer tanks | m3 |  | |
|  | Service air: | | | |
|  | - Peak capacity | Nm³/h |  | |
|  | - Connection points | No. |  | |
|  | Instrument air: | | | |
|  | - Peak capacity | Nm³/h |  | |
|  | - Connection points | No. |  | |
| **A5 sec. 8** | **Central Vacuum Cleaning Distribution System** | | | |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | |
|  | Number of connections | No. |  | |
|  | **Electrical Supply** | | | |
|  | ***Technical data:*** | ***Unit*** | ***Value/description*** | |
|  | Power consumption (400V) | | | |
|  | * Max. consumption | kW |  | |
|  | * Nominal consumption | kW |  | |
|  | * Nominal annual consumption | MWh |  | |

# Electrical Equipment

Please refer to Part III *Employers Requirement*, appendix A1 *Overall Scope of Works* and A6 *Technical Specifications for Electrical Equipment.*

| **Table 32** | **Technical Data** | Technical Data for Evaluation: |  | |
| --- | --- | --- | --- | --- |
|  | **Electrical Equipment General** | Supplier stamp: |  | |
| **Reference** |  |
| **A6 sec. 2+3** | **General** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | The scope of supply and the thoughts behind the systems and the functions of the equipment. | | |  |
|  | List of electrical consumers. Individual data for normal power supply, emergency power supply and safe power supply | | |  |
|  | Maximum power consumption at the different voltage levels. Individual data for normal power supply, emergency power supply and safe power supply | | |  |
|  | Single line diagram (SLD), included SLD of distribution and MCC/ACC switchboards and big motors. Design capacities and operation values. | | |  |
|  | List of possible sub-suppliers. | | |  |
|  | List of local operation panels | | |  |
|  | Specification of cable types for installations of high voltage, low voltage, instruments and communications. | | |  |
|  | Specification of routing material type for cable installation. | | |  |

| **Table 33** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
|  | **Electrical Equipment Power Transformer  12 MVA 22/6.3 kV** | Supplier stamp: | |  | |
| **Reference** |  |  | |  | |
| **A6 sec. 2+3** | **Power Transformer T24- 12MVA 22/6.3 kV**  **r** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of system | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | |
|  | Manufacture | - |  | | |
|  | Type | - |  | | |
|  | Rated power | MVA |  | | |
|  | Frequency | Hz |  | | |
|  | Nominal temperature rise oil | K |  | | |
|  | Nominal temperature rise windings | K |  | | |
|  | Cooling type / system | - |  | | |
|  | Voltage ratio | V / V |  | | |
|  | Rated primary voltage | kV |  | | |
|  | Rated secondary voltage | kV |  | | |
|  | Tap Changer Manufacture | - |  | | |
|  | Tap Changer type | - |  | | |
|  | Tap changer ratings | +/- % |  | | |
|  | Vector group | - |  | | |
|  | Short circuit voltage impedances Uk | % |  | | |
|  | Load losses | kW |  | | |
|  | No-load losses | kW |  | | |
|  | Weight | kg |  | | |
|  | Dimensions | m |  | | |
|  | Noise level | db |  | | |
|  | Design standards | - |  | | |

| **Table 34** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **Reference** | **Electrical Equipment Power Transformer 8 MVA 22/6.3 KV** | Supplier stamp: | |  | |
| **A6 sec. 2+3** | **Power Transformer T25 - 12MVA 22/6.3 kV**  **r** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of system | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | |
|  | Manufacture | - |  | | |
|  | Type | - |  | | |
|  | Rated power | MVA |  | | |
|  | Frequency | Hz |  | | |
|  | Nominal temperature rise oil | K |  | | |
|  | Nominal temperature rise windings | K |  | | |
|  | Cooling type / system | - |  | | |
|  | Voltage ratio | V / V |  | | |
|  | Rated primary voltage | kV |  | | |
|  | Rated secondary voltage | kV |  | | |
|  | Tap Changer Manufacture | - |  | | |
|  | Tap Changer type | - |  | | |
|  | Tap changer ratings | +/- % |  | | |
|  | Vector group | - |  | | |
|  | Short circuit voltage impedances Uk | % |  | | |
|  | Load losses | kW |  | | |
|  | No-load losses | kW |  | | |
|  | Weight | kg |  | | |
|  | Dimensions | m |  | | |
|  | Noise level | db |  | | |
|  | Design standards | - |  | | |

