

Part 0.g FORMS FOR TECHNICAL DATA

PUBLIC CONTRACT

"Modernization of WtE SAKO Brno"

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,



SAKO Brno, a.s.

registered address: Jedovnická 4247/2, 628 00 Brno

ID No: 60713470

Part 0.g FORMS FOR TECHNICAL DATA

Project name **Modernization of WtE Plant SAKO Brno**
Version **1**
Date **2024-06-26**
Documentation **Procurement documentation – Part 0 – Procurement documentation**

Ramboll
Hannemanns Allé 53
DK-2300 Copenhagen S
Denmark

T +45 5161 1000
F +45 5161 1001
www.ramboll.com/energy

CONTENTS

1.	General	2
2.	Incinerator/Boiler	4
3.	Flue Gas Treatment	24
4.	Turbine/Generator and DH Condensers	43
5.	Auxillary Equipment	52
6.	Electrical Equipment	54
7.	Control and Monitoring System	70
8.	Civil Works	71
9.	Room Data Sheet	71

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	Technical Data	Technical Data for Evaluation	
	General Data	Supplier 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 <i>Process and Design Data</i> .		
	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 <i>Procedure for Guarantee tests</i> .		
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 General Data	Supplier 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.	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	Technical Data		Technical Data for Evaluation	
	Incinerator/Boiler General Data		Supplier 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		m ³ /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		Nm ³ /h	
	- Temperature		°C	
	- O ₂		%, dry	
	- H ₂ O		%	
	- NO _x (basis: 11% O ₂ , dry flue gas)		mg/Nm ³	
	- NH ₃ (basis: 11% O ₂ , dry flue gas)		mg/Nm ³	
- Particles (basis: 11% O ₂ , dry flue gas)		mg/Nm ³		
- Dioxin and furans (basis: 11% O ₂ , dry flue gas)		ng/Nm ³ TEQ		

Table 3	Technical Data		Technical Data for Evaluation
	Incinerator/Boiler General Data		Supplier stamp:
Reference			
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		m ³ /h	
	- to make-up water system		m ³ /h	
	- other		m ³ /h	
	Max. consumption during operation		m ³ /h	
	Nominal annual consumption		m ³ /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.		m ³ /h	
	- Nominal		m ³ /h	
	- Number of consumers		nos.	

Table 5	Technical Data		Technical Data for Evaluation
	Incinerator/boiler Feeding System and Grate		Supplier 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	m ³	
	Material and material thickness (steel plates etc.)	mm	
	Slope angles 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	Technical Data		Technical Data for Evaluation	
	Incinerator/boiler Feeding System and Grate		Supplier stamp:	
Reference				
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 included.			
	Technical Data:		Unit	Value/Description
	Number of parallel grate tracks		nos.	
	Number of air-cooled grate zones		nos.	
	Slope of grate		°	
Grate area (effective)		m ²		
Grate area (combustion loaded part)		m ²		
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/m ²		
	Static grate load per area	kg/(m ² *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 Air Systems		Supplier 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 <i>Acoustic Noise and Vibrations</i> . 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		m ³ /h, Pa
	- Nom. air flow, pressure difference		m ³ /h, Pa
	- Nom. speed		rpm
	- Efficiency at nominal load		%
	- Noise level according to A14.3 <i>Acoustic Noise and Vibrations</i>		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	Technical Data		Technical Data for Evaluation
	Incinerator/boiler Air Systems		Supplier stamp:
Reference			
	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	m ³ /h, Pa	
	- Nom. air flow, pressure difference	m ³ /h, Pa	
	- Nom. speed	rpm	
	- Efficiency at nominal load	%	
	- Noise level according to Appendix A14.3 <i>Acoustic Noise and Vibrations</i>	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	m ²		
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 Incinerator		Supplier 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 1 st pass of the boiler which shall ensure possibility to carry out simultaneous maintenance work on the grate and up in the 1 st 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	Technical Data		Technical Data for Evaluation		
	Reference	Incinerator/boiler	Supplier stamp:		
		Incinerator			
	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 /°C		
	- Construction/design		-		
	- Radiation/convection loss estimate (at 25 °C ambient)		kW		
	Casing:				
	- Material		-		
- Thickness		mm			
- Construction/design		-			

