ŠKOENERGO

TENDER DOCUMENTATION FOR SELECTION OF THE CONTRACTOR

Refurbishment of the Combined Heat and Power Plant in Mladá Boleslav

Business Package OB 2

BOILER HOUSES

VOLUME III

TECHNICAL REQUIREMENTS

Annex A6 Guarantee Values

Contents

1 TERMS AND CONDITIONS FOR OPERATION

The Location: The Combined Heat and Power Plant in Mladá Boleslav – ŠKO-ENERGO, s.r.o.

The altitude of the construction site is approximately 210 m.a.s.l.

The Climate data (The Meteor station in Semčice):

Average annual temperature:	9.4 °C
Average maximum temperature in the month – the warmest month	25 °C
Average air temperature in the coldest month	-1.9 °C
Lowest daily temperature	-6.0 °C
Average annual relative humidity	70percent
Dispersion of air relative humidity	35 – 90percent
Annual rainfall average	560 -620 mm
The number of ice days	24 (max. 62)
The number of arctic days	1 (max.5)
The number of tropical days	11 (max.34)
Number of days with snow cover	44 (max.94)
The extremes	
The highest measured air temperature – the extreme	38.1 °C
The highest daily average temperature – the extreme	30.9 °C
The lowest measured air temperature – the extreme	-24.6 °C
The lowest average daily temperature – the extreme	-20.5 °C

The values have been obtained from 30-year average.

Within these climatic conditions, the OB 2 CONTRACTOR guarantees safe, reliable, and economical operation in accordance with the applied standards.

2 TERMS OF REFERENCE

2.1 Terms of reference for GUARANTEE MEASUREMENT

The parameters always refer to the connection point.

Ambient air temperature	20 °C
Air pressure	98.8 kPa (abs)
Air relative humidity	60percent
Fuel temperature	20 °C
Cooling water temperature	22 °C
Feed water reference temperature	205°C
Feed water reference pressure	15 MPa(g)
Reference fuel	see Fuel tables

Note:

When pressure values are given, (g) is understood as overpressure.

2.2 General conditions

2.2.1 Feed water tank

2.2.1.1 Parameters of feed water at the connection point

Operating range of feed water temperature when operating with a high-pressure heater 190 -210°C

Temperature of feed water when operating without a high-pressure heater 160°C

Pressure of feed water within 14 -18 MPa(g)

2.2.1.2 Quality of feed water

Standardized values according to ČSN 07 0403

The chemism of steam production, alkalization of demineralized (feed) water and a treatment of boiler water is governed by the standard ČSN 07 7403 from the year 1982 which is still valid and by the Local Operating Regulations for Chemical Regimes for the Treatment of All Water at the E1A No. PPT300/007.7.

The quality of feed water is defined by Czech State Standards (ČSN) also with limits applicable to the given limit states.

Feed water - parameter	CC $\lambda_{25°C}$	pH	O_2	SiO_2	Fe	Cu	Σ Ca/Mg
Units	[µS/cm]	[-]	[ug/l]	[ug/l]	[ug/l]	[ug/l]	[umol/l]
ČSN 07 7403	< 0.3	8.7 – 9.2	< 10	< 20	< 20	< 5	< 1.5

At the present time the Cu, Σ Ca/Mg values are not monitored regularly.

Measured values – operating averages

The measured averages from the years 2020 to 2021 are given below.

	pH	conductivity	silicates	ionic iron	ammonia	oxygen	conductivity per cat.
		µS/cm	µg/l	µg/l	mg/l	µg/l	µS/cm
Average value	9.34	6.14	8.56	9.72	0.8	3.4	0.089

The quality of feed water is guaranteed by the CLIENT, according to ČSN 07 74 03.

2.2.2 Fuel 1 – Wood chips

Fuel 1 – Wood chips

According to Decree No. 110/2022 Coll., as a fuel there are wood chips coming from fresh or stored broadleaf and coniferous wood in any ratio characterized as:

- As a residual material from logging, so-called the small wood, i.e. the wood up to 7 cm in diameter and residual products from its processing, including roots (tree stumps), a biomass created in the forest from thinning and pruning, wood material from maintenance of public and private greeneries, including tracks, watercourses, electricity distributions, etc., and residual products of its processing, including their modifications for transport to final consumers.

- As used wood, used products made from wood and wood materials, wooden packaging including by-products and residual products of their processing and including their treatment for transport to biomass final consumer, the wood will not contain halogenated organic compounds or heavy metals as a result of treatment with wood preservatives or paint materials.
- as residual wood material resulting from the production of cellulose, including bark, including by-products from its processing, and including its modifications for transport to the final biomass consumer,
- as wood offcuts intended for material use, including by-products and residual products of their processing, and including their modifications for transport to the biomass final consumer,
- as wood chips produced during sawmilling of barked and debarked wood.