| **Table 35** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **Reference** | **Electrical Equipment Distribution Transformers 5000 kVA** | Supplier stamp: | |  | |
| **A6 sec. 2+3** | **Distribution Transformers – 5000 kVA**  **r** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of system | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | |
|  | Manufacture | - |  | | |
|  | Type | - |  | | |
|  | Rated power | kVA |  | | |
|  | Frequency | Hz |  | | |
|  | Designed to temperature class | - |  | | |
|  | Service up to temperature class | - |  | | |
|  | Nominal temperature rise windings | K |  | | |
|  | Cooling type / system | - |  | | |
|  | Voltage ratio | V / V |  | | |
|  | Rated primary voltage | kV |  | | |
|  | Rated secondary voltage | kV |  | | |
|  | Tap Changer type | - |  | | |
|  | Tap changer ratings | +/- % |  | | |
|  | Vector group | - |  | | |
|  | Short circuit voltage impedances Uk | % |  | | |
|  | Load losses | kW |  | | |
|  | No-load losses | kW |  | | |
|  | Weight | kg |  | | |
|  | Dimensions | m |  | | |
|  | Noise level | db |  | | |
|  | Design standards | - |  | | |

| **Table 36** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **References** | **Electrical Equipment UPS Transformers – 100 kVA** | Supplier stamp: | |  | |
| **A6 sec. 2+3** | **UPS Transformers – 100 kVA**  **r** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of system | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/Description*** | | |
|  | Manufacture | - |  | | |
|  | Type | - |  | | |
|  | Rated power | kVA |  | | |
|  | Frequency | Hz |  | | |
|  | Designed to temperature class | - |  | | |
|  | Service up to temperature class | - |  | | |
|  | Nominal temperature rise windings | K |  | | |
|  | Cooling type / system | - |  | | |
|  | Voltage ratio | V / V |  | | |
|  | Rated primary voltage | V |  | | |
|  | Rated secondary voltage | V |  | | |
|  | Tap Changer type | - |  | | |
|  | Tap changer ratings | +/- % |  | | |
|  | Vector group | - |  | | |
|  | Short circuit voltage impedances Uk | % |  | | |
|  | Load losses | kW |  | | |
|  | No-load losses | kW |  | | |
|  | Weight | kg |  | | |
|  | Dimensions | m |  | | |
|  | Noise level | db |  | | |
|  | Design standards | - |  | | |

| **Table 37** | **Technical Data** | Technical Data for Evaluation: | | |  | |
| --- | --- | --- | --- | --- | --- | --- |
| **Reference** | **Electrical Equipment 22 kV Extension of  Switchboard R2** | Supplier stamp: | | |  | |
| **A6 sec. 2+3** | **22 kV Extension of Switchboard R2** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | | ***Reference*** |
|  | Specification of system | | | | |  |
|  | ***Technical Data:*** | | ***Unit*** | ***Value/description*** | | |
|  | Switchboard Manufacturer | | - |  | | |
|  | - Type | | - |  | | |
|  | - Rated voltage | | kV |  | | |
|  | - Rated frequency | | Hz |  | | |
|  | - Rated insulation level (phase to earth) | | kV |  | | |
|  | - Basic insulation level (BIL) | | kV |  | | |
|  | - Power frequency withstand voltage (1 min.) | | kV |  | | |
|  | - Busbar current rating at 40 °C | | A |  | | |
|  | - Busbar T-off current rating at 40 °C | | A |  | | |
|  | - Short time withstand current | | \_kA / \_sec |  | | |
|  | - Asymmetrical (Peak) | | kA |  | | |
|  | - Symmetrical | | kA |  | | |
|  | Incoming feeders | |  |  | | |
|  | Circuit breakers Manufacturer | | - |  | | |
|  | - Type | | - |  | | |
|  | - Rated current at 40 °C | | A |  | | |
|  | - Short circuit breaking capacity symm. | | kA |  | | |
|  | - Short circuit breaking capacity peak | | kA |  | | |
|  | Other panels | |  |  | | |
|  | Circuit breakers Manufacturer | | - |  | | |
|  | - Type | | - |  | | |
|  | - Rated current at 40 °C | | A |  | | |
|  | - Short circuit breaking capacity symm. | | kA |  | | |
|  | - Short circuit breaking capacity peak | | kA |  | | |
|  | Earthing switches making capacity symm. | | kA |  | | |
|  | - Marking capacity peak | | kA |  | | |
|  | Protection relay types - Incoming feeders  - Outgoing feeders  - Bus tie panel  - Bus riser panel  - Bus voltage panel | | -  -  -  -  - |  | | |
|  | Number of panels | | - |  | | |
|  | Dimensions of panels | | m |  | | |
|  | Total dimension of switchboard | | m |  | | |
|  | Design standards | | - |  | | |