Table 8	Technical Data		
	Incinerator/boiler	Technical Data for Evaluation	
Reference	Steam Boiler	Supplier stamp:	
A2 sec. 10.1	General		
	Descriptions to be included in Tender:		
	Main dimensions for the boiler unit including boiler drawing in scale	Reference	
	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 °C/W		
A2 sec. 10.2	Radiation Passes		
	Descriptions to be included in Tender:		
	Specification of how the boiler/furnace/grate is supported and how thermal expansions are handled	Reference	
	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	Technical Data		Technical Data for Evaluation	
	Incinerator/boiler	Steam Boiler	Supplier stamp:	
Reference				
	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	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	Technical Data		Technical Data for Evaluation	
	Reference	Incinerator/boiler	Supplier stamp:	
		Steam Boiler		
	- Economizer	mm		
	Tube pitching in membrane walls	mm		
	Empty flue gas cross sections:			
	- Inlet in first boiler pass	m ²		
	- Transition between first and second boiler pass	m ²		
	- Inlet last superheater	m ²		
	- Inlet economizer	m ²		
	Net volume drain tank / blow-down tank	m ³		
	Minimum bending radius of tubes:			
	- Tube diameter <33 mm	mm		
	- Tube diameter 33-38 mm	mm		
	- Tube diameter >38 mm	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.			
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	m ³ /m ³ h		
	Acceptable steam drum load at specified live steam parameters and the actual drum size	m ³ /m ³ h		
	Steam production, max.	tons/h		

Table 8	Technical Data		Technical Data for Evaluation	
	Incinerator/boiler Steam Boiler		Supplier stamp:	
Reference				
	Steam production, min.	tons/h		
A2 sec. 10	Maintenance			
	<i>Descriptions to be included in Tender:</i>			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	Technical Data		Technical Data for Evaluation	
	Incinerator/boiler Steam Boiler		Supplier stamp:	
Reference				
	- 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 1 st and 2 nd 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	Technical Data	Technical Data for Evaluation	
		Supplier stamp:	
Reference	Incinerator/boiler Steam Boiler		
	- maximum	kW	
	- nominal	kW	
	- minimum	kW	
	Natural gas consumption, nominal per burner	kg/h	
	Noise level according to Appendix A14.3 <i>Acoustic Noise and Vibrations</i>	dB	

Table 9	Technical Data		Technical Data for Evaluation			
	Incinerator/boiler Feed Water System		Supplier 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		m ³			
Net volume		m ³				
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):		Unit	50%	75%	100%
o Pressure rise		bar				
o Speed		rpm				
o Feed water flow		m ³ /h				
o Shaft power		kW				
o Efficiency		%				
o NPSH		bar				
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 Component Cooling System		Supplier 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	m ³ /h		

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

Table 11	Technical Data		Technical Data for Evaluation	
	Incinerator/boiler Ash and IBA Handling System		Supplier stamp:	
Reference				
	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	Technical Data	Technical Data for Evaluation	
		Supplier stamp:	
Reference	Incinerator/boiler Ash and IBA Handling System		
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	
		Supplier stamp:	
Reference	Incinerator/boiler Auxiliary Systems		
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	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 <i>Process and Design Data</i>) – 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 <i>Process and Design Data</i> . 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 <i>Process and Design Data</i> .		
	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) (<i>State with and without option 1</i>)			
- Max. consumption	kW		
- Nominal consumption	kW		
- Nominal annual consumption	MWh		

Table 14	Technical Data		Technical Data for Evaluation:
	Flue Gas Treatment Quencher/Reactor		Supplier stamp:
Reference			
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	Technical Data		Technical Data for Evaluation:
	Flue Gas Treatment Bag House Filter		Supplier stamp:
Reference			
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% O₂, 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	Technical Data		Technical Data for Evaluation:
	Flue Gas Treatment Bag House Filter		Supplier stamp:
Reference			
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	Technical Data for Evaluation:	
		Supplier stamp:	
Reference	Flue Gas Treatment Bag House Filter		
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	Technical Data for Evaluation:	
		Supplier stamp:	
Reference	Flue Gas Treatment Low-temperature Economizer (option 1)		
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 ₂ O	% (v/v)	
	- O ₂	%, dry (v/v)	
	- Flue gas negative pressure, inlet	Pa	

