Part 0.g FORMS FOR TECHNICAL DATA

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,

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PART 0.G
FORMS FOR TECHNICAL DATA

Project name	**High-efficient combined heat and power facility utilizing renewable sources (OHB II - line K1)**
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1. 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 **Reference**	**Technical Data** **General Data**	Technical Data for Evaluation Supplier stamp:

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 Reference	**Technical Data** **Administrative Requirements** **General Data**	Technical Data for Evaluation Supplier stamp:	
	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.	m^2	

2. INCINERATOR/BOILER

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

Table 3 **Reference**	**Technical Data** **Incinerator/Boiler** **General Data**	Technical Data for Evaluation Supplier stamp:	
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, SO_2, 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	
	- O_2	%, dry	
	- H_2O	%	
	- NO_x (basis: 11% O_2, dry flue gas)	mg/Nm³	
	- NH_3 (basis: 11% O_2, dry flue gas)	mg/Nm³	
	- Particles (basis: 11% O_2, dry flue gas)	mg/Nm³	
	- Dioxin and furans (basis: 11% O_2, dry flue gas)	ng/Nm³ TEQ	

Table 3 Reference	**Technical Data** **Incinerator/Boiler** **General Data**	Technical Data for Evaluation Supplier stamp:	
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 Supply Conditions	Supplier 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 Reference	**Technical Data** **Incinerator/boiler** **Feeding System and Grate**	Technical Data for Evaluation Supplier stamp:

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	m^3		
	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			

Table 5 Reference	**Technical Data** **Incinerator/boiler** **Feeding System and Grate**	Technical Data for Evaluation Supplier stamp:

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		

Table 5 Reference	Technical Data Incinerator/boiler Feeding System and Grate	Technical Data for Evaluation Supplier stamp:	
	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 Reference	**Technical Data** **Incinerator/boiler** **Air Systems**	Technical Data for Evaluation Supplier stamp:

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			

Table 6 Reference	**Technical Data** **Incinerator/boiler Air Systems**	Technical Data for Evaluation Supplier stamp:	
	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 Reference	**Technical Data** **Incinerator/boiler** **Incinerator**	Technical Data for Evaluation Supplier stamp:

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	Nm^3/h, dry		
	Max. flue gas temperature in areas without protective refractory lining	°C		
	Air cooled area	m^2		
	Boiler cooled area	m^2		
	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***	

Table 7 Reference	Technical Data Incinerator/boiler Incinerator	Technical Data for Evaluation Supplier stamp:	
	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	$W/m^2/^oC$	
	- Construction/design	-	
	- Radiation/convection loss estimate (at 25 °C ambient)	kW	
	Casing:		
	- Material	-	
	- Thickness	mm	
	- Construction/design	-	

Table 8 Reference	**Technical Data** **Incinerator/boiler** **Steam Boiler**	Technical Data for Evaluation Supplier stamp:

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	m^2		
	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	$m^2\ ^oC/W$		
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.		

Table 8 Reference	Technical Data Incinerator/boiler Steam Boiler	Technical Data for Evaluation Supplier stamp:	
	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 Number of Nozzles	nos. nos.	
A2 sec. 10	**Steam boiler construction details**		
	Technical Data:	***Unit***	***Value/Description***
	Heating surface areas, values to be stated as projected and actual	m^2/m^2	
	Heating surface, boiler tube membrane walls excl. membrane walls with lining	m^2	
	Lined heating surface, total	m^2	
	Heating surface, evaporator sections, total	m^2	
	Heating surface, superheater sections, total	m^2	
	Heating surface, economizer sections, total	m^2	
	Total heating surface on flue gas side	m^2	
	Water volume in tubes and steam drum	m^3	
	Boiler	m^3	
	Boiler drum (up to set point level)	m^3	
	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	

Table 8 Reference	Technical Data Incinerator/boiler Steam Boiler	Technical Data for Evaluation Supplier stamp:	
	- 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	

Table 8 Reference	Technical Data Incinerator/boiler Steam Boiler	Technical Data for Evaluation Supplier stamp:	
	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	

Table 8 Reference	Technical Data Incinerator/boiler Steam Boiler	Technical Data for Evaluation Supplier stamp:	
	- 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	m^3	
	Capacity	tons/h	
	NaOH tank		
	Technical data:	***Unit***	***Value/Description***
	NaOH concentration	%	
	Net volume	m^3	
	- Pump, type	-	
	- Pump, capacity	-	
	- Number of pumps	-	
	Ammonia water tank		
	Technical data:	***Unit***	***Value/Description***
	Ammonia concentration	%	
	Net volume	m^3	
	- 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:		