| **Table 38** | **Technical Data** | Technical Data  for Evaluation: | | | |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Reference** | **Electrical Equipment 6.3 kV Distribution Switchboard** | Supplier stamp: | |  | | |
| **A6 sec. 2+3** | **6.3 kV Distribution Switchboard** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** | |
|  | Specification of system | | | |  | |
|  | ***Technical Data:*** | | ***Unit*** | ***Value/description*** | | |
|  | Switchboard Manufacturer | | - |  | | |
|  | - Type | | - |  | | |
|  | - Rated voltage | | kV |  | | |
|  | - Rated frequency | | Hz |  | | |
|  | - Rated insulation level (phase to earth) | | kV |  | | |
|  | - Basic insulation level (BIL) | | kV |  | | |
|  | - Power frequency withstand voltage (1 min.) | | kV |  | | |
|  | - Busbar current rating at 40 °C | | A |  | | |
|  | - Busbar T-off current rating at 40 °C | | A |  | | |
|  | - Short time withstand current | | \_kA / \_sec |  | | |
|  | - Asymmetrical (Peak) | | kA |  | | |
|  | - Symmetrical | | kA |  | | |
|  | Incoming feeders | |  |  | | |
|  | Circuit breakers Manufacturer | | - |  | | |
|  | - Type | | - |  | | |
|  | - Rated current at 40 °C | | A |  | | |
|  | - Short circuit breaking capacity symm. | | kA |  | | |
|  | - Short circuit breaking capacity peak | | kA |  | | |
|  | Other panels | |  |  | | |
|  | Circuit breakers Manufacturer | | - |  | | |
|  | - Type | | - |  | | |
|  | - Rated current at 40 °C | | A |  | | |
|  | - Short circuit breaking capacity symm. | | kA |  | | |
|  | - Short circuit breaking capacity peak | | kA |  | | |
|  | Earthing switches making capacity symm. | | kA |  | | |
|  | - Marking capacity peak | | kA |  | | |
|  | Protection relay types - Incoming feeders  - Outgoing feeders  - Bus tie panel  - Bus riser panel  - Bus voltage panel | | -  -  -  -  - |  | | |
|  | Number of panels | | - |  | | |
|  | Dimensions of panels | | m |  | | |
|  | Total dimension of switchboard | | m |  | | |
|  | Design standards | | - |  | | |