2.2.2.1 Wood chip parameters

parametr		unit	value		
			min.	**ref.**	max.
Water content	$W^{(ar)}$	%wg.	25	**40**	55
Ash content	$A^{(ar)}$	%wg.	0.3	**4**	11
Lower heating value	$Q^{(ar)}$	MJ/kg	7.8	**10**	12
Bulk density	$\rho^{(ar)}$	kg/m^3	200	**250**	380
Sulphur content	$S^{(ar)}$	%wg.	0.01	**0.05**	0.1
Chlorine content	$Cl^{(ar)}$	%wg.	0.01	**0.015**	0.02
Fluorine content	$F^{(ar)}$	%wg.	0.003	**0.002**	0.01
Nitrogen content	$N^{(ar)}$	%wg.	0.1	**0.3**	0.6
Carbon content	$C^{(ar)}$	%wg.	23	**30**	36
Hydrogen content	$H^{(ar)}$	%wg.	3	**3.7**	5

2.2.2.2 Trace elements in wood chips

The content of trace elements in wood chips will depend on the nature of a supply and a source of the wood material.

The content of trace elements in wood chips is not guaranteed by the CLIENT.

2.2.2.3 Guaranteed granulometry of incoming wood chips to the UNIT OB2

Chips particles meet the following size limits and their relative fractions:

Parameter	**Unit**	**Value**
Particles smaller than 63 mm or equal to 63 mm in one direction	%	90
The largest particle can have dimensions of no more than 100x40x35 mm (height/ width/ depth)	%	10
Particles smaller than 3.15 mm in one direction	%	10
Particles smaller than 5.6 mm in one direction	%	30
Content of soil, clay, sand, etc. (max. 30 pieces of stones (e.g. gravel) the size of a cube with an edge of max. 5 cm	%	2
Metal objects – the SEPARATION with a minimum efficiency of 85% from the input parameter to the OB 1		

2.2.3 Fuel 2 – Plant pellets

Parameters of plant pellets

parametr		unit	value		
			min.	**ref.**	max.
Water content	$W^{(ar)}$	%wg.	8.5	**12**	16
Ash content	$A^{(ar)}$	%	3	**6**	10
Lower heating value	$Q^{(ar)}$	MJ/kg	12	**15.5**	17.5
Bulk density	$\rho^{(ar)}$	kg/m^3	300	**450**	700
Sulphur content	$S^{(ar)}$	%wg.	0.15	**0.2**	0.25
Chlorine content	$Cl^{(ar)}$	%wg.	0.07	**0.1**	0.15
Fluorine content	$F^{(ar)}$	%wg.	0.002	**0.005**	0.01
Nitrogen content	$N^{(ar)}$	%wg.	1.4	**1.7**	2.2
Carbon content	$C^{(ar)}$	%wg.	39	**43**	48
Hydrogen content	$H^{(ar)}$	%wg.	5	**5.5**	6

2.2.4 Natural gas – start-up flue

Lower heating value $Q_i{}^r$ min. 35.25 MJ/m ^{3}

Volume composition of gas:

Content of CH_4 96.3 %

Content of C_2H_6 1.5 %

Content of C_3H_8 0.4 %

Content of CO_2 0.4 %

Content of O_2 0.5 %

Content of N_2 0.9 %

Operating pressure of natural gas: 200-300 kPa

2.2.5 Technological fuel

It is a mixture of water and thickened oil and cutting emulsions after treatment from Škoda Auto oily water.

parametr			value		
			min.	**ref.**	**max.**
Water content	$W^{(ar)}$	%wg.	8	63	80
Ash content	$A^{(ar)}$	%wg.	1	1.5	5
Lower heating value	Q_i	MJ/kg	8	14	25
Sulphur content	$S^{(ar)}$	%wg.		0.16	
Chlorine content	$Cl^{(ar)}$	%wg.		0.04	

The fuel is burned a campaign-wise in the amount of 250-650 kg/h.

2.2.6 Urea

The specific use of the DeNOx agent is at the Contractor's OB 2, whereby three aqueous solutions are permitted:

- 40% urea solution,
- 35% ammonium sulphate solution,
- 25% ammonia solution.

The use of a specific agent is binding for guarantees by filling in Annex K of the tender documentation.