Table 8 **Reference**	**Technical Data** **Incinerator/boiler** **Steam Boiler**	Technical Data for Evaluation Supplier stamp:	
	- 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 Reference	**Technical Data** **Incinerator/boiler** **Feed Water System**	Technical Data for Evaluation Supplier stamp:

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 Reference	**Technical Data** **Incinerator/boiler** **Component Cooling System**	Technical Data for Evaluation Supplier stamp:	
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	m^3/h	

Table 11 Reference	**Technical Data** **Incinerator/boiler** **Ash and IBA Handling System**	Technical Data for Evaluation Supplier stamp:	
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	Nm^3/h	
	Number of injector vessels	-	
	Number of transport pipes	-	
	Hoppers:		
	- Number	nos.	
	- Volume per hopper	m^3	
	- Type of gates	-	

Table 11 Reference	**Technical Data** **Incinerator/boiler** **Ash and IBA Handling System**	Technical Data for Evaluation Supplier stamp:	
	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.)	m^3/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)	-	

Table 11 Reference	Technical Data Incinerator/boiler Ash and IBA Handling System	Technical Data for Evaluation Supplier stamp:	
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 Reference	Technical Data Incinerator/boiler Auxiliary Systems	Technical Data for Evaluation Supplier stamp:	
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	-	

3. 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** **Flue Gas Treatment** **General Data**	Technical Data for Evaluation: 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.	m^3/min	
	- Nominal annual consumption	m^3/h	
	Process air consumption:		
	- Max.	m^3/min	
	- Nominal annual consumption	m^3/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 Reference	**Technical Data** **Flue Gas Treatment Quencher/Reactor**	Technical Data for Evaluation: 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	m^3/h	
	Outlet flue gas flow rate, wet gas	Nm^3/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	Nm^3/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 Reference	**Technical Data** **Flue Gas Treatment** **Bag House Filter**	Technical Data for Evaluation: 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	Nm^3/h	
	Inlet flue gas temperature	°C	
	Air to cloth ratio	$m^3/m^2/min$	
	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	Nm^3/h, wet	
	Minimum pressure	Pa	
	Maximum pressure	Pa	
	Maximum inlet temperature	°C	
	Maximum raw gas dust concentration	mg/Nm^3,dry	
A3 Sec. 2.3	**Concentration of Flue Gas at Outlet - Expected Values at Nominal Load, 11% O_2, Dry**		
	Particles	mg/Nm^3	
	HCl	mg/Nm^3	
	HF	mg/Nm^3	
	SO_2	mg/Nm^3	
	Hg	mg/Nm^3	
	Dioxins and furans (in T eq)	mg/Nm^3	
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	-	

Table 15 Reference	**Technical Data** **Flue Gas Treatment** **Bag House Filter**	Technical Data for Evaluation: Supplier stamp:	
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	Nm^3/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	

Table 15	Technical Data Flue Gas Treatment Bag House Filter	Technical Data for Evaluation: Supplier stamp:	
Reference			
A3 Sec. 2.3	**Nominal Process Data**		
	Technical data:	***Unit***	***Value/description***
	Amount recirculated material	kg/h	
	Amount of water added to recirculated material	m^3/h	
	Dimensioning Data		
	Technical data:	***Unit***	***Value/description***
	Amount recirculated material	kg/h	
	Amount of water added to recirculated material	m^3/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 Flue Gas Treatment Low-temperature Economizer (option 1)	Technical Data for Evaluation: Supplier stamp:	
Reference			
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	Nm^3/h, wet	
	- Temperature	°C	
	- H_2O	% (v/v)	
	- O_2	%, dry (v/v)	
	- Flue gas negative pressure, inlet	Pa	

Table 16 Reference	**Technical Data** **Flue Gas Treatment Low-temperature Economizer (option 1)**	Technical Data for Evaluation: Supplier stamp:	
	- 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	m^2	
	- Tube diameter, outer	mm	
	- Tube pitching	mm	
	- Tubing arrangement (co-, counter, cross flow)	-	
	- Fouling factor	$m^2°C/W$	
A3 Sec. 3.2	**Circulation Pumps**		
	Technical Data:	***Unit***	***Value/description***
	Number, total	-	
	Number, standby	-	
	Capacity per pump	m^3/h	
	Installed motor effect per pump	kW	