| **Table 39** | **Technical Data** | Technical Data  for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **Reference** | **Electrical Equipment 400 / 230 V Main Distribution Switchboards** | Supplier  stamp: | |  | |
| **A6 sec. 2+3** | **400 V / 230 V Main Distribution Switchboards A** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of system | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | Switchboard Manufacturer | - |  | | |
|  | - Type | - |  | | |
|  | - Rated voltage | V |  | | |
|  | - Rated frequency | Hz |  | | |
|  | - Busbar current rating at 40 °C | A |  | | |
|  | - Short time withstand current | \_kA / \_sec |  | | |
|  | - Symmetrical / - Asymmetrical (Peak) | kA / kA |  | | |
|  | Circuit breakers Manufacturer | - |  | | |
|  | Incoming feeders and Bus ties | - |  | | |
|  | - Type |  |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Outgoing feeders 2000 A type | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Outgoing feeders 800 A type | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Outgoing feeders 630 A type | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Outgoing feeders 400 A type | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Outgoing feeders 250 A type | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Outgoing feeders 160 A type | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Total dimension of switchboard | m |  | | |
|  | Total heat losses of switchboard | W |  | | |
|  | Design standards | - |  | | |
| **A6 sec. 2+3** | **400 V / 230 V Main Distribution Switchboards B** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of system | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | Switchboard Manufacturer | - |  | | |
|  | - Type | - |  | | |
|  | - Rated voltage | V |  | | |
|  | - Rated frequency | Hz |  | | |
|  | - Busbar current rating at 40 °C | A |  | | |
|  | - Short time withstand current | \_kA / \_sec |  | | |
|  | - Symmetrical / - Asymmetrical (Peak) | kA / kA |  | | |
|  | Circuit breakers Manufacturer | - |  | | |
|  | Incoming feeders and Bus ties | - |  | | |
|  | -Type |  |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Outgoing feeders 2000 A type | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Outgoing feeders 800 A type | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Outgoing feeders 630 A type | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Outgoing feeders 400 A type | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Outgoing feeders 250 A type | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Outgoing feeders 160 A type | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Total dimension of switchboard | m |  | | |
|  | Total heat losses of switchboard | W |  | | |
|  | Design standards | - |  | | |

| **Table 40** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **Reference** | **Electrical Equipment 400 / 230 V MCC A, B, ….** | Supplier stamp: | |  | |
| **A6 sec. 2+3** | **400 V/ 230 V MCC A, B, ….** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of system | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | Switchboard Manufacturer | - |  | | |
|  | - Type | - |  | | |
|  | - Rated voltage | V |  | | |
|  | - Rated frequency | Hz |  | | |
|  | - Busbar current rating at 40 °C | A |  | | |
|  | - Short time withstand current | \_kA / \_sec |  | | |
|  | - Symmetrical / - Asymmetrical (Peak) | kA / kA |  | | |
|  | Circuit breakers Manufacturer | - |  | | |
|  | Total dimension of switchboard | m |  | | |
|  | Total heat losses of switchboard | W |  | | |
|  | Design standards | - |  | | |

| **Table 41** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **References** | **Electrical Equipment 400 / 230 V ACC A, B, …** | Supplier stamp: | |  | |
| **A6 sec. 2+3** | **400 V/ 230 V ACC A, B, ….** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of system | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | Switchboard Manufacturer | - |  | | |
|  | - Type | - |  | | |
|  | - Rated voltage | V |  | | |
|  | - Rated frequency | Hz |  | | |
|  | - Busbar current rating at 40 °C | A |  | | |
|  | - Short time withstand current | \_kA / \_sec |  | | |
|  | - Symmetrical / - Asymmetrical (Peak) | kA / kA |  | | |
|  | Circuit breakers Manufacturer | - |  | | |
|  | Total dimension of switchboard | m |  | | |
|  | Total heat losses of switchboard | W |  | | |
|  | Design standards | - |  | | |

| **Table 42** | **Technical Data** | Technical Data  for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **Reference** | **Electrical Equipment 400 V / 230 V Main Distribution Switchboards – UPS A and UPS B** | Supplier stamp: | |  | |
| **A6 sec. 2+3** | **400 V / 230 V Main Distribution Switchboards – UPS A and UPS B** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of system | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | Switchboard Manufacturer | - |  | | |
|  | - Type | - |  | | |
|  | - Rated voltage | V |  | | |
|  | - Rated frequency | Hz |  | | |
|  | - Busbar current rating at 40 °C | A |  | | |
|  | - Short time withstand current | \_kA / \_sec |  | | |
|  | - Symmetrical / - Asymmetrical (Peak) | kA / kA |  | | |
|  | Circuit breakers Manufacturer | - |  | | |
|  | Incoming feeders | - |  | | |
|  | - Protection relay type | - |  | | |
|  | - Rated current at 40 °C | A |  | | |
|  | - Short circuit breaking capacity Ics | kA |  | | |
|  | Total dimension of switchboard | m |  | | |
|  | Total heat losses of switchboard | W |  | | |
|  | Design standards | - |  | | |

