



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

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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 designs 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 (reference state values)

Note:

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

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2.2 General conditions

The measurement of the guarantee values is based on the following general terms and conditions:

- the guarantee parameters are set in accordance with the terms specified in this document,
- the standards applied in the guarantee measurement are listed in the table below,
- the unit will be operated and maintained in accordance with the OB 2 CONTRACTOR's instructions. The CLIENT undertakes to provide to OB 2 CONTRACTOR operation and maintenance records,
- the CLIENT shall provide remote access for sharing of operating data during the entire guarantee period. The data shall be shared through the Energis platform (operated by Instar), unless agreed otherwise between the OB 2 CONTRACTOR and the CLIENT,
- the CLIENT shall provide to the CONTRACTOR in the course of the guarantee period information about qualitative and quantitative parameters of fuels and additives,
- the OB 2 CONTRACTOR will be allowed to perform during all schedule and non-scheduled shut-offs maintenance activities, particularly those relating to the securing of guaranteed availability,
- equipment and systems that do not fall within the scope of the OB 2 CONTRACTOR shall not restrict proper operation of the supplied equipment; the guarantee measurement may only be carried out in full coordination with the other contractors and the operation of the heat plant,
- only original or recommended parts may be used in cases defined by the OB 2 CONTRACTOR, some selected parts that are subject to wear must be available in the heat plant warehouse, such parts are to be supplied by the OB 2 CONTRACTOR within his scope for a period of two years beginning with the PAC.
- in the case that some facts are not sufficiently described by this document, it is possible to specify them within the documentation for the GUARANTEE MEASUREMENT PROJECT.

2.2.1 Noise

Legal requirements of Act No. 258/2000 Coll. on the protection of public health and on the amendment to some related laws and of Act No. 272/2011 Coll. on the protection of health from adverse effects of noise and vibrations, as amended, must be met.

2.2.2 Feed water

2.2.2.1 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)

2.2.2.2 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.

Feed water must not contain any oil, mud or foam.

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

Feed water - parameter	CC λ _{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	3 < 10	< 20	< 20	< 5	< 1.5

given limit states.

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	direct conductivity	silicates	ionic iron	ammonia	oxygen	CC A _{25°C}
		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.

2.2.3 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.

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2.2.3.1 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	ρ ^(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

2.2.3.2 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 table below shows the values of the long-term supply of wood chips into the heating plant.

Element	Unit	Wood chips		
		min.	ref.	max.
As	mg/kg ^(d)	<0.5	<0.5	0.7
Al	mg/kg ^(d)	250	540	2 250
C	% ^(d)	47	49	51
Ca	mg/kg ^(d)	2 000	2 300	4 200
Cd	mg/kg ^(d)	<0.4	<0.4	<0.4
Cl	% ^(d)	0.01	0.02	0.03
Co	mg/kg ^(d)	1.2	16	55
Cr	mg/kg ^(d)	4	12	74
Cu	mg/kg ^(d)	2.5	6.7	15
F	% ^(d)	0.002	0.005	0.01
Fe	mg/kg ^(d)	320	900	2 400
H	% ^(d)	5.6	5.9	6.3
Hg	mg/kg ^(d)	<0.02	0.03	0.05
K	mg/kg ^(d)	670	1 300	2 900
Mg	mg/kg ^(d)	280	600	1 350
Mn	mg/kg ^(d)	120	380	640
N	% ^(d)	0.1	0.27	0.7
Na	mg/kg ^(d)	17	30	60
Ni	mg/kg ^(d)	2.5	8	36
P	mg/kg ^(d)	150	250	950
Pb	mg/kg ^(d)	2.2	3.4	4.8
S	% ^(d)	0.005	0.01	0.1

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Sb	mg/kg ^(d)	<0.5	<0.5	<0.5
Si	mg/kg ^(d)	290	350	450
Ti	mg/kg ^(d)	9	13.5	23
Tl	mg/kg ^(d)	<0.5	<0.5	<0.5
V	mg/kg ^(d)	0.2	1.6	3.5
Zn	mg/kg ^(d)	20	43	80

2.2.3.3 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
The maximum share of metal objects is 0.3% at the input of technologies within the scope of OB 2.		

The quantity of non-combustible particles in the fuel (with an average size of more than 2.0 mm), including ash fuel, stone, gravel, earth, supplementary sand and other non-combustible particlars shall be determined from the weight balance and the quantity of coarse material in the removed bed ashes.

2.2.3.1 Sampling and analysis of wood chips

The CLIENT undertakes to share in the course of the basic guarantee period information about the composition of fuel. Sampling and all other subsequent processing and analyses shall take place in accordance with applicable Czech standards listed below. The analyses shall be made by an accredited laboratory, which will be provided with a mixed sample consisting of at least 4 samples per month, with the exception of the period of scheduled and unscheduled shut-offs, when one representative sample corresponding to the fuel that has caused the failure will be required. In case of a failure of the equipment, it is possible to carry out extraordinary offtake and analysis of the fuel that has caused the failure. The required parameters and frequency of analyses are shown in the table below.

analysed variables	unit	frequency
humidity	%hm. ^(d)	once a month
combustion heat, calorific value	MJ/kg ^(d)	once a month
ash content	%hm. ^(d)	once a month
S	%hm. ^(d)	once a month
Cl	%hm. ^(d)	once a month
Na	mg/kg ^(d)	once a month
K	mg/kg ^(d)	once a month
C, H, N	%hm. ^(d)	once a month
Hg	mg/kg ^(d)	once a month
Pb, Zn, Sn	mg/kg ^(d)	once a month

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2.2.4 Fuel 2 – Plant pellets

The second fuel type is the pelletized plant biomass made from agricultural scraps. This fuel type is burned solely in K80 and K90 boilers. Parameters of this fuel are specified below.

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

2.2.4.1 Trace elements in plant pellets

The content of trace elements in wood chips will depend on the nature of the supply and on the source of the material. The table below shows the values of the long-term supply of plant pellets into the heating plant.

Element	Unit	Plant pellets		
		min.	ref.	max.
As	mg/kg ^d	<0.5	<0.5	0.7
Al	mg/kg ^(d)	280	360	510
C	% ^(d)	44	47	50
Ca	mg/kg ^(d)	5 500	6 500	7 900
Cd	mg/kg ^(d)	<0.4	<0.4	<0.4
Cl	% ^(d)	0.08	0.13	0.15
Co	mg/kg ^(d)	0.7	3.4	10
Cr	mg/kg ^(d)	10	22	29
Cu	mg/kg ^(d)	7	11	15
F	% ^(d)	0.002	0.007	0.015
Fe	mg/kg ^(d)	400	600	810
H	% ^(d)	5.6	6	6.6
Hg	mg/kg ^(d)	<0.02	0.03	0.05
K	mg/kg ^(d)	7 400	9 200	11 000
Mg	mg/kg ^(d)	1 500	1 700	1 900
Mn	mg/kg ^(d)	75	95	120
N	% ^(d)	1.6	2	2.6
Na	mg/kg ^(d)	85	145	260
Ni	mg/kg ^(d)	2	8	16
P	mg/kg ^(d)	1 700	2 360	3 100
Pb	mg/kg ^(d)	1	3.3	5

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S	% ^(d)	0.2	0.23	0.3
Sb	mg/kg ^(d)	<0.5	<0.5	<0.5
Si	mg/kg ^(d)	250	310	410
Ti	mg/kg ^(d)	9	11.5	15
Tl	mg/kg ^(d)	<0.5	<0.5	<0.5
V	mg/kg ^(d)	0.6	0.9	3.7
Zn	mg/kg ^(d)	30	55	80