Table 17 Reference	**Technical Data** **Flue Gas Treatment** **Flue gas condensation – Quencher (option 1)**	Technical Data for Evaluation: 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	Nm^3/h		
	Inlet flue gas temperature	°C		
	Outlet flue gas temperature	°C		
	Outlet flue gas moisture content	Vol%		
	Water evaporation	m^3 /h		
A3 Sec. 3.3	**Dimensioning Data**			
	Technical data:*	***Unit***	***Value/description***	
	Inlet flue gas flow rate, wet	Nm^3/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	m^3/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			

Table 17	**Technical Data** **Flue Gas Treatment** **Flue gas condensation – Quencher (option 1)**	Technical Data for Evaluation: Supplier stamp:	
Reference			
	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	m^3/h	
	- Minimum running time when no external water is available	min	
	Emergency nozzles:		
	- Number	-	
	Emergency water tank:		
	- Net volume	m^3	

Table 18	**Technical Data** **Flue Gas Treatment** **Condensing Section (option 1)**	Technical Data for Evaluation: Supplier stamp:	
Reference			
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	Nm^3/h	
	- Outlet flue gas moisture content	Vol%	
	Dimensioning data:*		
	- Maximum flue gas flow rate	Nm^3/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% O_2**		
	Technical data:	***Unit***	***Value/description***
	Particles	mg/Nm^3 dry	
	HCl	mg/Nm^3 dry	
	HF	mg/Nm^3 dry	
	SO_2	mg/Nm^3 dry	
	Hg	mg/Nm^3 dry	
	Dioxins and furans (Teq.)	ng/Nm^3 dry	

Table 18 Reference	**Technical Data** **Flue Gas Treatment Condensing Section (option 1)**	Technical Data for Evaluation: Supplier stamp:	
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)	m^3	
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	m^3 /Nm^3	
	Number of pumps, total	-	
	Number of pumps, standby	-	
	Type of pumps	-	
	Capacity per pump	m^3/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	m^3	

Table 19	**Technical Data** **Flue Gas Treatment** **Heat pump section** **(option 1)**	Technical Data for Evaluation: Supplier stamp:
Reference		

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** **Flue Gas Treatment** **Reheater** **(option 1)**	Technical Data for Evaluation: Supplier stamp:
Reference		

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	-	

Table 20 Reference	**Technical Data** **Flue Gas Treatment Reheater (option 1)**	Technical Data for Evaluation: Supplier stamp:	
	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	Nm^3/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	m^2	
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 Reference	**Technical Data** **Flue Gas Treatment Flue Gas Condensate (option 1)**	Technical Data for Evaluation: 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	
	- SO_4^{2-}	mg/L	
	- SO_3^{2-}	mg/L	
	- Hg	µg/L	
	- Heavy metals Σ(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	
	- SO_4^{2-}	mg/L	
	- SO_3^{2-}	mg/L	
	- Hg	µg/L	
	- Heavy metals Σ(Cd, Tl, As, Pb, Co, Cr, Cu, Mn, Ni, Sb, V, Zn)	µg/L	
	- Dioxins and furans (Teq.)	ng/L	

Table 22	**Technical Data** **Flue Gas Treatment** **Flue gas condensate treatment (option 1)**	Technical Data for Evaluation: Supplier stamp:
Reference		

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, SO_4, 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	m^3/h	
	Dimensioning inlet flow (range)	m^3/h	
	No of polishing steps	-	
A3 Sec. 10.2	**Cleaned condensate Control**		
	Technical Data:	***Unit***	***Value/description***
	Nominal outlet flow	m^3/h	
	Dimensioning outlet flow	m^3/h	
	Size	m^3	
	Construction material	-	
	Agitation	y/n	
	Number of effluent pumps	-	
	Capacity of effluent pumps, each	m^3/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	m^3/h	
	Nominal quantity (annual)	m^3	
	Max. temperature	◦C	

Table 23 Reference	**Technical Data** **Flue Gas Treatment** **Induced Draught Fan**	Technical Data for Evaluation: 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	Nm^3/h	
	Inlet temperature	°C	
	Outlet temperature	°C	
	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	Nm^3/h	
	Min / Max permissible inlet temperature	°C/°C	
	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 Reference	**Technical Data** **Flue Gas Treatment** **Flue Gas Monitoring**	Technical Data for Evaluation: 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	-	
	- H_2O	-	
	- O_2	-	
	- CO_2	-	
	- Dust	-	
	- HCl	-	
	- HF	-	
	- SO_2	-	
	- NO_X ($NO + NO_2$)	-	
	- NH_3	-	
	- TOC	-	
	- CO	-	
	- N_2O	-	
	- 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:		
	- H_2O	-	
	- O_2	-	
	- Dust	-	
	- HCl	-	
	- SO_2	-	

