

Employer  
**SAKO BRNO A.S.**

Project  
**„Modernization of WtE Plant SAKO Brno“**

Date  
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# Part II.g

## **GUARANTEES**



## Part II.g GUARANTEES

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## 1. GUARANTEE, ENVIRONMENTAL AND FUNCTIONAL REQUIREMENTS

The performance and specifications of the Contract Object is specified and determined according to the documents contained in part III, *Scope of Works and Technical Requirements*. The specifications in part III, *Scope of Works and Technical Requirements* shall be fulfilled by the Contractor and form the basis for the performance guarantees of the Line.

Part III, appendix A11, *End of Assembly, Commissioning and Testing* contains the procedures for commissioning and performance Test, ensuring the compliance with the Contractor's performance guarantees.

The guarantee requirements of the Contract Object shall be fulfilled. Test results cannot be improved by adding test variance or tolerance.

Environmental requirements are considered satisfied if the attained test results meet the minimum limits set. Test results cannot be improved by adding test variance or tolerance, even if tolerances are accepted in the permit.

If the environmental requirements are not fulfilled, the Contract Object shall be rectified according to the Contract. If environmental requirements are not met, this shall be deemed to be a substantial defect according to the Contract.

All requirements, specifications and descriptions in the Contract that are not specifically described as guarantee or environmental requirements are considered as functional requirements. If these functional requirements as described in the Contract are not fulfilled, this is to be considered as a defect and shall be rectified according to the Contract.

## 2. GUARANTEE DATA

Table 1 General	Employer's guarantee requirements		Contractor's Guarantee	
			Date:	Contractor Stamp:
Guarantee Parameter	Guarantee values / data	Notes / References	Guarantee values / data	Notes / References
General guarantee	Min. 2 years	To be stated by Contractor		
Corrosion and erosion guarantee, including lifetime for super heaters	Guarantee for 5 years lifetime to minimum material thickness in EN 12953  Demonstrated duration between superheater replacement: 5 years.	Contractor to provide references		
Lifetime of grate bars <sup>1)</sup>	Operating hours until 100% of grate area has been replaced  Min. 4 years	To be stated by Contractor		
Lifetime of membrane walls <sup>2)</sup>	Operating hours until first partial replacement of membrane walls	To be stated by Contractor		
Lifetime of refractory	Operating hours until first partial replacement of refractory tiles	To be stated by Contractor		
Lifetime of Inconel (or similar corrosion proof alloy) cladding <sup>3)</sup>	Operating hours until first welding of new Inconel cladding	To be stated by Contractor		
Lifetime of bag house filter bags	Min. lifespan of 4 years	To be stated by Contractor		

- 1) Replacement of 100 % of the grate area is in this context defined as when the total number of replaced grate bars corresponds to the total number of installed grate bars.
- 2) First partial replacement of membrane walls is in this context defined as the first event where a part of the membrane wall has to be replaced because the wall thickness does no longer comply with the minimum requirements in the latest issue of EN12952-3.
- 3) First welding of the cladding is in this context defined as situation when thickness of cladding drop below 0,5 mm.

Table 2 Availability	Employer's guarantee requirements		Contractor's Guarantee	
			Date:	
			Contractor Stamp:	
Guarantee Parameter	Guarantee values / data	Notes / References	Guarantee values / data	Notes / References
Availability of Line	Min. h/Year 8,000	Defined according to the Contract		
Availability, control and monitoring system of the Line	Min. h/Year 8,755	Defined according to the Contract		
Availability, continuous emission monitoring station of the Line	Min. h/Year 8,585 Max. 10 days per year with more than 5 invalid ½-hour average values			
Continuous period of operation of the Line	Min. h 8,000	Defined according to the Contract		