Table 16	Technical Data		Technical Data for Evaluation:	
	Reference	Flue Gas Treatment Low-temperature Economizer (option 1)	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	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	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	Technical Data for Evaluation:	
	Flue Gas Treatment Flue gas condensation – Quencher (option 1)	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	Technical Data for Evaluation:	
	Flue Gas Treatment Condensing Section (option 1)	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% O₂		
	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	Technical Data		Technical Data for Evaluation:
	Flue Gas Treatment Condensing Section (option 1)		Supplier stamp:
Reference			
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	Technical Data for Evaluation:	
	Flue Gas Treatment Heat pump section (option 1)	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 <i>Process and Design Data</i> . 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:	
	Flue Gas Treatment Reheater (option 1)	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	Technical Data	Technical Data for Evaluation:	
	Flue Gas Treatment Reheater (option 1)	Supplier stamp:	
Reference			
	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	Technical Data		Technical Data for Evaluation:
	Flue Gas Treatment Flue Gas Condensate (option 1)		Supplier stamp:
Reference			
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		Technical Data for Evaluation:		
	Flue Gas Treatment Flue gas condensate treatment (option 1)		Supplier stamp:		
Reference					
A3 Sec. 10.2	Flue gas condensate treatment				
	Descriptions to be included in Tender:		Reference		
	<p>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.</p> <p>The description shall include information about each treatment step including, but not limited to:</p> <ul style="list-style-type: none"> - 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	Technical Data		Technical Data for Evaluation:	
	Flue Gas Treatment Induced Draught Fan		Supplier stamp:	
Reference				
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	Technical Data		Technical Data for Evaluation:
	Flue Gas Treatment Flue Gas Monitoring		Supplier stamp:
Reference			
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 ₂ O	-	
	- O ₂	-	
	- CO ₂	-	
	- Dust	-	
	- HCl	-	
	- HF	-	
	- SO ₂	-	
	- NO _x (NO + NO ₂)	-	
	- NH ₃	-	
	- TOC	-	
- CO	-		
- N ₂ O	-		
- 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 ₂ O	-	
	- O ₂	-	
	- Dust	-	
	- HCl	-	
	- SO ₂	-	

Table 24	Technical Data	Technical Data for Evaluation:		
	Flue Gas Treatment Flue Gas Monitoring	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	Technical Data for Evaluation:		
	Flue Gas Treatment Ducts and Stack	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)	°C/°C		
	- Material	-		
	- Lining, type	-		
	- Diameter	m		
	- Thickness	mm		
	- Insulation, type	-		
	- Insulation, thickness and K-value	mm, W/m ² /°C		
	- 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)	°C/°C		
	- Material	-		
- Lining, type	-			
- Diameter	m			
- Thickness	mm			
- Insulation, type	-			
- Insulation, thickness and K-value	mm, W/m ² /°C			

Table 25	Technical Data	Technical Data for Evaluation:	
	Flue Gas Treatment Ducts and Stack	Supplier stamp:	
Reference	- 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 /°C		
- Cladding (type)	-		

Table 26	Technical Data		Technical Data for Evaluation:
	Flue Gas Treatment Silos and Tanks for Consumables and Products		Supplier stamp:
Reference			
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		
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	Technical Data		Technical Data for Evaluation:
	Flue Gas Treatment Silos and Tanks for Consumables and Products		Supplier stamp:
Reference			
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	Technical Data		Technical Data for Evaluation:	
	Turbine/generator (selectable options for negotiation pursuant to Section 3.1 (b) and Section 3.9 of the procurement documentation) General		Supplier stamp:	
Reference				
Statement of the contracting authority concerning the (non)use of the selectable option for negotiation				
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 (selectable options for negotiation)		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	°C		
	- live steam temperature gradients	°C/min.		
	The allowable range for the following parameters with bypass:			
	- live steam temperature range	°C		
	- live steam temperature gradients	°C/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	Technical Data		Technical Data for Evaluation:
	Turbine/generator Turbine (selectable options for negotiation)		Supplier stamp:
Reference			
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 (selectable options for negotiation)		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	

Table 29	Technical Data	Technical Data for Evaluation:	
	Turbine/generator Generator (selectable options for negotiation)	Supplier stamp:	
Reference			
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	%	
	- X_q	%	
	- 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		
- $T_{q0'}$	sec		
- $T_{q0''}$	sec		
- T_a	sec		
- Short-circuit ratio	%		

Table 30	Technical Data		Technical Data for Evaluation:
	Turbine/generator District Heat and Condensate		Supplier stamp:
Reference			
	Statement of the contracting authority concerning the technical design of district heating given the non(use) of the above selectable options for negotiation		
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	°C	
	Design terminal temperature difference (TTD) at nominal load	°C	
	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 <i>Process and Design Data</i> . The balances shall include states (p,T,h,m) for the DH water, water/glycol circuit and air.		
	Technical Data:	Unit	Value/Description

Table 30	Technical Data		Technical Data for Evaluation:	
	Turbine/generator District Heat and Condensate		Supplier stamp:	
Reference				
	Statement of the contracting authority concerning the technical design of district heating given the non(use) of the above selectable options for negotiation			
	- 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		
	- Design temperature	°C		
	- Total weight (wet)	kg		