Table 24	Technical Data Flue Gas Treatment Flue Gas Monitoring	Technical Data for Evaluation: Supplier stamp:
Reference		

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	-	
	- SO_2	-	

Table 25	Technical Data Flue Gas Treatment Ducts and Stack	Technical Data for Evaluation: Supplier stamp:
Reference		

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, $W/m^2/ºC$	
	- 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, $W/m^2/ºC$	

Table 25 Reference	Technical Data Flue Gas Treatment Ducts and Stack	Technical Data for Evaluation: Supplier stamp:	
	- 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, $W/m^2/^oC$	
	- Cladding (type)	-	

Table 26 Reference	**Technical Data** **Flue Gas Treatment Silos and Tanks for Consumables and Products**	Technical Data for Evaluation: 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	m^3/m^3		
	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		

Table 26 Reference	**Technical Data** **Flue Gas Treatment** **Silos and Tanks for Consumables and Products**	Technical Data for Evaluation: Supplier stamp:	
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	m^3/m^3	
	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	m^3/m^3	
	Weight (empty/full)	t/t	
	Over and under pressure, max	Pa/Pa	
	Type of level indicator	-	
	Number of weighing cells	-	
	Filter type	-	

4. 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 **Reference**	**Technical Data** **Turbine/generator** **General**	Technical Data for Evaluation: Supplier stamp:	
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 Reference	**Technical Data** **Turbine/generator Turbine**		Technical Data for Evaluation: Supplier stamp:
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.		

Table 28 Reference	**Technical Data** **Turbine/generator Turbine**		Technical Data for Evaluation: Supplier stamp:
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 Reference	**Technical Data** **Turbine/generator Generator**	Technical Data for Evaluation: Supplier stamp:	
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	

Table 29 Reference	**Technical Data** **Turbine/generator Generator**	Technical Data for Evaluation: Supplier stamp:	
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:		
	- r_a stator resistance per phase	Ω	
	Reactances:		
	- X_{ad} stator dispersion reactance per phase	%	
	- X_d	%	
	- Xq	%	
	- X'_d (unsaturated)	%	
	- X'q	%	
	- X''_d (saturated)	%	
	- X''q	%	
	- X_d	%	
	- X_2	%	
	- X_0	%	
	Time constants:		
	- $T_{d0'}$	sec	
	- $T_{d0''}$	sec	
	- $T_{d'}$	sec	
	- $T_{d''}$	sec	
	- $Tq_{0'}$	sec	
	- $Tq_{0''}$	sec	
	- T_a	sec	
	- Short-circuit ratio	%	

Table 29 Reference	**Technical Data** **Turbine/generator Generator**	Technical Data for Evaluation: Supplier stamp:	
	Stator:		
	- Weight	kg	
	- Maximum size of terminal	mm^2	
	- 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/m^2	
	- Bearing temperature detector type	-	
	Excitation equipment:		
	- Make	-	
	- Type	-	
	Other:		
	- Degree of protection for enclosures	IP	
	- Cooling medium	-	
	- Mass flow	m^3/h	
	- Voltage of anti-condensation heating	V	
	- Output of anti-condensation heating	kW	

Table 30 Reference	**Technical Data** **Turbine/generator** **District Heat and Condensate**	Technical Data for Evaluation: Supplier stamp:	
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	m^2	
	Max. water flow velocity	m/s	
	Fouling factor	$m^2°C/W$	
	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	

Table 30 Reference	**Technical Data** **Turbine/generator** **District Heat and Condensate**	Technical Data for Evaluation: Supplier stamp:	
	- No. of coils per module	-	
	- Total surface area per module	m^2	
	- Heat transfer coefficient	W/m^2K	
	- Design temperature	°C	
	- 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	°C	
	- Nominal temperature out	°C	
	- Nominal pressure loss	kPa	
	Air side		
	- Nominal flow	kg/h	
	- Nominal temperature in	°C	
	- Nominal temperature out	°C	
	- Nominal pressure loss	kPa	
	Fans and Motors		
	- No. of fans per module	-	
	- Air volume	m^3/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	m^2	
	- Max. water flow velocity	m/s	
	- Fouling factor assumed Glycol side Air side	 $m^2°C/W$ $m^2°C/W$	
	- Materials used (pipes, shell)	-	
	- No of pipes and dimensions	qty/mm	
	- Design pressure	bara	

Table 30 Reference	**Technical Data** **Turbine/generator** **District Heat and Condensate**	Technical Data for Evaluation: Supplier stamp:	
	- Design temperature	ºC	
	- Total weight (wet)	kg	