2.2.4.2 Sampling and analysis of plant pellets

The CLIENT undertakes to share in the course of the basic guarantee period information about the composition of fuel. Sampling and all other subsequent processing and analyses shall take place in accordance with applicable Czech standards listed below. The analyses shall be made by an accredited laboratory, which will be provided with a mixed sample consisting of at least 4 samples per month, with the exception of the period of scheduled and unscheduled shut-offs, when one representative sample corresponding to the fuel that has caused the failure will be required. The required parameters and frequency of analyses are shown in the table below. In case of a failure of the equipment, it is possible to carry out extraordinary offtake and analysis of the fuel that has caused the failure. The OB 2 CONTRACTOR shall be provided with information about the biological origin of the material.

analysed variables	unit	frequency
humidity	%hm. ^(d)	once a month
combustion heat, calorific value	MJ/kg ^(d)	once a month
ash content	%hm. ^(d)	once a month
C, H, N	%hm. ^(d)	once a month
S	%hm. ^(d)	once a month
Cl	%hm. ^(d)	once a month
Na	mg/kg ^(d)	once a month
K	mg/kg ^(d)	once a month
P, Ca, Mg, Si, Fe, Mn, Hg, F	mg/kg ^(d)	once a month

2.2.5 Guaranteed parameters of the fuel mix of plant pellets (40%en.) and wood chips (60%en.)

Parameter	Units	Values	Range
Plant pellets	%en.	40	0-40
Wood chips	%en.	60	0-100
Calorific value	MJ/kg ^(ar)	11.64	7.8-13.7
Humidity	% ^(ar)	31.65	19.9-55
Ash content	% ^(d)	6.41	< 18.3
Composition of elements			
Carbon content	% ^(d)	49.6	
Hydrogen content	% ^(d)	6.2	
Oxygen content	% ^(d)	36.57	
Sulphur content	% ^(d)	0.14	0.25
Nitrogen content	% ^(d)	1.05	
Chlorine content	% ^(d)	0.058	< 0.097

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Fluorine content	mg/kg ^(d)	0.004	0.004
Sulphur/chlorine ratio		2.5	
Sodium content	mg/kg ^(d)	75	< 138
Potassium content	mg/kg ^(d)	4 366	< 6 043
Na + K	mg/kg ^(d)	4 430	< 6 170
Calcium content	mg/kg ^(d)	3 930	
Mercury content	mg/kg ^(d)	0.03	< 0.05

2.2.6 Natural gas – start-up fuel

Lower heating value Q_i min. 35.25 MJ/m³

Volume composition of gas:

Content of CH₄ 96.3 %

Content of C₂H₆ 1.5 %

Content of C₃H₈ 0.4 %

Content of CO₂ 0.4 %

Content of O₂ 0.5 %

Content of N₂ 0.9 %

Operating pressure of natural gas: 200-300 kPa

2.2.7 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. The burning campaign lasts approx. 5 days and occurs once a month.

2.2.8 DeNOx agent

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

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- 40% urea solution,
- 30% ammonium sulphate solution,
- 25% ammonia solution.

2.2.8.1 30% aqueous solution of ammonium sulphate

The ammonium sulphate solution will be made from drinking quality or demineralized water. The solution is supplied as a 30% aqueous solution.

	unit	value
residue after evaporation	mg/kg	< 2
solid particles	no solid particles	
content of $(\text{NH}_4)_2\text{SO}_4$	%	30 %

2.2.8.2 25% aqueous solution of ammonium

The ammonium solution will be made from drinking quality or demineralized water. The solution is supplied as a 25% aqueous solution.

	unit	value
residue after evaporation	mg/kg	< 2
solid particles	no solid particles	
content of NH_3	%	25 %

2.2.8.3 40% aqueous solution of urea

The urea solution will be made from drinking quality or demineralized water. The solution is supplied as a 40% aqueous solution.

	unit	value
residue after evaporation	mg/kg	< 2
solid particles	no solid particles	
content of urea	%	40 %

2.2.9 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

2.2.10 Cooling water of the inner cooling circuit

Demi-water of inner cooling circuit currently has the following values:

Parameter	Unit	Value
Demi-water pressure	MPa(g)	0.65

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Operating temperature range	°C	10 - 25
Conductivity	µS/cm	1
Silicates	µg/l	20

2.2.11 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

2.2.12 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
Required air quality under ČSN ISO 8573-1: 1 – 4 - 2	

2.2.13 Control compressed air

Specification of the control compressed air:

- Nominal air pressure in the distribution pipes 0,75 MPa(g)
- Max. air pressure in air distribution pipes 0.83 MPa (g)
- Pressure dew point -40°C
- Required air quality under ČSN ISO 8573-1: 2 – 2 – 2

2.2.14 Lime hydrate

The powder form based on Ca(OH)₂ produced specifically for the ash cleaning purposes shall be used. Hence, it will not be the ordinary slaked lime used in the construction industry. The required properties are listed below.

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	units	value
specific surface (BET)	m ² /g	> 40
Ca(OH) ₂ content	%wg.	> 97
particle size	< 90 µm	%wg. > 95
	< 5 µm	%wg. < 55

2.2.15 Sodium hydro carbonate

The powder form based on NaHCO₃ or Na₂CO₃ will be used. The required properties are listed below.

	units	value
NaHCO ₃ content	%wg.	> 98
particle size	< 20 µm	%wg. > 90

2.2.16 Sand for BFB boilers

Natural sand may be considered for use as an inert fluid layer material. Use of sea sand or of sand polluted or contaminated with salts is not permitted. Maximum reuse of bed ash is required as a cost saving measure. The sand is subject to the following requirements:

	units	value
humidity		dry
melting point (to be determined by the DTA method)	°C	> 1200
loose mass	kg/m ³	1300 – 1500
hardness (at the MOH scale)		6,0 – 7,0

	fraction passage %wg. (the finest)	fraction passage %wg. (the coarsest)
<1.6 mm	100	100
<1.4 mm	100	95
<1.2 mm	100	80
<1.0 mm	95	50
<0.7 mm	40	0
<0.5 mm	10	0
<0.25 mm	2	0

2.2.17 Sand for CFB boilers

Natural sand may be considered for use as an inert fluid layer material. Use of sea sand or of sand polluted or contaminated with salts is not permitted. Maximum reuse of bed ash is required as a cost saving measure. The sand is subject to the following requirements:

	units	value
humidity		dry
melting point (to be determined by the DTA method)	°C	> 1200
loose mass	kg/m ³	1200 – 1500
hardness (at the MOH scale)		6,0 – 7,0
maximum content of SiO ₂	%	< 60

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	Fraction passage %wg. (the finest)	Fraction passage %wg. (the coarsest)
<0,7mm	100	100
<0.5 mm	100	100
<0.355 mm	100	85
<0.25 mm	90	55
<0.125mm	40	10
<0.063 mm	15	0

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 I 1 3.6* 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. Unless specified otherwise in the standards, the results will be calculated from average values recorded during the measured period.
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 the UNIT itself will be stabilized to the initial performance level for 1 hour at least. At the same time, the OB 2 CONTRACTOR and the CLIENT will mutually agree that the UNIT is ready for the start of the testing.
4. The parameters for meeting the guaranteed values are assessed for each boiler individually.