5. AUXILIARY 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		
	Incinerator/boiler Auxiliary Systems		
Reference	Technical Data for Evaluation Supplier stamp:		
A5 sec. 4	Waste Cranes		
	Descriptions to be included in Tender:		
	Expected outage days and coordination with Employers planned annual revisions for Existing facility when replacing the existing waste cranes with new waste cranes.	Reference	
	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:			
Preliminary drawing for turbine cranes incl. hook height		Reference	
Technical Data:		Unit	Value/Description
Crane lifting capacity (MCR)	tons		
A5 sec. 7	Service Cranes		
	Descriptions to be included in Tender:		
	Preliminary drawing for main service cranes	Reference	
A5 sec. 7	Compressed Air Distribution System		
	Technical Data:		
	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	Technical Data	Technical Data for Evaluation	
		Supplier stamp:	
Reference	Incinerator/boiler Auxiliary Systems		
	- 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	Technical Data for Evaluation:
	Electrical Equipment General	Supplier stamp:
A6 sec. 2+3	General	
	<i>Descriptions to be included in Tender:</i>	
		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	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	Technical Data		Technical Data for Evaluation:	
	Electrical Equipment Power Transformer 12 MVA 22/6.3 KV		Supplier stamp:	
Reference				
A6 sec. 2	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	Technical Data		Technical Data for Evaluation:	
	Electrical Equipment Distribution Transformers 5000 kVA		Supplier stamp:	
Reference				
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	Technical Data		Technical Data for Evaluation:	
	Electrical Equipment UPS Transformers – 100 kVA		Supplier stamp:	
References				
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	Technical Data		Technical Data for Evaluation:	
	Electrical Equipment 22 kV Extension of Switchboard R2		Supplier stamp:	
Reference				
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:
	Electrical Equipment 6.3 kV Distribution Switchboard		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	Technical Data		Technical Data for Evaluation:	
	Electrical Equipment 6.3 kV Distribution Switchboard		Supplier stamp:	
Reference				
A6 sec. 2+3	6.3 kV Distribution Switchboard			
	Design standards	-		

Table 39	Technical Data		Technical Data for Evaluation:	
	Electrical Equipment 400 / 230 V Main Distribution Switchboards		Supplier stamp:	
Reference				
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	Technical Data		Technical Data for Evaluation:	
	Electrical Equipment 400 / 230 V Main Distribution Switchboards		Supplier stamp:	
Reference				
	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	Technical Data	Technical Data for Evaluation:		
		Supplier stamp:		
Reference	Electrical Equipment 400 / 230 V Main Distribution Switchboards	- 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:			
		Supplier stamp:			
Reference	Electrical Equipment 400 / 230 V MCC A, B,				
		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:	
	Electrical Equipment 400 / 230 V ACC A, B, ...	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	Technical Data for Evaluation:	
	Electrical Equipment 400 V / 230 V Main Distribution Switchboards – UPS A and UPS B	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	Technical Data		Technical Data for Evaluation:	
	Electrical Equipment 400 V / 230 V Main Distribution Switchboards – UPS A and UPS B		Supplier stamp:	
Reference				
A6 sec. 2+3	400 V / 230 V Main Distribution Switchboards – UPS A and UPS B			
	Design standards	-		

Table 43	Technical Data		Technical Data for Evaluation:	
	Electrical Equipment UPS 2x100 kVA		Supplier stamp:	
Reference				
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:	
	Electrical Equipment Emergency Generator Systems 1300 kVA		Supplier stamp:	
Reference				
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 <i>Acoustic Noise and Vibrations</i>		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		

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	Technical Data		Technical Data for Evaluation:
	Control and Monitoring System (CMS)		Supplier stamp:
Reference			
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	Technical Data	Technical Data for Evaluation:	
		Supplier stamp:	
Reference	Civil Works		
A9	Fire Detection & Firefighting System		
	Descriptions to be included in Tender:		Reference
	Manufacture and system type.		
	Technical description of fire detection and firefighting system.		

Table 48	Technical Data	Technical Data for Evaluation:	
		Supplier stamp:	
Reference	Civil Works		
A9	Statement of the contracting authority concerning the non(use) of the selectable option pursuant to Section 3.1 (b) and Section 3.9. of the procurement documentation „SO 501 – Extension of the waste storage hall“:		
	Statement of the contracting authority concerning the non(use) of the selectable option pursuant to Section 3.1 (b) and Section 3.9. of the procurement documentation „Location of the line within the SAKO premises“:		

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.

If the selectable options for negotiation are used, the contracting authority shall adequately modify the document *Part 0.h Room Data Sheet* so as to describe the lay-out design of the Line as selected by the contracting authority.

The Contractor shall fill in the document in different colour resolution for better control of the Employer.