2.2.7 Cooling water

The cooling water currently reaches the following values:

Parameter	**Unit**	**Value**
Cooling water pressure	MPa(g)	0.15
Input temperature of cooling water in the summertime - the average	°C	22
Operating temperature range	°C	10 - 30
Quality		
pH	-	8.5-8.9
$KNK_{4,5}$	mmol	3 - 7
Total hardness	dH	Max.25
Conductivity	µS/cm	700 - 1200

2.2.8 Demi-water

Demi-water currently has the following values:

Parameter	Unit	Value
Demi-water pressure	MPa(g)	0.65
Operating temperature range	°C	10 - 25
Conductivity	µS/cm	1
Silicates	µg/l	20

2.2.9 Industrial water

Process currently achieves the following assigned values:

Parameter	Unit	Value
pH	-	6.7 – 7.5
$KNK_{4,5}$	mmol	0.55 – 2.3
Total hardness	mmol/l	0.8 – 3.2
Conductivity	µS/cm	250 - 400
Aluminium	Mg/l	0.01 – 0.15

2.2.10 Transport pressure air from the Škoda Auto

Specification of pressure air from the Škoda Auto:

Nominal air pressure in the Škoda Auto distribution at the connection point	0.6 MPa(g)
Max. air pressure in the ŠKODA distribution at the connection point	0.62 MPa(g)
Pressure dew point at the dryer inlet	+3 to 7 °C from the Škoda distribution (ISO 8573-1:2001)
Maximum pressure	0.7 MPa (g)

Nominal pressure	0.6 MPa (g)
Minimal pressure	0.5 MPa (g)
Pressure dew point	+2 to +7 °C
Temperature	10–40 °C
Solid particles	class 4
Residual oil content	class 2

3 CONDITIONS OF GUARANTEE MEASUREMENT

3.1 General conditions

3.1.1 THE TESTING COMPANY

For the method of performing all GUARANTEE TESTS of the LOT OB 2 see the *Table 3.6 1 I* and conditions and requirements will be specified in the relevant GUARANTEE MEASUREMENT PROJECT approved by the CLIENT. The GUARANTEE MEASUREMENT will be performed by a mutually agreed TESTING COMPANY.

3.1.2 THE PROJECT OF GUARANTEE MEASUREMENT

Before starting the GUARANTEE MEASUREMENT, the CLIENT shall approve the GUARANTEE MEASUREMENT PROJECT, according to which these tests will be directed, they will determine the expected date and program of these GUARANTEE MEASUREMENTS, their arrangement and a form, requirements for the daybook of tests, etc.

Without prior approval of the GUARANTEE MEASUREMENTS PROJECT by the CLIENT, the GUARANTEE MEASUREMENTS will not be carried out.

3.1.3 The CLIENT cooperation

The CLIENT and the OB2 CONTRACTOR will provide the necessary cooperation for the performance of the GUARANTEE MEASUREMENTS.

3.1.4 Further conditions

1. GUARANTEE MEASUREMENTS will take place under steady state conditions. The testing company will provide additional instrumentation with a specified accuracy that will be in accordance with the relevant standards for conducting acceptance tests for the purpose of performing GUARANTEE MEASUREMENTS.
2. The UNIT will be operated according to operating regulations during the GUARANTEE MEASUREMENTS.
3. The guaranteed parameters will be proven by measurements at the steady state of the UNIT, or its parts – the boilers. It is a condition where all operating units were operated for at least three days before the test and the UNIT itself have been stabilized to the initial performance level for 1 hour, at least.
4. The parameters for meeting the guaranteed values are assessed for each boiler individually.
5. Measurement of the guaranteed parameters on the boiler will be carried out according to the ČSN EN 12952-15 standard "Water-tube boilers and auxiliary equipment - Acceptance tests".

6. The specified standards determine the maximum fluctuations and deviations of operating conditions, as well as the required classes of accuracy of measuring devices and the resulting average uncertainty of measurements.
7. The correction of results for different boundary conditions during measurements will be carried out in accordance with the stated standards using correction curves processed by the CONTRACTOR and approved by the CLIENT for all different boundary conditions.
8. No repair works on the equipment are allowed during the guarantee tests.

3.1.5 Performance levels for the tests

Where the guarantee tests are ordered for the entire performance range of the UNIT OB 2, the measurements will be performed at least for the following performance levels, and always for each of the K80, K90, K20 boilers:

a) wood chip fuel only:
   1. nominal power output of the boiler,
   2. the boiler power output – 70percent of its nominal power output,
   3. the boiler minimum power output.

b) For the K80 and K90 boilers: a fuel mixture of wood chips 60percent and plant pellets 40percent share of the boiler heat input for:
   1. The boiler nominal power output,
   2. The boiler power output: 70 percent of nominal output,
   3. The boiler minimum power output.