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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". Each point will be measured for 4 hours, blasting will be carried out before new measurement, blowdown from the drum will be closed, ash release outside the unit will be limited and defined in the GUARANTEE MEASUREMENT PROJECT. Unless specified otherwise, the resulting value shall be deemed to be average value resulting from these periods. Further technical parameters will be specified and agreed in the GUARANTEE MEASUREMENT PROJECT.
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. If it is not regulated by the standard, it will be specified by the OB 2 CONTRACTOR in the documentation for the GUARANTEE MEASUREMENT PROJECT.
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. These corrections will be made against the reference values stated in this document. If these values are missing, they will be specified by the OB 2 CONTRACTOR in the documentation for the GUARANTEE MEASUREMENT PROJECT.
8. No repair works on the equipment are allowed during the guarantee tests.
9. If a guarantee parameter is not met in the course of the guarantee measurement, the OB 2 CONTRACTOR shall be entitled to make adjustments and/or calibration of the boiler and to repeat the guarantee test during which the deficiencies of the guaranteed performance will be retested. The OB 2 CONTRACTOR is entitled to repeat at least three times each of the guarantee tests and to make adjustments and calibrations of the equipment in the period between the tests
10. According to Article 15.5.3 of the Contract for Work, failure to fulfil certain parameters marked as "relative" in table 3.6.1 "The application of guarantee measurements and tests – the group of guaranteed values" is permitted subject to payment of the contractual fine specified in Article 18.2(c) of the Contract for Work and subject to compliance with the conditions specified in Article 6 of this document.

The properties of water / steam will be calculated according to the formulations of International Association of Properties Water and Steam –International Formulation 1997, developed by Ruhr University Bochum.

The heat input of auxiliary steam is calculated based on the steam mass flow and the difference of steam inlet and outlet enthalpies at the system border.

When evaluating the results of the Guarantee tests, the correction curves shall be applied. Supplier will provide the following correction curves in documentation of GUARANTEE TESTS PROJECT.

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 minimum power output.

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- 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 minimum power output.

3.1.6 Regulations and standards

The following standards and laws (as amended, i.e. in their most recent wording) will be used in the GUARANTEE MEASUREMENT. In case of any conflict or collision priority will be given to Czech standards and laws. The list below may not be exhaustive.

	Standard
proposed parameters - legislation	Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment
water-tube boilers– output parameters	ČSN EN 12952
non-heated pressure containers	ČSN EN 13445
metal industrial popes	ČSN EN 13480
materials	ČSN EN 12952-2
control	ČSN EN 12952-6
Measurement of emissions - legislation	Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) Act No. 201/2012 Cool. on the protection of atmosphere Decree No. 415/2012 Coll. on the admissible pollution level and its identification and on the implementation of some other provisions of Act No. 201/2012 Cool. on the protection of atmosphere
Solid pollutants	ČSN EN 13284-1 ČSN ISO 9096
Sulphur dioxide SO ₂	ČSN EN 14791
Nitrogen oxides NO _x	ČSN EN 14792
Carbon oxide CO	ČSN EN 15058
Water H ₂ O	ČSN EN 14790
Oxygen O ₂	ČSN EN 14789
Hydrogen chloride HCl	ČSN EN 1911
Hydrogen fluoride HF	ČSN P CEN/TS 17640
Total mercury Hg	ČSN EN 13211
Heavy metals	ČSN EN 14385
Total organic carbon (TOC)	ČSN EN 12619
PCDD/F	ČSN EN 1948
Ammonium NH ₃	ČSN 834728
Nitrous oxide N ₂ O	ČSN EN ISO 21258
Steam output	ČSN EN 12952-15

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Radiation	ČSN EN 12952-15
Total organic carbon (TOC) in ash	ČSN EN 13137
Sampling	ČSN EN 18135
Sample preparation	ČSN EN 14780
Humidity content	ČSN EN 18134
Combustion heat	ČSN EN 18125
Ash content	ČSN EN 18122
Sulphur content	ČSN EN 16994
Chlorine content	ČSN EN 16994
Fluorine and bromine content	ČSN EN 16994
Nitrogen, oxygen and hydrogen content	ČSN EN 16948
Content of minority materials in ash (Cd, Ti, Hg, Sb, As, Cr, Co, Cu, Mn, Ni, V, Pb, Sn, Zn)	ČSN EN 16968 ČSN EN 1483
Content of majority materials in ash (Na, K, Ca, Mg, Si, P, Fe, Al, Ti, Mn)	ČSN EN 16967
Bulk density	ČSN EN 17828
Size and distribution of particles	ČSN EN 17827-1
Volatile substances (VOC)	ČSN EN 18123
Ash melting temperature	ČSN ISO 540
Fuel sieving	ČSN ISO 3310-2
Vibration	ČSN ISO 10816-1+3
Determination of internal acoustic level	ČSN ISO 3744
Determination of external acoustic level	ČSN ISO 8297
Scope of load change	VDI/VDE 3501-3508
Classification of hazardous premises (ATEX)	Directive 94/9/EC a 1999/92/EC of the European Parliament and f the Council, ČSN EN 60079-10, ČSN EN 50281-3
Oils viscosity	ČSN EN ISO 3104
Oil viscosity at 15°C	ČSN EN ISO 12185

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.

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.

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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 and the table - 1 3.63.6 2 - the Group of guaranteed values II.

3.3 GUARANTEE MEASUREMENTS A

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

The GUARANTEE MEASUREMENTS A shall be carried out during the TRIAL RUN,

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 MEASUREMENTS B

In accordance with the GUARANTEE MEASUREMENT PROJECT, the GUARANTEE MEASUREMENTS B will be performed before the BASIC GUARANTEE PERIOD within the range of guaranteed parameters defined in the Table 3.6-1. The GUARANTEE MEASUREMENTS B will be performed in the course of the BASIC GUARANTEE PERIOD but not earlier than 12 months after the PAC and not later than 2 months before the expiration of the BASIC GUARANTEE PERIOD.

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 MEASUREMENTS A	GUARANTEE MEASUREMENTS B	absolute /relative
G1	SP	Yes	Yes	Yes	absolute
G2	NO _x	Yes	Yes	Yes	absolute

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Number	Parameter	The preliminary measurements of guaranteed values by operational measurements during the COMPLEX TEST and the TRIAL RUN	GUARANTEE MEASUREMENTS A	GUARANTEE MEASUREMENTS B	absolute /relative
G3	CO	Yes	Yes	Yes	absolute
G4	SO ₂	Yes	Yes	Yes	absolute
G5	HF	Yes	Yes	Yes	absolute
G6	NH ₃	Yes	Yes	Yes	absolute
G7	HCl	Yes	Yes	Yes	absolute
G8	Hg	No	Yes	Yes	absolute
G9	K20 output, steam temperature and pressure - fuel 1	Yes	Yes	Yes	absolute
G10	K80 and K90 outputs, steam temperature and pressure – fuel 1	Yes	Yes	Yes	absolute
G11	K80 and K90 outputs, steam temperature and pressure – mixture of the fuel 1 and the fuel 2	Yes	Yes	Yes	absolute
G12	Steam quality	No	Yes	Yes	absolute
G13	Availability *)	No	No	Yes	relative
G14	Boiler output – fuel 1 and 2	No	Yes	No	relative
G15	Minimum steam output of the boiler	No	Yes	No	relative
G16	Self- consumption of electricity by K20	No	Yes	No	relative
G17	Limestone consumption	No	Yes	No	relative
G18	Hydrated lime consumption	No	Yes	No	relative
G19	Soda bicarbonate consumption	No	Yes	No	relative
G20	Sand consumption	No	Yes	No	relative
G21	Consumption of aqueous solution of urea	No	Yes	No	relative
G22	Consumption of aqueous solution of ammonium sulphate	No	Yes	No	relative
G23	Consumption of aqueous solution of ammonium	No	Yes	No	relative

*) The availability will be measured as a guaranteed value after a period preliminary handover of the LOT OB 2 to the CLIENT in the course of the BASIC GUARANTEE PERIOD.

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4 GUARANTEED PARAMETERS

Unless specified otherwise, the following parameters listed below are guaranteed for terms of reference defined in this document:

- *chapter 2.1: Terms of Reference for GUARANTEE MEASUREMENT, and*
- reference values are considered for guarantee measurement,
- reference values for each medium and fuel or fuel mix stated in *chapter 2.2 General conditions*.