Table 3 Environmental Compliance	Employer's environmental requirements for the Line		Contractor's Guarantee Date:
			Contractor's stamp:
	Note: All concentrations are referred to dry gas at 11 % O <sub>2</sub> at standard conditions (Nm <sup>3</sup> at 0° and 101 325 Pa).		
Guarantee Parameter	Unit	½ h value. 97% / 100% (IED)	Daily average value (BREF)
CO	mg/Nm <sup>3</sup>	100/150 <sup>1)</sup>	50
TOC	mg/Nm <sup>3</sup>	10/20	8
Dust	mg/Nm <sup>3</sup>	10/30	5
HCl	mg/Nm <sup>3</sup>	10/60	6
HF	mg/Nm <sup>3</sup>	2/4	<0.8
SO <sub>2</sub> and SO <sub>3</sub> (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	50/200	30
NO <sub>x</sub> as NO <sub>2</sub>	mg/Nm <sup>3</sup>	200/400	120 <sup>3)</sup>
NH <sub>3</sub>	mg/Nm <sup>3</sup>	10/20 <sup>2)</sup>	10
Hg	mg/Nm <sup>3</sup>	0.02/0.04 <sup>2)</sup>	0.02
<sup>1)</sup> CO "100" as half-hourly average value (100%), "150" as 10-minute average value (97%)			
<sup>2)</sup> Defined here, but not stated in IED.			
<sup>2)</sup> Any lower value according to the Contractor's Tender shall apply			
Guarantee Parameter	Unit	Result of short-term spot sampling (3 samples, each of 1 h at least)	
Σ Cd and Tl	mg/Nm <sup>3</sup>	0.02	
Σ As, Pb, Co, Cr, Cu, Mn, Ni, Sb and V	mg/Nm <sup>3</sup>	0.3	
Guarantee Parameter	Unit	Result of short term spot sampling (2 samples of each of 6-8 h)	
Dioxins and furans (2,3,7,8-TCDD eq.)	ng/Nm <sup>3</sup>	0.04	
IBA quality (before any treatment) <sup>1)</sup>	Unit	General guarantee requirements	
Leaching		EU's Council decision of 19/12 - 2002, chapter 2.2.2 for non hazardous waste shall be fulfilled as well as TA Siedlungsabfall Deponieklasse 1 and any Czech Regulation.	
TOC	% w/w	< 3	
Dioxins and furans 2,3,7,8-TCDD eq. (VDI 3499)	ng/kg	< 5	
Ignition loss for IBA	% w/w	< 5	
<sup>1)</sup> IBA quality (before any treatment) shall comply with values in reference to directive EU 2010/75/EU			

<b>Table 4</b> <b>Other requirements</b>	<b>Employer's environmental requirements for the Line</b>		<b>Contractor's Guarantee</b>	
			Date:	Contractor Stamp:
Guarantee Parameter	Guarantee values / data	Notes / References	Guarantee values / data	Notes / References
In any load point of the Line: Retention time of flue gas at temperature above 850°C after last air injection.	Min. 2 sec			
Exhaust air from various auxiliary plants of the Line.	Max. dust content 5 mg/Nm <sup>3</sup>			
Noise from the Line	Environmental requirements according to the Table 1 of appendix A14.3 <i>Acoustic Noise and Vibrations</i>	Absolute requirement		



Table 5 Process Guarantees and Data	Guarantee Values and Process Data to be used for Interpolation								Contractor's Guarantee
	Stated by Contractor								Date:
	<i>Note: All correction curves and equations needed for correction of production and consumption is included in the Contract. Specific reference is made to testing procedures described in Appendix A20, Procedure for Guarantees Tests.</i>								Contractor Stamp:
Guarantee Parameter	Unit	Guarantee load point according to the capacity diagram/ Boiler load point							
		a) LP1	b) LP1	c) LP2	e) LP9	f) LP8	g) LP7	h) LP6	i) LP5
<b>Guarantees, conditions</b>									
Waste throughput	tonnes/h	16.5	16.5	19.5	19.5	16.5	11.6	11.6	12.7
Waste LHV	GJ/ton	10.0	10.0	8.5	7.0	7.0	10.0	13.0	13.0
Thermal input	MW	46	46	46	38	32	32	42	46
District Heat temperatures (cold return – hot forward) <sup>1</sup>	°C	69 – 83	69 – 90	69 – 83	69 – 83	69 – 83	69 – 83	69 – 83	69 – 83
LT-ECO and FGC (option 1) <sup>2</sup>	-	Excluded	Included	Excluded	Excluded	Excluded	Excluded	Excluded	Excluded
<b>Weighting for Contractor's Tender evaluation purpose</b>		Refer to part 0.d <i>Economic Model</i>							
<b>Output guarantees for the Line</b>									
Gross power production (Not subject to guarantee)	kW								
Net power production <sup>3</sup> (aux consumption shall be divided into main consumers)	kW								
Heat production, Turbine condenser (Not subject to guarantee)	kW								
Heat production, LT-ECO (option 1) <sup>2</sup>	kW	NA		NA	NA	NA	NA	NA	NA
Heat production, Heat pump for FGC (option 1) <sup>2</sup>	kW	NA		NA	NA	NA	NA	NA	NA
Steam consumption, 11.5 bara steam from Existing facility (option 1) <sup>2</sup>	kW	NA		NA	NA	NA	NA	NA	NA