3.2 Preliminary measurements of some guaranteed values during COMPREHENSIVE EXAMINATIONS AND A TRIAL RUN

The UNIT is operated in the manner and for the period as specified in Annex A1 for a relevant test, or in Annex A5.

As a part of the COMPLEX TEST and the TRIAL RUN, a preliminary measurement of the guaranteed parameters will be performed for those values that can be measured, using operational measurements.

3.2.1 Measurement of guaranteed emission values

The preliminary measurements of continuously measured emissions will be carried out during the entire COMPLEX TEST and the entire TRIAL RUN in accordance with Decree No. 415/2012 Coll., in accordance with Methodological Instruction MZP 2019/710/462 and in accordance with BAT 2017/1442.

3.2.2 Emission measuring device

As for the measurement is considered, the measured values will be applied by continuous measurement of the emissions of the boilers K20, K80, K90 before entering the stack.

3.2.3 Measurements of other guaranteed parameters

The preliminary measurements of guaranteed values will be performed for parameters that will be measurable by installed operational measurements, see the table 3.6 1 - and the table 3.6 2 - the Group of guaranteed values II.

3.3 GUARANTEE TEST A

After a successful COMPREHENSIVE TEST, the GUARANTEE TEST A will be performed. The Testing company will perform the GUARANTEE TEST A proving to the CLIENT that the LOT OB 2 meets the guaranteed parameters prescribed for the GUARANTEE TEST A in this Appendix and the requirements set forth in the technical appendices in accordance with the GUARANTEE MEASUREMENT PROJECT.

3.4 Guarantee Measurements during the GUARANTEE PERIOD

The results of pollutants measurements conducting within continuous measurements will be evaluated according to Decree 415/2012 Coll., in accordance with BAT 2017/1442 and the relevant methodological instructions for the entire BASIC GUARANTEE PERIOD.

The results of one-time measurements, carried out during the GUARANTEE period in the frequency and method of evaluation according to Decree 415/2012 Coll. and the relevant methodological instruction and in accordance with BAT 2017/1442.

The measurement of the availability of the UNIT OB 2 will be carried out within the period being evaluated.

3.5 GUARANTEE TEST B

In accordance with the GUARANTEE MEASUREMENT PROJECT, the GUARANTEE TEST B will be performed before the BASIC GUARANTEE PERIOD expires, within the range of guaranteed parameters defined in the Table 3.6.1 and the Table 3.6.2.

3.6 The Application of guaranteed measurements of guaranteed values

Table 3.6-1 The application of guarantee measurements and tests – the group of guaranteed values I

Number	Parameter	The preliminary measurements of guaranteed values by operational measurements during the COMPLEX TEST and the TRIAL RUN	Guarantee measurement during the BASIC GUARANTEE PERIOD	GUARANTEE TEST A	GUARANTEE TEST B
A1	SP	Yes	Yes	Yes	Yes
A2	NO_X	Yes	Yes	Yes	Yes
A3	CO	Yes	Yes	Yes	Yes
A4	SO_2	Yes	Yes	Yes	Yes
A5	HF	Yes	Yes	Yes	Yes
A6	NH_3	Yes	Yes	Yes	Yes
A7	HCl	Yes	Yes	Yes	Yes
A8	Hg	No	No	Yes	Yes
A9	K20 output, steam temperature and pressure - fuel 1	No	No	Yes	Yes
A10	K80 and K90 outputs, steam	No	No	Yes	Yes

Number	Parameter	The preliminary measurements of guaranteed values by operational measurements during the COMPLEX TEST and the TRIAL RUN	Guarantee measurement during the BASIC GUARANTEE PERIOD	GUARANTEE TEST A	GUARANTEE TEST B
	temperature and pressure – fuel 1				
A11	K80 and K90 outputs, steam temperature and pressure – mixture of the fuel 1 and the fuel 2	No	No	Yes	Yes
A12	Steam quality	No	No	Yes	Yes
A13	Internal and external noise	No	No	Yes	No
A14	Availability *)	No	Yes	No	Yes

*) The availability will be measured as a guaranteed value after a period preliminary handover of the LOT OB 2 to the CLIENT, or after the GUARANTEE PERIOD, whichever is longer.