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, O₂ in flue gases, pressure 101.325 kPa and temperature 273.15 K.
6. Concentrations of pollutants will be documented by the installed legal measurement device separately for each boiler in accordance with the standards listed above.

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.

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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: plant pellets in the range of fuel 2 co-combustion; 0-40percent of heat input,
-

	Emissions from the boiler	Limits	
	Particulate matter Continuous measurement	Annual limit Value (mg/Nm ³)	Daily limit Value (mg/Nm ³)
G 1.1	The boiler K20 fuel 1: wood chips	5	10
G1.2.1	The boilers K80 and K90 Fuel 1: wood chips	10	16
G1.2.2	The boilers K80 and K90 – a mixture Fuel 1: wood chips and the fuel 2 – plant pellets	10	16
	NO _x Continuous measurement	Annual limit Value (mg/Nm ³)	Daily limit Value (mg/Nm ³)
G2.11	The boiler K20, the fuel 1: wood chips	140	150
G2.2.1	The boilers K80 and K90 Fuel 1: wood chips	160	200
G2.2.2	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)	
G3.1	The boiler K20 – the fuel 1: wood chips	80	275
G3.2.1	The boilers K80 and K90 Fuel 1: wood chips	80	275
G3.2.2	The boilers K80 and K90 – a mixture Fuel 1: wood chips and the fuel 2 – plant pellets	80	275
	SO ₂ Continuous measurement	Annual limit Value (mg/Nm ³)	Daily limit Value (mg/Nm ³)
G4.1	The boiler K20, the fuel 1: wood chips	35	70
G4.2.1	The boilers K80 and K90	50	85

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	Fuel 1: wood chips		
G4.2.2	The boilers K80 and K90 – a mixture Fuel 1: wood chips and the fuel 2 – plant pellets	67	128
	HF	Average value (mg/Nm ³)	Daily limit Value (mg/Nm ³)
G5.1	The boiler K20, the fuel 1: wood chips - One-time measurement	1	1
G5.2.1	The boilers K80 and K90 - Continuous measurement Fuel 1: wood chips	1	1
G5.2.2	The boilers K80 and K90 – a mixture - Continuous measurement Fuel 1: wood chips and the fuel 2 – plant pellets	1	1
	NH₃ Continuous measurement	Annual limit Value (mg/Nm ³)	
G6.1	The boiler K20, the fuel 1: wood chips	15	
G5.2.1	The boilers K80 and K90 Fuel 1: wood chips	15	
G6.2.2	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)
G7.1	The boiler K20, the fuel 1: wood chips	5*	12***
G7.2.1	The boilers K80 and K90 Fuel 1: wood chips	5**	12***
G7.2.2	The boilers K80 and K90 – a mixture Fuel 1: wood chips and the fuel 2 – plant pellets	5**	12***
<p>*an exception for 15mg/Nm³ in case of use of the aqueous solution ammonium sulphur in the SNCR technology may be applied</p> <p>**an exception for 25mg/Nm³ in case of use of the aqueous solution ammonium sulphur in the SNCR technology may be applied</p> <p>***it is possible to apply an exception in case of use of the aqueous solution ammonium sulphur in the SNCR technology where this value will not be required</p>			
	Annual limit Hg	Annual limit	

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	One-time measurement	Value ($\mu\text{g}/\text{Nm}^3$)	
G8.1	The boiler K20, the fuel 1: wood chips	5	
G8.2.1	The boilers K80 and K90 Fuel 1: wood chips	5	
G8.2.2	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

Meters certified by ČMI (Czech Institute of Metrology) will be used for steam measurements at the output from the boiler before the joint steam busbar in the machine room. Average value from max. 5 minutes intervals will be used for the evaluation.

	Parameters at connection points	Units	Value
	The boiler K20- the fuel 1		
G9.1	The nominal output of the boiler K20 at the nominal steam parameters at the connection point for fuel 1: wood chips	t/h	80
G9.3	The nominal steam temperatures of the boiler K20 for fuel 1: wood chips	°C	535±5
A 9.1.3	The nominal steam pressure of the boiler K20 in fuel 1: wood chips	MPa(g)	12.5±0.3
	The boilers K80 and K90 – the fuel 1		
G10.1	The nominal steam pressure for each of the K80 and K90 boilers K20 at the output for t fuel 1: wood chips	t/h	100
G10.2	The steam rated temperatures of each of the K80 and K90 boilers for fuel 1: wood chips	°C	535±5
G10.3	The nominal steam pressure of each of the K80 and K90 boilers 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		
G11.1	The nominal output of each of the K80 and K90 boilers for fuel 1: wood chips 60percent and fuel 2: plant pellets – 40percent	t/h	100
G11.2	The nominal steam temperatures of each of the K80 and K90 boilers for the operating range from 70 to 100percent for fuel 1: wood chips 60percent and fuel 2: plant pellets – 40percent	°C	535±5
G11.3	The nominal steam pressure of each of the K80 and K90 boilers fuel 2: plant pellets – 40percent	MPa(g)	12.5±0.3

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4.3 The guaranteed quality of superheated steam at the connection point

Superheated steam	Cathexis conductivity CC $\lambda_{25^{\circ}\text{C}}$	Fe	SiO ₂	Sodium and Potassium (Na ⁺ + K ⁺)
G12	(μS/cm)	(ug/l)	(ug/l)	(ug/l)
ČSN 07 74 03	<0.3	<20	<20	<10

4.4 Availability

The measurement of availability will be carried out in the course of the BASIC GUARANTEE PERIOD for a period of one year. The measurement will start not later than 3 months after PAC upon written notice of the OB 2 CONTRACTOR.

During the availability measurement period, the OB 2 CONTRACTOR will be entitled to planned shut-off for an agreed period allowing to perform all checks and maintenance works. This shut-off period, all necessary preparatory works preceding the shut-off and all necessary works performed during the shut-off period shall be agreed and planned between the CLIENT and the OB 2 CONTRACTOR in a way permitting effective preventive maintenance and repairs of the equipment with the aim of ensuring maximum availability.

Availability means the relative period during which the unit is operated in a **regulated scope** and is capable of operation at the nominal value and nominal parameters.

Annual availability is represented by the following relation:

$$D_K = \frac{100 \cdot t_p}{t_c} [\%]$$

where:

D_K is the availability of the relevant boiler (K20, K80, K90),

t_p is the total length of the evaluated period during which the boiler is ready for operation. In case of any impediments or of the CLIENT's decision (e.g. due to human errors on the CLIENT's side), the above period will not include hours during which the hourly availability will be less than 100% due to such reasons. Neither will the calculated period include any interruptions caused outside the equipment falling within the scope of the OB 2 CONTRACTOR.

t_c means the maximum possible fond of the operating period of the boiler or the measured period (8760 hours.)

Conditions of gathering evidence (testing conditions):

- the availability will be evaluated by the CLIENT with the CONTRACTOR's participation on the basis of the operating records of the equipment,
- t_p will not include the period from the moment of shut-off of the equipment due to its malfunction or failure,
- t_p will include periods required for start-up from idle time and the idle time caused by external factors, force majeure, incorrect operation (failure to comply with operating regulations), by a failure of equipment outside the scope of the OB 2 LOT, by a decision or reasons on the CLIENT's side.