<sup>1</sup> DH temperatures are at DH supply limits of the Line, refer to Appendix A18 *Limits of Supply*. I.e the connection points for the Line to the Employer's existing DH system.

<sup>2</sup> Option 1 covers inclusion of a low temperature economizer (LT ECO) and flue gas condensation (FGC) with heat pump located downstream bag-house filter and upstream ID-fan.

<sup>3</sup> Net power production=Gross power production – process power consumption (All process equipment from hopper to stack, not including waste cranes, and district heating pumps of the Existing facility).

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Guarantee Parameter	Unit	Guarantee load point according to the capacity diagram/ Boiler load point							
		a) LP1	b) LP1	c) LP2	e) LP9	f) LP8	g) LP7	h) LP6	i) LP5
Total heat production for district heating	kW								
<b>Consumption and other guarantees for the Line</b>									
Water consumption, boiler	m <sup>3</sup> /h	1)	NA	NA	NA	NA	NA	NA	NA
Fresh water consumption, total	m <sup>3</sup> /h	1)	NA	NA	NA	NA	NA	NA	NA
Urea-consumption (values ref. 100% Urea)	kg/h	1)	NA	NA	NA	NA	NA	NA	NA
Quick lime consumption, CaO (values ref. 100% CaO )	kg/h	1)	NA	NA	NA	NA	NA	NA	NA
Hydrated lime consumption, Ca(OH) <sub>2</sub> (values ref. 100% Ca(OH) <sub>2</sub> )	kg/h	1)	NA	NA	NA	NA	NA	NA	NA
Activated carbon consumption	kg/h	1)	NA	NA	NA	NA	NA	NA	NA
<i>Consumptions of all other chemicals, shall be specified by Contractor</i>	kg/h	<i>ref. to article 3</i>	NA	NA	NA	NA	NA	NA	NA
Boiler ash and FGT residue	kg/h	1)	NA	NA	NA	NA	NA	NA	NA
Compressed air consumption, service air	Nm <sup>3</sup> /h	1)	NA	NA	NA	NA	NA	NA	NA
Compressed air consumption, instrument air	Nm <sup>3</sup> /h	1)	NA	NA	NA	NA	NA	NA	NA
Live steam temperature (Assuming 2000 hours of operation)	°C	400 2)	NA	NA	NA	NA	NA	NA	NA
Flue gas temperature downstream boiler economiser	°C	3)	NA	NA	NA	NA	NA	NA	NA

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Guarantee Parameter	Unit	Guarantee load point according to the capacity diagram/ Boiler load point							
		a) LP1	b) LP1	c) LP2	e) LP9	f) LP8	g) LP7	h) LP6	i) LP5
<div><div><sup>1)</sup> Maximum value valid at load case shall be provided.</div><div><sup>2)</sup> Reference is made to associated part of the Contract regarding liquidated damages for reduced live steam temperature.</div><div><sup>3)</sup> Min. 170°C, nominal 170°C and maximum 190°C (maximum temp is after 8,760 hours operation without manual boiler cleaning).</div></div>									

### 3. OTHERS CHEMICALS CONSUMPTION<sup>4</sup>

Specification of others Contractor's consumables chemicals for the operation of the Line:

Table 6 Consumption guarantee Others chemicals consumption		
Guarantee Parametr	Unit	a) LP1
<i>Chemical 1 ... to be stated by Contractor</i>		1)
		1)
		1)
		1)
		1)
		1)
		1)
		1)
		1)
		1)
		1)
		1)
		1)
		1)
<sup>1)</sup> Maximum value valid at load case shall be provided.		

<sup>4</sup> Contracting authority add contractual penalties to the part II.c Contractual penalties for non-compliance with values, related to non-compliance of inserted values in relation to the fulfilment of Table 6.