| **Table 43** | **Technical Data** | Technical Data for Evaluation: | |  | |
| --- | --- | --- | --- | --- | --- |
| **Reference** | **Electrical Equipment UPS 2x100 kVA** | Supplier stamp: | |  | |
| **A6 sec. 2+3** | **UPSs 2x100 kVA** | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | ***Reference*** |
|  | Specification of system | | | |  |
|  | ***Technical Data:*** | ***Unit*** | ***Value/description*** | | |
|  | UPS Manufacturer | - |  | | |
|  | - Type | - |  | | |
|  | - Rated input / output voltage | V / V |  | | |
|  | - Rated frequency | Hz |  | | |
|  | - Output voltage regulation | +/-% |  | | |
|  | - Rated output power at 40 °C | kW / kVA |  | | |
|  | - Overload % 10 min. | % |  | | |
|  | Bypass Circuit breakers Manufacturer | - |  | | |
|  | Total dimension of UPS | m |  | | |
|  | Total heat losses of UPS at 100% load | W |  | | |
|  | Design standards | - |  | | |
|  | Batteries Manufacturer | - |  | | |
|  | - Type | - |  | | |
|  | - Rated voltage | V |  | | |
|  | - Quantity | - |  | | |
|  | - Lifetime 10 or 12 years | - |  | | |
|  | Total dimension of Batteries | m |  | | |
|  | Total heat losses of batteries at 100% load | W |  | | |
|  | Design standards | - |  | | |
|  | UPS system | - |  | | |
|  | - No break time at 100kW output | H |  | | |
|  | - Short circuit output current | kA |  | | |

| **Table 44** | **Technical Data** | Technical Data for Evaluation: | | |  | |
| --- | --- | --- | --- | --- | --- | --- |
| **Reference** | **Electrical Equipment Emergency Generator Systems 1300 kVA** | Supplier stamp: | | |  | |
| **A6 sec. 2+3** | **Emergency Generator systems 1300 kVA** | | | | | |
|  | ***Descriptions to be included in Tender:*** | | | | | ***Reference*** |
|  | Specification of system | | | | |  |
|  | ***Technical Data:*** | | ***Unit*** | ***Value/description*** | | |
|  | Diesel engine Manufacturer | | - |  | | |
|  | - Type | | - |  | | |
|  | - Rated power | | kW |  | | |
|  | - Efficiency at rated power | | % |  | | |
|  | - Fuel consumption at rated power | | l/h |  | | |
|  | Local motor control panel manufacturer | | - |  | | |
|  | - Type | | - |  | | |
|  | Start batteries Manufacturer | | - |  | | |
|  | - Type | | - |  | | |
|  | - Rated voltage | | V |  | | |
|  | - Quantity | | - |  | | |
|  | - Lifetime 10 or 12 years | | - |  | | |
|  | Total dimension of batteries | | m |  | | |
|  | Generator Manufacturer | | - |  | | |
|  | - Type | | - |  | | |
|  | - Rated output voltage | | kV |  | | |
|  | - Rated frequency | | Hz |  | | |
|  | - Output voltage regulation | | +/-% |  | | |
|  | - Rated output power at 40 °C | | kW / kVA |  | | |
|  | * Overload % 1 hour | | % |  | | |
|  | - Short circuit output current | | kA |  | | |
|  | Total dimension of Set | | m |  | | |
|  | Total heat losses of Set at 100% load | | W |  | | |
|  | Noise level according to A14.3 *Acoustic Noise and Vibrations* | | dB |  | | |
|  | Noise attenuation measures, if any | | dB |  | | |
|  | Design standards | | - |  | | |