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The OB 2 CONTRACTOR is obliged to ensure that the availability of all boilers will not be less than 91%
The minimum availability of the boilers is defined as follows:

- G13.1 **K20 availability: 91 %**
G13.2 **K80 availability: 91 %**
G13.3 **K920 availability: 91 %**

4.5 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			
G14.1	The average boiler efficiency at nominal boiler output for fuel 1: wood chips	%	91,2	min. 91
	The boilers K80 and K90 - Fuel 1			
G14.2.1	The average boiler efficiency at the boiler nominal output for the fuel 1: wood chips - for the duration of 24 hours	%	89,0	min. 89
	The boilers K80 and K90 for any mixture of fuel 1: wood chips – 60percent and the fuel 2: plant pellets – 40percent			
G14.2.2	The average boiler efficiency at the boiler nominal output for the fuel mixture	%	91,5	min. 89

4.6 Minimum Steam Output of the Boiler

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

	Parameters at the connecting points	Units	Value
	Boiler K20, fuel 1		
G15.1.1	Minimum steam output of the boiler K20 at the connecting point	%	40
G15.1.2	the K20 boiler at the minimum steam output of the boiler	°C	520
G15.1.3	K20 steam pressure at the minimum steam output of the boiler	MPa(g)	12
	Boilers K80 and K90, fuel 1		
G15.2.1	Steam output of each of the K80 and K90 boilers at the boiler outlet for fuel 1: wood chips	%	60
G15.2.2	Steam temperature of each of the K80 and K90 boilers at the minimum steam output for fuel 1: wood chips	°C	520
G15.2.3	Steam pressure of each of the K80 and K90 boilers at the minimum steam output for fuel 1: wood chips	MPa(g)	12

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	Boilers K80 and K90 fuel mix based on heat input		
G15.3.1	Steam output of each of the K80 and K90 boilers at the boiler outlet for fuel 1: wood chips - 60% and fuel 2: plant pellets – 40%	%	60
G15.3.2	Steam temperature of each of the K80 and K90 boilers at the minimum steam output for fuel 1: wood chips - 60% and fuel 2: plant pellets – 40%	°C	520
G15.3.3	Steam pressure of each of the K80 and K90 boilers at the minimum steam output for fuel 1: wood chips- 60% and fuel 2: plant pellets – 40%	MPa(g)	12

4.7 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 BIDDER will list the appliances in their offer.

	Parameter	Units	The value of the guaranteed parameter	Note
G16	Self- consumption of electricity at the nominal output of the K20 boiler as an hourly average over 4 hours of operation.	kWh/h	790	according to the value entered in Annex J of the tender documentation

Self- 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.

4.8 Specific consumption of lime

	Parameter	Units	The value of the guaranteed parameter	Note
	The boiler K20 – fuel 1: wood chips			
G17.1	Specific consumption of limestone as a one hour average over 4 hours at the boiler nominal output	kg/h	-	according to the value entered in Annex J of the tender documentation
	The boilers K80 and K90 - Fuel 1: wood chips			
G17.2	Specific consumption of limestone as a one hour average over 4 hours at the boiler nominal output	kg/h	-	according to the value entered in Annex J of the

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				tender documentation
	The boilers K80 and K90 for any mixtures of the fuel 1 – 60percent and the fuel 2 – 40percent			
G17.3	Specific consumption of limestone as a one hour average over 4 hours at the boiler nominal output	kg/h	-	according to the value entered in Annex J of the tender documentation

4.9 Specific consumption of hydrated lime

	Parameter	Units	The value of the guaranteed parameter	Note
	The boiler K20 – fuel 1: wood chips			
G18.1	Specific consumption of lime hydrate as a one hour average over 4 hours at the boiler nominal output	kg/h	0	according to the value entered in Annex J of the tender documentation
	The boilers K80 and K90 - Fuel 1: wood chips			
G18.2	Specific consumption of hydrated lime as a one hour average over 4 hours at the boiler nominal output	kg/h	200	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			
G18.3	Specific consumption of hydrated lime as a one hour average over 4 hours at the boiler nominal output	kg/h	30	according to the value entered in Annex J of the tender documentation

4.10 Specific consumption of sodium bicarbonate

	Parameter	Units	The value of the guaranteed parameter	Note
	The boiler K20 – fuel 1: wood chips			

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G19.1	Specific consumption of sodium bicarbonate as a one hour average over 4 hours at the boiler nominal output	kg/h	-	according to the value entered in Annex J of the tender documentation
	The boilers K80 and K90 - Fuel 1: wood chips			
G19.2	Specific consumption of sodium bicarbonate as a one hour average over 4 hours at the boiler nominal output	kg/h	-	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			
G19.3	Specific consumption of sodium bicarbonate as a one hour average over 4 hours at the boiler nominal output	kg/h	-	according to the value entered in Annex J of the tender documentation

4.11 Specific consumption of sand

	Parameter	Units	The value of the guaranteed parameter	Note
	The boiler K20 – fuel 1: wood chips			
G20.1	Specific consumption of sand as a one hour average over 4 hours at the boiler nominal output	kg/h	70	according to the value entered in Annex J of the tender documentation
	The boilers K80 and K90 - Fuel 1: wood chips			
G20.2	Specific consumption of sand as a one hour average over 4 hours at the boiler nominal output	kg/h	300	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			
G20.3	Specific consumption of sand as a one hour average over 4	kg/h	300	according to the value entered in Annex J of the

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	hours at the boiler nominal output			tender documentation
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4.12 Specific consumption of the aqueous solution of urea

	Parameter	Units	The value of the guaranteed parameter	Note
	The boiler K20 – fuel 1: wood chips			
G21.1	Specific consumption of the aqueous solution of urea as a one hour average over 4 hours at the boiler nominal output	kg/h	-	according to the value entered in Annex J of the tender documentation
	The boilers K80 and K90 - Fuel 1: wood chips			
G21.2	Specific consumption of the aqueous solution of urea as a one hour average over 4 hours at the boiler nominal output	kg/h	-	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			
G21.3	Specific consumption of the aqueous solution of urea as a one hour average over 4 hours at the boiler nominal output	kg/h	-	according to the value entered in Annex J of the tender documentation

4.13 . Specific consumption of the aqueous solution of ammonium sulphate

	Parameter	Units	The value of the guaranteed parameter	Note
	The boiler K20 – fuel 1: wood chips			
G22.1	Specific consumption of the aqueous solution of ammonium sulphate as a one hour average over 4 hours at the boiler nominal output	kg/h	-	according to the value entered in Annex J of the tender documentation
	The boilers K80 and K90 - Fuel 1: wood chips			

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G22.2	Specific consumption of the aqueous solution of ammonium sulphate as a one hour average over 4 hours at the boiler nominal output	kg/h	50	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			
G22.3	Specific consumption of the aqueous solution of ammonium sulphate as a one hour average over 4 hours at the boiler nominal output	kg/h	25	according to the value entered in Annex J of the tender documentation

4.14 Specific consumption of the aqueous solution of ammonium

	Parameter	Units	The value of the guaranteed parameter	Note
	The boiler K20 – fuel 1: wood chips			
G23.1	Specific consumption of the aqueous solution of ammonium as a one hour average over 4 hours at the boiler nominal output	kg/h	30	according to the value entered in Annex J of the tender documentation
	The boilers K80 and K90 - Fuel 1: wood chips			
G23.2	Specific consumption of the aqueous solution of ammonium as a one hour average over 4 hours at the boiler nominal output	kg/h	-	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			
G23.3	Specific consumption of the aqueous solution of ammonium as a one hour average over 4 hours at the boiler nominal output	kg/h	-	according to the value entered in Annex J of the tender documentation

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5 GUARANTEE AND GUARANTEE CONDITIONS

The guarantees provided in the contract for work apply subject to the following:

- The equipment is operated, checked and maintained (including preventive maintenance) in accordance with standard international industrial procedures and with procedures defined by the OB 2 CONTRACTOR.
- The input materials (fuel, air, water, additives, etc.) used in the course of the guarantee period comply with the parameters defined by this document.
- No changes of the equipment supplied by the OB 2 CONTRACTOR are made without his consent.
- The CLIENT shall notify the OB 2 CONTRACTOR without undue delay of any circumstances indicating possible failures of the equipment that forms part of the OB LOT (such as minor leaks of tubes), which may result in major damage or in the shut-off of the boiler. Thereafter, the CLIENT shall begin implementing remedial and preventive measures in coordination with the CONTRACTOR.
- The CLIENT possesses and proceeds in accordance with an internal fuel quality control system (fuel sampling and testing is carried out in accordance with applicable operating regulations or with the standards listed above) or ensure that the fuel burned in the boilers corresponds to the definitions set forth in this document.
- The CLIENT keeps records of all failures, records, quantity and quality of fuel and additives, as well as all operating data as required by the OB 2 CONTRACTOR. The CLIENT shall allow to OB 2 CONTRACTOR access to such data or such data shall be sent to the OB 2 CONTRACTOR in agreed intervals.