The Table 3.6 2 The Application of guarantee measurements – The group of guaranteed values II

Number	Parameter	GUARANTEE TEST A	GUARANTEE TEST B
B1	Efficiency - fuel 1 and 2	Yes	Yes
B2	Boiler minimum power output	Yes	Yes
B3	Superheated steam temperature, minimum output	Yes	Yes
B4	Rate of power output change	Yes	Yes
B5	Start-up duration	Yes	No
B6	Electricity consumption of K20	Yes	No
B7	Consumption of additives	Yes	Yes

4 GUARANTEED PARAMETERS OF THE GROUP I

4.1 Emissions

4.1.1 Emissions - General conditions

The CONTRACTOR guarantees for the LOT OB 2, that the guaranteed values of emissions into the atmosphere specified in this Annex will not be exceeded.

1. The K20 boiler is classified as a new combustion unit.
2. The boilers K80 and K90 are considered as an existing combustion unit.

3. The resource has been included in the category of input power higher than 300 MW.
4. All emission values are understood at the entrance to the stack, unless defined otherwise.
5. The emission values of the boiler relate to reference conditions which are given by valid legislation, in the time of publishing tender documentation it was: dry gas 6 percent, O_2 in flue gases, pressure 101.325 kPa and temperature 273.15.

4.1.2 The assessment of emission limits measurement

4.1.2.1 Pre-PAC Evaluation Period

The evaluation of fulfilment of the guaranteed values of continuously measured emissions will be carried out for the entire period of preliminary measurements of the guaranteed values during the COMPREHENSIVE TEST and the TRIAL RUN, as well as the guarantee measurements during the GUARANTEE TEST A.

4.1.2.2 Pre-FAC Evaluation within the GUARANTEE PERIOD

The evaluation of the fulfilment of the guaranteed emission values will be carried out in accordance with Chapter 4.1.2.3.

4.1.2.3 Method of Evaluation

The measurement will be carried out in accordance with Act No. 201/2012 Coll.

The evaluation of emission limits will be carried out in accordance with Decree No. 415/2012 on the permissible level of pollution and its detection and the methodological instruction of the Ministry of the Environment No. MZP/2019/710/462 – the minimum emission requirements according to the emission levels associated with the best techniques for large combustion plants based on the implementation decision of the European Commission BAT 2017/1442.

The measured values for pollutants for which a monthly or annual limit are indicated will be for the period specified in the chapter *4.1.2.1 The evaluated period before the PAC* and will be compared additionally with the annual and monthly limits.

One-time measurements will be evaluated only from the measured values during the GUARANTEE TEST A, and alternatively during the evaluated period within the GUARANTEE PERIOD, according to the frequency given by the legislative regulations mentioned in this Chapter and by measurements within the GUARANTEE TEST B.

4.1.3 Guaranteed emissions of the boilers K20, K80, K90

The parameters are guaranteed for the full operating range of a boiler, from the minimum to maximum boiler output, for the entire range of defined fuel quality and for entire ranges of media:

- in the case of K80 and K90 boilers also for the entire range of the co-combustion of fuel 1: wood chips and the fuel 2: vegetable pellets in the range of fuel 2 co-combustion; 0-40percent of heat input,
- in addition, for the K80 and K90 boilers, even in the case of the technological fuel 3 co-combustion, to the maximum extent.

	Emissions from the boiler	**Limits**	
	Particulate matter **Continuous measurement**	Annual limit Value (mg/Nm^3)	Daily limit Value (mg/Nm^3)
A 1.1.1	The boiler K20 fuel 1: wood chips	5	10

A1.1.2	The boilers K80 and K90 Fuel 1: wood chips	10	16
A1.1.3	The boilers K80 and K90 – a mixture Fuel 1: wood chips and the fuel 2 – plant pellets	10	16
	NOx **Continuous measurement**	Annual limit Value (mg/Nm^3)	Daily limit Value (mg/Nm^3)
A 2.1.1	The boiler K20, the fuel 1: wood chips	140	150
A 2.1.2	The boilers K80 and K90 Fuel 1: wood chips	160	200
A2.1.3	The boilers K80 and K90 – a mixture Fuel 1: wood chips and the fuel 2 – plant pellets	160	200
	CO **Continuous measurement**	Annual limit Value (mg/Nm^3)	
A 3.1.1.	The boiler K20 – the fuel 1: wood chips	80	
A 3.1.2	The boilers K80 and K90 Fuel 1: wood chips	80	
A3.1.3	The boilers K80 and K90 – a mixture Fuel 1: wood chips and the fuel 2 – plant pellets	80	
	SO_2 **Continuous measurement**	Annual limit Value (mg/Nm^3)	Daily limit Value (mg/Nm^3)
A 4.1.1	The boiler K20, the fuel 1: wood chips	35	70
A 4.1.2	The boilers K80 and K90 Fuel 1: wood chips	50	85
A4.1.3	The boilers K80 and K90 – a mixture Fuel 1: wood chips and the fuel 2 – plant pellets	50	85
	HF	Average value (mg/Nm^3)	
A 5.1.1.	The boiler K20, the fuel 1: wood chips - **One-time measurement**	<1	
A 5.1.2	The boilers K80 and K90 - **Continuous measurement** Fuel 1: wood chips	<1	