5. AUXILLARY EQUIPMENT

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

Table 31 **Reference**	**Technical Data** **Incinerator/boiler** **Auxiliary Systems**	Technical Data for Evaluation Supplier stamp:	
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	m^3	
	The nominal carrying capacity of the cranes	m^3/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	m^3	
	Service air:		
	- Peak capacity	Nm^3/h	
	- Connection points	No.	
	Instrument air:		
	- Peak capacity	Nm^3/h	

Table 31 Reference	Technical Data Incinerator/boiler Auxiliary Systems	Technical Data for Evaluation Supplier stamp:	
	- 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	

6. ELECTRICAL EQUIPMENT

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

Table 32 **Reference**	**Technical Data** **Electrical Equipment General**	Technical Data for Evaluation: Supplier stamp:	
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 Reference	**Technical Data** **Electrical Equipment** **Power Transformer** **12 MVA 22/6.3 kV**	Technical Data for Evaluation: Supplier stamp:

A6 sec. 2+3	**Power Transformer T24- 12MVA 22/6.3 kV**			
	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 Reference	**Technical Data** **Electrical Equipment** **Power Transformer** **8 MVA 22/6.3 KV**	Technical Data for Evaluation: Supplier stamp:	
A6 sec. 2+3	**Power Transformer T25 - 12MVA 22/6.3 kV**		
	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 Reference	**Technical Data** **Electrical Equipment Distribution Transformers 5000 kVA**	Technical Data for Evaluation: Supplier stamp:	
A6 sec. 2+3	**Distribution Transformers – 5000 kVA**		
	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 References	**Technical Data** **Electrical Equipment** **UPS Transformers – 100 kVA**	Technical Data for Evaluation: Supplier stamp:	
A6 sec. 2+3	**UPS Transformers – 100 kVA**		
	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 Reference	**Technical Data** **Electrical Equipment 22 kV Extension of Switchboard R2**	Technical Data for Evaluation: 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** **Electrical Equipment** **6.3 kV Distribution Switchboard**	Technical Data for Evaluation: Supplier stamp:	
Reference			
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	

Table 38 Reference	**Technical Data** **Electrical Equipment** **6.3 kV Distribution Switchboard**	Technical Data for Evaluation: Supplier stamp:	
A6 sec. 2+3	**6.3 kV Distribution Switchboard**		
	Design standards	-	

Table 39 Reference	**Technical Data** **Electrical Equipment 400 / 230 V Main Distribution Switchboards**	Technical Data for Evaluation: 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	

Table 39 Reference	**Technical Data** **Electrical Equipment 400 / 230 V Main Distribution Switchboards**	Technical Data for Evaluation: Supplier stamp:	
	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	

Table 39 **Reference**	**Technical Data** **Electrical Equipment** **400 / 230 V Main Distribution Switchboards**	Technical Data for Evaluation: Supplier stamp:	
	- Short circuit breaking capacity Ics	kA	
	Total dimension of switchboard	m	
	Total heat losses of switchboard	W	
	Design standards	-	

Table 40 **Reference**	**Technical Data** **Electrical Equipment** **400 / 230 V MCC A, B, ….**	Technical Data for Evaluation: 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 Electrical Equipment 400 / 230 V ACC A, B, ...	Technical Data for Evaluation: Supplier stamp:
References		

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 Electrical Equipment 400 V / 230 V Main Distribution Switchboards – UPS A and UPS B	Technical Data for Evaluation: Supplier stamp:
Reference		

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	

Table 42 Reference	**Technical Data** **Electrical Equipment** **400 V / 230 V Main Distribution Switchboards – UPS A and UPS B**	Technical Data for Evaluation: Supplier stamp:	
A6 sec. 2+3	**400 V / 230 V Main Distribution Switchboards – UPS A and UPS B**		
	Design standards	-	

Table 43 Reference	**Technical Data** **Electrical Equipment** **UPS 2x100 kVA**	Technical Data for Evaluation: 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 - Short circuit output current	- - H kA	

Table 44 Reference	**Technical Data** **Electrical Equipment** **Emergency Generator Systems** **1300 kVA**	Technical Data for Evaluation: 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 Total dimension of Set	kA 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 Reference	**Technical Data** **Electrical Equipment Miscellaneous**	Technical Data for Evaluation: Supplier stamp:
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	

7. 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 **Reference**	**Technical Data** **Control and Monitoring System (CMS)**	Technical Data for Evaluation: 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	

8. CIVIL WORKS

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

Table 47 **Reference**	**Technical Data** **Civil Works**	Technical Data for Evaluation: 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.		

9. 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.