The guarantee does not apply to:

- any equipment that did not fall within the scope of the OB 2 LOT,
- defects and shortcomings:
 - of the equipment that did not fall within the scope of the OB 2 LOT, or
 - caused by incorrect operation, handling or storage by the CLIENT in conflict with common industrial practice or OB 2 CONTRACTOR's instructions,
 - defects resulting from any modifications or repairs carried out by the CLIENT or a third party without an express consent of the OB 2 CONTRACTOR,
- defects that could be caused by fuel deviating from the above specification,
- parts subject to wears and tear – replacement of those parts is considered routine maintenance not covered by the guarantee,
- goods qualified as consumables,
- **ordinary** wear and tear, damage, corrosion or erosion of the equipment; if, however the thickness of the tube wall in the pressure parts of the boiler is less at the end of the BASIC GUARANTEE PERIOD than the thickness defined in accordance with harmonized standards, the supplier shall repair or replace such defective parts.

6 CONTRACTUAL FINE FOR GUARANTEED VALUES

If the OB 2 CONTRACTOR fails to achieve some of the valued guaranteed below which are designated as "relative" in the Application of guarantee measurements and tests – guaranteed values group, the

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OB 2 CONTRACTOR may repeat at his own discretion the guarantee measurement or pay the contractual fine specified in the following table:

	Guaranteed value	Unit	Value	EUR for each whole unit value	Limit on compensation with contractual fine
G14.1	Boiler effectiveness - K20	%	0,1	60 000	min 91 %
G14.2	Boiler effectiveness - K80/90	%	0,1	75 000	min 89 %
G15	Minimum steam output of the boiler	%	1	15 000	
G13.1	Availability of K20	%	1	110 000	
G13.2+G13.3	Availability of K80/90	%	1	140 000	
G16	Self-consumption of electricity by K20	kW	10	30 000	
G17	Lime consumption	kg/h	10	14 000	
G18	Lime hydrate consumption	kg/h	10	95 000	
G19	Sodium bicarbonate consumption	kg/h	10	155 000	
G20	Sand consumption	kg/h	10	6 500	
G21	Consumption of aqueous solution of urea	kg/h	5	52 000	
G22	Consumption of aqueous solution of ammonium sulphate	kg/h	5	50 000	
G23	Consumption of aqueous solution of ammonium	kg/h	5	32 500	

The OB 2 CONTRACTOR acknowledges that the minimum limits defined for values of effectiveness and availability must always be complied with (the columns "Limit on compensation with contractual fine"), i.e. the failure to comply with them during the GUARANTEE MEASUREMENT cannot be compensated by payment of the contractual fine and if the OB 2 CONTRACTOR fails to comply with them, he will be obliged to repeat the GUARANTEE MEASUREMENT. All other parameters that are not presented, i.e. the values marked as "absolute" in the table "Application of guarantee measurements and tests – guaranteed values group" must be met under any circumstances and their achievement during the GUARANTEE MEASUREMENT cannot be replaced by payment of the contractual fine. The best resulting value will be counted in case of a repetition of the GUARANTEE MEASUREMENT, but only from one measurement. All these parameters must be achieved in one test and results of different tests cannot be combined.

If the required value is not achieved in the GUARANTEE MEASUREMENTS A and the LD is paid, the basic value for the Guarantee Measurement B shall be the value achieved in the Guarantee Measurement A.

In case of the achievement of a better value of the guaranteed parameter by the whole unit value, the amount specified in the above table shall be ascribed to the CONTRACTOR, who can set it off with fees imposed for his failure to comply with other guaranteed values. This applies, however, solely to the guaranteed parameters designated as "relative" and this amount cannot be used in compensation of fees between GUARANTEE MEASUREMENTS A and B. If, after the evolution of the measurement, the CONTRACTOR still possesses an amount to his credit, such amount will not be paid out. This means that such amount may only be used to compensate deficiencies caused by the failure to achieve other guaranteed values designated as "relative".

ANNEX NO. 1 DRAFT OF PRE-BEP TEMPLATE

The template will be filled by the OB 2 CONTRACTOR to start BIM within the project

The text written in red must be filled in by the OB 2 CONTRACTOR.

The meaning Contractor hereinafter is the same as OB 2 CONTRACTOR.

1 The basic identification data of the document

Client: ŠKO-ENERGO, s.r.o.

Contractor: Valmet Oy

Contract No.: XXXXXXXX

This document was created in accordance with the documents "Concept for introducing the BIM method in the Czech Republic" (hereinafter referred to as the "Concept") according to Government Resolution No. 682 of 25/09/2017 and valid standards (especially ČSN ISO 19650).

2 Communication and information sharing

The exchange of information throughout the design and construction phase will take place in the Common Data Environment (CDE). Goals of the BIM project from the point of view of CDE use:

- centralization of communication and information sharing,
- archiving of information and its metadata,
- digitization of existing processes of information transfer and communication within the project,
- implementation of work procedures within the CDE.

3 Passportization

- the visualization/model will be the source of the building object's basic visualization
- the project documentation/ the drawing part will be produced from the information model,
- spatial coordination/coordination will be carried out using a model.

4 Information models according to the stage of the project/documentation for the building construction execution (DPS)

- the visualization/model will be used for the creation of visualizations,
- the project documentation/ the drawing part of the PD will be produced from the information model,
- spatial coordination/coordination will be carried out using a model,
- the bill of quantities/the model will be a source for the bill of quantities,
- the time schedule/ a simulation will be performed on the model.

5 Time schedule for handover of models

The contractor will complete the expected schedule for the models handing over.

6 Duties and responsibilities

As a part of the project processing, from the point of view of information modelling, it is necessary to define the duties/roles of individual participants, their job content and responsibility for the project.

Duties/roles shall be clearly defined along with the extent of responsibilities.

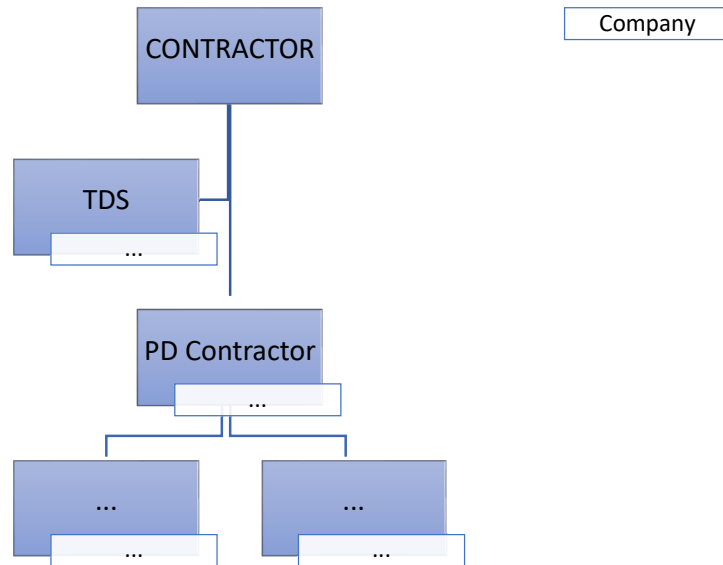
This document and all its annexes must be kept continuously up to date. If there is a need to change the document or its annexes, it is obligation of the responsible people below mentioned to submit proposed changes for approval.