A 5.1.3	The boilers K80 and K90 – a mixture - **Continuous measurement** Fuel 1: wood chips and the fuel 2 – plant pellets	<1	
	NH_3 **Continuous measurement**	Annual limit Value (mg/Nm^3)	
A 6.1.1	The boiler K20, the fuel 1: wood chips	15	
A 6.1.2	The boilers K80 and K90 Fuel 1: wood chips	15	
A 6.1.3	The boilers K80 and K90 – a mixture Fuel 1: wood chips and the fuel 2 – plant pellets	15	
	HCl **Continuous measurement**	Annual limit Value (mg/Nm^3)	Daily limit Value (mg/Nm^3)
A 7.1.1.	The boiler K20, the fuel 1: wood chips	5	12
A 7.1.2	The boilers K80 and K90 Fuel 1: wood chips	5	12
A7.1.3	The boilers K80 and K90 – a mixture Fuel 1: wood chips and the fuel 2 – plant pellets	5	12
	Annual limit Hg **One-time measurement**	Annual limit Value (µg/Nm^3)	
A 8.1.1	The boiler K20, the fuel 1: wood chips	5	
A 8.1.2	The boilers K80 and K90 Fuel 1: wood chips	5	
A 8.1.3	The boilers K80 and K90 – a mixture Fuel 1: wood chips and the fuel 2 – plant pellets	5	

4.2 Nominal parameters of the boiler

The parameters listed below are guaranteed for the reference conditions specified in this document:

- Chapter *2.1 Reference conditions for the GUARANTEE MEASUREMENT* A,
- for the Reference values given for individual media and fuels, respectively for fuel mixtures from the Chapter *2.2. General conditions.*
-

	Parameters at connection points	Units	Value
	The boiler K20- the fuel 1		
A 9.1.1.	The nominal output of the boiler K20 at the nominal steam parameters at the connection point for the fuel 1: wood chips	t/h	80
A 9.1.2	The nominal steam temperatures of the boiler K20 for operating range from 70 to 100percent of the boiler nominal output for the fuel 1: wood chips	°C	535±5
A 9.1.3	The nominal steam pressure of the boiler K20 in the entire range from the minimum to the nominal boiler power output for the fuel 1: wood chips	MPa(g)	12.5±0.3
	The boilers K80 and K90 – the fuel 1		
A 10.1.1	The nominal steam pressure K20 in the entire range from minimum to the boiler nominal output for the fuel 1: wood chips	t/h	100
A 10.1.2	The steam rated temperatures of each of the K80 and K90 boilers for the operating range of 70 to 100percent of the boiler rated output for the fuel 1: wood chips	°C	535±5
A 10.1.3	The nominal steam pressure of each of the K80 and K90 boilers over the entire range from minimum to the boiler nominal output for fuel 1: wood chips	MPa(g)	12.5±0.3
	The boilers K80 and K90 for a mixture of fuels based on heat input		
A 11.1.1	The nominal output of each of the K80 and K90 boilers at the nominal parameters at the connection point for the fuel 1: wood chips 60percent and the fuel 2: plant pellets – 40percent	t/h	100
A 11.1.2	The nominal steam temperatures of each of the K80 and K90 boilers for the operating range from 70 to 100percent of the boiler nominal output for the fuel 1: wood chips 60percent and the fuel 2: vegetable pellets – 40percent	°C	535±5
A 11.1.3	The nominal steam pressure of each of the K80 and K90 boilers in the entire range from the minimum to the nominal boiler output for the fuel 1: wood chips 60percent and the fuel 2: vegetable pellets – 40percent	MPa(g)	12.5±0.3

4.3 Other guaranteed parameters of the group I

A 12 Steam quality

The guaranteed quality of superheated steam at the connection point

Superheated steam	Cathexis conductivity CC $\lambda_{25°C}$	Fe	SiO_2	Sodium and Potassium ($Na^+ + K^+$)
	(µS/cm)	(ug/l)	(ug/l)	(ug/l)
ČSN 07 74 03	<0.3	<20	<20	<10

A 13 Internal and external noise

The sound pressure inside buildings, measured at a distance of 1 m from the equipment or from the surface of the noise protection cover (ISO 3746) LpA must be less than 85 dB.