| **Table 45** | **Technical Data** | Technical Data  for Evaluation: |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | **Electrical Equipment Miscellaneous** | Supplier |  |
|  | stamp: |  |
| **Reference** |  |  |  |
| **A6 sec. 2+3** | **Motors** | | |
|  | ***Descriptions to be included in Tender:*** | | ***Reference*** |
|  | Data sheet for motors > 100 kW | |  |
| **A6 sec. 2+3** | **Frequency Converters** | | |
|  | ***Descriptions to be included in Tender:*** | | ***Reference*** |
|  | Data sheet > 100 kW | |  |
| **A6 sec. 2+3** | **Local Operation Panel** | | |
|  | ***Descriptions to be included in Tender:*** | | ***Reference*** |
|  | List of local operation panels | |  |
| **A6 sec. 2+3** | **Cable Installation** | | |
|  | ***Descriptions to be included in Tender:*** | | ***Reference*** |
|  | Specification of cable types for high voltage, low voltage, instruments and communications | |  |
|  | Specification of routing material type | |  |

# Control and Monitoring System

Please refer to Part III *Employers Requirement*, appendix A1 *Overall Scope of Works* and A7 *Technical Specifications for Control and Monitoring System (CMS).*

| **Table 46** | **Technical Data**  **Control and Monitoring System (CMS)** | Technical Data for Evaluation: |  | |
| --- | --- | --- | --- | --- |
| **Reference** |  | Supplier stamp: |  | |
| **A7** | **Technical Specifications for CMS** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | The scope of supply and the thoughts behind the systems and the functions of the equipment (if any). | | |  |
| **A7** | **CMS** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | Manufacture and system type | | |  |
|  | CMS configuration/hardware architecture  Drawings | | |  |
|  | Software & licenses specifications. | | |  |
|  | Specification of system capacities, loading  and response times | | |  |
|  | Communication systems specification | | |  |
|  | Description of redundancies incl. to local PLC's (black boxes) | | |  |
|  | Description of back-up/restore facilities | | |  |
|  | CMS documentation system specification | | |  |
|  | Process stations (controllers) incl. panels | | |  |
|  | Description of expected number of Process stations and redundancy conditions | | |  |
|  | Specification of safety control systems for equipment- and person protection. | | |  |
|  | Description of expected number of safety PLC’s and related Safety Integrity Level (SIL) | | |  |
|  | Description of RIO panels | | |  |
|  | Typicals/standards for drives including connection to switchboard/MCC | | |  |
|  | Number of signals to/from process stations (DI/DO/AI/AO) divided in hardwired type (via IO units) and serial communication type | | |  |
|  | Description of CMS training programs | | |  |
|  | Description of service contract incl. life cycle maintenance and spare parts recommendations | | |  |
|  | Description of alarm pager system | | |  |
| **A7 sec. 7** | **CCTV** | | |  |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | Manufacture and system type. | | |  |
| CCTV configuration/hardware architecture drawings | | |  |
| Software & licenses specifications | | |  |
| Specification of system capacities, loading and response times. | | |  |
|  | Hardware specification | | |  |
| **A7** | **Instrumentation** | | | |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | PI-Diagrams | | |  |

# Civil Works

Please refer to Part III *Employers Requirement*, appendix A1 *Overall Scope of Works* and A8 *Technical Specifications for Building.*

| **Table 47** | **Technical Data**  **Civil Works** | Technical Data for Evaluation: |  | |
| --- | --- | --- | --- | --- |
| **Reference** |  | Supplier stamp: |  | |
| **A8** | **Fire Detection & Firefighting System** | | |  |
|  | ***Descriptions to be included in Tender:*** | | | ***Reference*** |
|  | Manufacture and system type. | | |  |
| Technical description of fire detection and firefighting system. | | |  |

# Room Data Sheet

Please refer to *Part 0.h Room Data Sheet*. The Room Data Sheets is to be filled in by the Contractor. The Contractor shall fill in the document in different colour resolution for better control of the Employer.