Position	Description
Project manager	The Person responsible for managing the project on the CLIENT's part.
BIM project manager	<p>The Person responsible for BEP compliance in the project on the CLIENT's part. His/her activities are as follows:</p> <ul style="list-style-type: none"> • preparing and updating the BIM Execution Plan (BEP) in cooperation with the BIM Coordinator, • monitoring compliance with the BEP document by all participants, • checking data handed over by the CONTRACTOR, according to the BEP, • final checks and inspection of information models before handing over the completed building construction to the CLIENT, • related services, the need of which will emerge following the adjustment of the BEP during the project implementation, • active participation in solving the problems that have arisen and proposing their solutions, • he/she is directly responsible to the project management on the CLIENT's part. <p>He/she does not approve and does not discuss the CONTRACTOR'S questions regarding the technical solution from the point of view of the project solution.</p>
Data Environment Administrator	<p>The responsible person delegated by the CLIENT, whose activities are as follows:</p> <ul style="list-style-type: none"> • Administration of the common data environment for the whole project team (including the CLIENT) throughout the course of the project, • training of users.
Chief project engineer	The person responsible for the technical solution of the given part on the CONTRACTOR'S part.
BIM coordinator	<p>The person responsible for BEP compliance by the CONTRACTOR, whose activities are as follows:</p> <ul style="list-style-type: none"> • management of project teams according to the agreed EIR (Exchange information requirement by the CLIENT) and BEP, • checking the information models filling, evaluating the correctness of the data contained in the information models and handing over the BIM to the project manager, • active submission of BEP changes proposals, • active participation in solving the problems that have arisen and proposing their solutions, • control of the project's goals fulfilment in view of the project milestones, • reports directly to the project's chief engineer.
Lead Model Maker	<p>The Person delegated by the CONTRACTOR responsible for the models of the given part. His/her activities are as follows:</p> <ul style="list-style-type: none"> • management of model makers to the extent defined by BEP, • creation of project standards that complement the missing standards in the BEP, and submitting them for approval to the BIM coordinator, • he/she is responsible for the correctness of the information model for the given profession.
Model Maker	<p>A person delegated by the contractor. Its activities are as follows:</p> <ul style="list-style-type: none"> • responsibility for a given model/set of models.

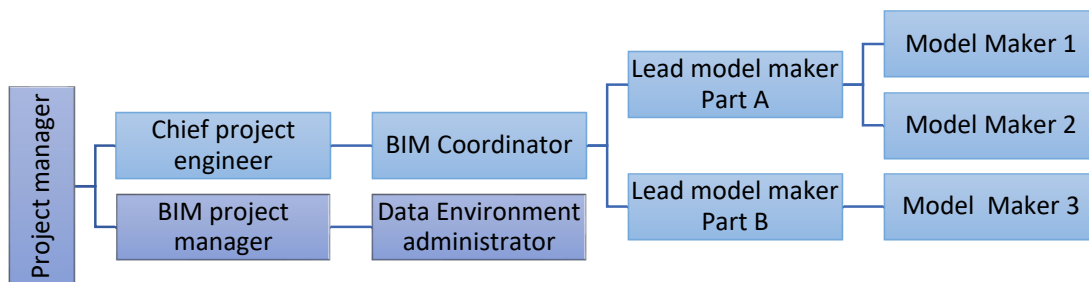
The relationship matrix of responsibility within the BIM project is clearly shown in the following two schemes (company's, name's).

Company's scheme

Organizational chart of the OB 2 CONTRACTOR's structure with the division of responsibilities within the BIM project



Name Scheme



Contact Persons

Position	Company /Organization	First name and Surname	E-mail	Phone
Project Manager	Completed by Client	Completed by Client	Completed by Client	Completed by Client
BIM Project Manager	Completed by Client	Completed by Client	Completed by Client	Completed by Client
Data Environment Administration	Completed by Client	Completed by Client	Completed by Client	Completed by Client
Chief Project Engineer - BFB	Valmet Oy	Topi Saarenpää	topi.saarenpaa@valmet.com	+358401259150

Chief Project Engineer - CFB	Valmet Oy	Jussi Norja	jussi.norja@valmet.com	+358408675482
BIM Coordinator	Valmet Oy	Andrey Abrosimov	andrey.abrosimov@valmet.com	+358503076407
Lead Model Maker	Valmet Oy	Ville-Samuli Aulen	ville-samuli.aulen@valmet.com	+358505292414
Model Maker	Valmet Oy	Andrey Abrosimov	andrey.abrosimov@valmet.com	+358503076407
Others	-	-	-	-

7 Technological infrastructure

Software tools

The list of tools used (including versions and data format) and their methods of application for the project processing.

Software tool	Tool short	Version	Data format
EVERYTHING 3d	E3D	2.1	Dabacon database
SOLIDWORKS	SW	2020	.SLDASM .SLDPRT .SLDRW
TEKLA	TEKLA	TS2022	.db1

Project documentation and models will be handed over in a pre-agreed format by the CLIENT, according to the points mentioned below.

The following items will be used for the model handing over:

- Native format,
- Open format IFC.

List of tools used.

The List of modelled PS and SO with assigned tools in which they will be processed.

Overview of modelled PS and SO	Short of the SW tool
E3D / Piping, Electrical for Object Space reservation, Instrumentation, Control & automation for object space reservations, Obstruction Models.	E3D
Tekla and its models imported through *.ifc into E3D or native E3D / Civil and Structural	TEKLA
Solid works and its models imported through *.step into E3D or native E3D / Mechanical	SW

8 Units and coordinate systems

Units and coordinate systems are defined for all information models and will contain this information. Every and each model will also include a height setting.

The positioning system is used.

System of height coordinates.

Unit	Short	Min. number of significant digits
Length	millimetre	mm
Mass	Kilogram	Kg

Force	Kilonewton	KN
Movement	Newton Metre	Nm
Area	Square Meter	M ²
Temperature	celsius	°C
Pressure	Pascal	Pa

9 Information model requirements

Models must be compact and built efficiently within the modelling tool. Within the project processing one model may not exceed 200 MB in size. Exceptions are possible after approval by the BIM project.

Every and each model is created by means of elements that are represented by their 3D graphics and attached information. The graphic detail of the elements generally needs to be chosen in such a way that it fulfils the specified goals and legislative requirements.

In general, it can be said that the model is created stepwise, according to the steps of the building construction execution and the interface of the structures corresponds to the real interface. If there are cases where this is not possible, these deviations need to be specified and clearly described in this document.

Models nomenclature methodology

Each model will have a unique designation. In case of splitting models to more files, they must be clearly identifiable. The model's name contains the project identifier, the project stage, the documentation part and the PS/SO identifier.

The contractor will propose a nomenclature methodology.

List of models

PS/SO Name	Model Name
Equipment	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number
Piping	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number
Piping Supports	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number
Ducting with Supports	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number
Cable trays	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number
E & I	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number
Construction steels	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number
Doors	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number
Rooms	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number
Foundations	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number
Walls and Roofs	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number
Platforms and Handrails	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number
Stairs and Ladders	Project prefix-Production Line-Process-Sub Process-Equipment-Rev- Number

Axis system

The axis system will be located in the centre of the modelling tool space. Axes names will be the same in all models.