A 14 Availability

Within the guaranteed value A15 Availability, all the equipment of the OB2 UNIT - the relevant boiler within the connection points of the OB2 UNIT is a subject to evaluation.

A14.1 The guaranteed availability of the K20 boiler is *will be filled in by the BIDDER hours for a period of one year (8,760 hours), while the minimum value is 8,000 operating hours.*

A14.2 The guaranteed availability of the K80 boiler is *will be filled in by the BIDDER hours for a period of one year (8,760 hours), while the minimum value is 8,000 operating hours.*

A14.3 The guaranteed availability of the K90 boiler is *will be filled in by the BIDDER hours for a period of one year (8,760 hours), while the minimum value is 8,000 operating hours.*

A14.4 The guaranteed maximum time of planned shutdowns of boiler K20 is *will be filled in by the BIDDER hours for a period of one year (8,760 hours), while the maximum value is 760 hours.*

A14.5 The guaranteed maximum time of planned shutdowns of boiler K80 is *will be filled in by the BIDDER hours for a period of one year (8,760 hours), while the maximum value is 760 hours.*

A14.6 The guaranteed maximum time of planned shutdowns of boiler K90 is *will be filled in by the BIDDER hours for a period of one year (8,760 hours), while the maximum value is 760 hours.*

The availability will be evaluated by the CLIENT with the OB2 CONTRACTOR´s participation on the basis of the operational records of the equipment within the guarantee operation.

5 GUARANTEED VALUES OF the GROUP II

The parameters listed below in this chapter are guaranteed for the reference conditions given in this document:

- The Chapter 2.1 The reference conditions for the GUARANTEE MEASUREMENT A,
- For the reference values given for individual media and fuels, or a mixture of fuels from the Chapter 2.2. General conditions.

5.1 The Boiler Efficiencies

The indirect method according to ČSN EN 12 952 will be used to determine the guaranteed efficiency.

	Parameter	Units	The value of the guaranteed parameter	LIMIT VALUE OF THE GUARANTEED PARAMETER
	The boiler K20 - Fuel 1			
B 1.1	The average boiler efficiency at nominal boiler output for fuel 1: wood chips	%	*will be filled in by the BIDDER*	min. 91
	The boilers K80 and K90 - Fuel 1			
B 1.3	The average boiler efficiency at the boiler nominal output for the fuel 1: wood chips - for the duration of 24 hours	%	*will be filled in by the BIDDER*	min. 90
	The boilers K80 and K90 for any mixture of fuel 1: wood chips – 60percent and the fuel 2: vegetable pellets – 40percent			
B 1.3	The average boiler efficiency at the boiler nominal output for the fuel mixture	%	*will be filled in by the BIDDER*	min. 90

5.2 The Boiler Minimum Output

It is applied to reference fuels, reference feed water temperature and reference conditions.

	Parameter	Units	The value of the guaranteed parameter	LIMIT VALUE OF THE GUARANTEED PARAMETER
	The boiler K20 - Fuel 1			
B 2.1	The boiler minimum output – the fuel 1: wood chips – the average for the duration of 4 hours	% of the boiler nominal output	*will be filled in by the BIDDER*	min. 40
	The boilers K80 and K90 - Fuel 1			
B 2.2	The boiler minimum output – the fuel 1: wood chips – the average for the duration of 4 hours	% of the boiler nominal output	*will be filled in by the BIDDER*	min. 50
	The boilers K80 and K90 for any mixtures of the fuel 1 – 60percent and the fuel 2 – 40percent			
B 2.3	The boiler minimum output – a mixture of fuels - the average for the duration of 4 hours	% of the boiler nominal output	*will be filled in by the BIDDER*	min. 50

5.3 The temperature of superheated steam at the minimum output

	Parameter	Units	The value of the guaranteed parameter	LIMIT VALUE OF THE GUARANTEED PARAMETER
	The boiler K20 - Fuel 1			
B 3.1	The temperature of superheated steam at the connection point at the boiler minimum output – the fuel 1 for the entire fuel range and for the reference conditions	°C	As a minimum: *will be filled in by the BIDDER*	min. 515
	The boilers K80 and K90 - Fuel 1			
B 3.2	The temperature of superheated steam at the connection point at the boiler minimum output – the fuel 1 for the entire fuel range and for the reference conditions	°C	As a minimum: *will be filled in by the BIDDER*	min. 515
	The boilers K80 and K90 for any mixtures of the fuel 1 – 60percent and the fuel 2 – 40percent			
B 3.3	The temperature of superheated steam at the connection point at the boiler minimum output – the mixture of fuels for the entire fuel range and for the reference conditions	°C	As a minimum: *will be filled in by the BIDDER*	min. 515

5.4 Rate of change of the boiler output

	Parameter	Units	The value of the guaranteed parameter	LIMIT VALUE OF THE GUARANTEED PARAMETER
	The boiler K20 - fuel 1			
B 4.1	The average rate of change of the boiler output in the range of minimum to maximum output – the Fuel 1 – wood chips	(t/h)/min	*will be filled in by the BIDDER*	lower by more than 20% of the guaranteed value
	The boilers K80 and K90 – the Fuel 1			
B 4.2	The average rate of change of the boiler output in the range of minimum to maximum output – the Fuel 1 – wood chips	(t/h)/min	*will be filled in by the BIDDER*	lower by more than 20% of the guaranteed value
	The boilers K80 and K90 for any mixtures of the fuel 1 – 60percent and the fuel 2 – 40percent			

B 4.3	The average rate of change of the boiler output in the range of minimum to maximum output – the mixture of fuels	(t/h)/min	*will be filled in by the BIDDER*	lower by more than 20% of the guaranteed value

5.5 The boiler start-up from its cold state to the boiler minimum output

The cold state means a shutdown longer than 48 hours.

The minimum output means achieving steam parameters and the boiler stable operation, without start-up fuel and achieving the steam quality according to ČSN 07 7403, paragraph 13 and table 2.

	Parameter	**Units**	**The value of the guaranteed parameter**	**LIMIT VALUE OF THE GUARANTEED PARAMETER**
	The boiler K20			
B 5.1	The start-up time from the cold state to the minimum output – the fuel 1: wood chips	min	*will be filled in by the BIDDER*	higher than 30% of the guaranteed value
	The boilers K80 and K90			
B 5.2	The start-up time from the cold state to the minimum output – the fuel 1: wood chips	min	*will be filled in by the BIDDER*	higher than 30% of the guaranteed value

5.6 Self-consumption of electricity of K20

This is the self-consumption of the UNIT OB 2 defined part of the K20 boiler part, from the fuel input to the operating silo to the output from the boiler smoke exhaust fan and the ash output on the filter hoppers.

The CLIENT will list the appliances in their offer.

	Parameter	**Units**	**The value of the guaranteed parameter**	**LIMIT VALUE OF THE GUARANTEED PARAMETER**
B 9.1	The own consumption of electricity at the nominal output of the K20 boiler as an hourly average over 4 hours of operation.	kWh/h	*will be filled in by the BIDDER*	min. according to the value entered in Annex J of the tender documentation

The own consumption includes all appliances located within the K20 boiler house, including air conditioning, heating, lighting, including the flue gas and air system of the K20 boiler, flue gas cleaning, ash removal, small cooling circuit.

The air compressor station, a supply of belt conveyors within the OB 1 and the fuel management ventilation systems within the OB 1 are excluded from this evaluated group.

5.7 Specific consumption of additives

	Parameter	Units	The value of the guaranteed parameter	LIMIT VALUE OF THE GUARANTEED PARAMETER
	The boiler K20 – the flue 1: wood chips			
B 7.1	Specific consumption of additives *(the name - will be filled in by the BIDDER)* as an one hour average over 4 hours at the boiler nominal output Qualitative characteristics of the reagent: *will be filled in by the BIDDER*	kg/h	*will be filled in by the BIDDER*	min. according to the value entered in Annex J of the tender documentation
	The boilers K80 and K90 - Fuel 1: wood chips			
B 7.2	Specific consumption of additives *(the name - will be filled in by the BIDDER)* as an one hour average over 4 hours at the boiler nominal output Qualitative characteristics of the reagent: *will be filled in by the BIDDER*	kg/h	*will be filled in by the BIDDER*	min. according to the value entered in Annex J of the tender documentation
	The boilers K80 and K90 for any mixtures of the fuel 1 – 60percent and the fuel 2 – 40percent			
B 7.3	Specific consumption of additives *(the name - will be filled in by the BIDDER)* as an one hour average over 4 hours at the boiler nominal output Qualitative characteristics of the reagent: *will be filled in by the BIDDER*	kg/h	*will be filled in by the BIDDER*	min. according to the value entered in Annex J of the tender documentation

The above table must be filled in for all additives listed in Annex J of the tender documentation.