Graphic detail of the model

One of the basic steps of using the BIM method is the creation of an information model. It is not necessary for all the information to be situated only in one model, on the contrary, it is desirable to have several models available.

The information model ensures the consistency of information and is the source of project documentation (ground plan, section, view, etc.). It is not desirable for PD production to modify locally the projection of given views (ground plan, section, view, etc.) and supplement or modify the projection in such a way that only a part of the goal for the project documentation creation is fulfilled.

Each model consists of individual elements that are defined graphically. The graphic detail for the individual stages will correspond to Decree No. 499/2006 Coll., on the documentation of building constructions, as amended.

Other requirements for the creation of models are mentioned in the following subchapters, according to individual logical units. The requirements for the significant elements of the model are defined. Not all elements that make up the model are listed here. Unless defined otherwise, the OB 2 CONTRACTOR will supply the given elements in the model according to the general rules in this document and to the best of their knowledge and conscience.

During processing, the model may show deficiencies as far as graphical details is considered, but the graphical detail must never be an obstacle to the fulfilment of the objectives given by this document. The necessary details can be prepared within the 2D documentation.

Duplications of the same elements are not permitted, unless specified otherwise.

In general

The individual elements of the model must correspond to the real construction.

The BIM model must be consistent – the same elements will be always modelled in the same way throughout their entire BIM model and in individual partial BIM models.

Individual BIM model elements will be modelled by the relevant categories in accordance with the given SW (e.g. a wall will be modelled by a wall and not be a general model. etc.). Model categories of the relevant SW will be mapped to the appropriate IFC categories (IfcProductType) in accordance with the IFC definition, ČSN ISO 16739 (73 0109).

Elements having the same function in the object will be placed into the same IFC category (IfcProductType) in accordance with the IFC definition, ČSN ISO 16739 (73 0109).

Inclusion of elements in the universal category IfcBuildingElementProxy is not desirable and is subject to the CLIENT's approval in the BEP.

The initial export to IFC must include the entry of GUID in the BIM model parameters. Each subsequent export where GUID have already been included will adhere to the same value and will not be overwritten. Following each IFC export, the GUID must be also saved in the native data of the BIM model.

Groundwork

Groundwork models respect the designed shape of the structures and the geology and hydrogeology identified.

Foundation

Foundation footings, belts or slabs are modelled as objects corresponding to the drawing of shape in the relevant stage of the project documentation.

For deep foundations, the design dimensions of piles are defined for coordination. The reinforced cage or elements fitted for piles tests are not modelled. For special foundations (micropiles, land ties, nails), the length and diameter of a borehole, the length and diameter of a borehole, as well as the borehole root length and diameter are defined

Masonry constructions, concrete constructions, and reinforced concreting

Blocks of concrete monolithic constructions (pillars, walls, ceilings, overflow structures, etc.) will be modelled as complete units. Each dilatation unit will be modelled separately. There is no requirement to model the reinforcing bars setting.

Networks and relocations

The model will include the route of related networks and relocations. Network objects will be modelled in design dimensions. The model of network objects dimensionally corresponds to the project documentation.

Air conditioning

The expected shape will be modelled which will define the spatial requirements. HVAC components (fans, valves, intake vents - blinds) will be modelled with design dimensions defining the spatial requirements of these elements.

Openings fillers

The elements must correspond to the actual construction dimensions of the openings. The structure of filling (doors and windows) will correspond to reality. It is possible to simplify the frame profiles, the outer dimensions of the profiles must always be observed. Additional parts of the openings filling do not need to be modelled (door inserts, etc.).

Penetrations

All vertical and horizontal penetrations through constructions are modelled in real positions and sizes. The penetrations must clearly define the static and construction openings.

Pipes and pipe routing

The pipeline and the equipment placed on the pipeline must have realistic external dimensions.

Mechanical equipment and end elements

Mechanical equipment and end elements are modelled in realistic external dimensions.

Electrical installation

All models will respect the division into high-voltage current, low-voltage current, CCTV and IT (using parameters, model division, etc.). The models will contain the main cable routes, and all fitted elements (e.g. switch cabinets, sockets, switches, boxes, etc.). There is no requirement to model individual cables. The wiring diagram does not need to be solved in the modelling tool. Cable guards are parts of the model.

Informational detail of the model

Information detail requirements define the parameters attached to individual elements. These parameters serve as a carrier of non-geometric information of the elements.

The OB 2 CONTRACTOR can add other parameters to the elements, as needed. New parameters can only be introduced during the creation of the model by responsible persons specified in the BEP.

Geometric information will always be read from the model, it is not permissible to fill in this data manually. Non-geometric information are parameters filled in manually, semi-automatically or automatically and provide additional information about the element.

Model elements of the TZB will be mutually linked by the system tool “system” (or similarly in accordance with the used SW). Thanks to that, these elements will be combined into logical and technical units according to professions and functional branches. This functional link must be also recorded in the attributes of the relevant elements.

10 Handover of Information models

The models will be delivered with all the information and settings that are necessary for the production of project documentation according to the object composition, spatial coordination and other requirements as a part of an arrangement of this document.

Models will not contain working and temporary settings that could increase the data size of models, except for passing off milestones for collaboration purposes.

The model maker will provide the CLIENT with partial models of individual building objects and at the same time one overall model by means of only one file or a file referring to partial models.

All models will be handed over in the native formats of information modelling tools and the IFC format.

In cases required by chap. 16.1 of the EIR, the attributes in the submitted BIM models will be recorded bilingually (in Czech and English). This applies to both their names and to the recorded values of properties of the elements.

Dial values will be kept in bilingual form, in the English and the Czech language.

11 Method of coordination of information models

All models will be properly coordinated with each other. The coordination takes place in a pre-agreed and agreed software product, the results of coordination are transmitted through coordination protocols.

One coordination model of the building construction will be created for the whole building construction. This will consist of sub-models of individual SOs, PSs or sub-models of agreed parts (i.e. the scope of a sub-model may

not always respect the division into SOs, PSs). This model is used for mutual coordination of sub-models, for collision detection, for displaying the entire building construction, for displaying individual stages of construction across the object structure, creating overall sections, etc.

The coordination model is a separate file that contains sub-models.

The models are handed over to the CLIENT coordinated, without obvious coordination defects and deficiencies.

12 Method of information exchange within the project

Data exchange will take place via the Common Data Environment (CDE).

The CDE is operated by the CLIENT throughout the duration of the project and provides a number of licenses to the OB 2 CONTRACTOR.

The exchange of data between the OB 2 CONTRACTOR and the CLIENT will take place exclusively via a common data environment. The CDE will be the only one source of information that collects, maintains, and send out important approved documents.

Positions and duties within CDE

Position	Company / Organization	Name and Surname	E-mail	Authorization
Project Manager	Completed by Client	Completed by Client	Completed by Client	Completed by Client
BIM Project Manager	Completed by Client	Completed by Client	Completed by Client	Completed by Client
Data Environment Administrator	Completed by Client	Completed by Client	Completed by Client	Completed by Client
Chief Project Engineer - BFB	Valmet Oy	Topi Saarenpää	topi.saarenpaa@valmet.com	+358401259150
Chief Project Engineer - CFB	Valmet Oy	Jussi Norja	jussi.norja@valmet.com	+358408675482
BIM Coordinator	Valmet Oy	Andrey Abrosimov	andrey.abrosimov@valmet.com	+358503076407
Lead Model Maker	Valmet Oy	Ville-Samuli Aulen	ville-samuli.aulen@valmet.com	+358505292414
Model Maker	Valmet Oy	Andrey Abrosimov	andrey.abrosimov@valmet.com	+358503076407
Others	Valmet Oy	Maria Hernesniemi	maria.hernesniemi@valmetpartners.com	+358504605892

Basic layout of folders

The OB 2 CONTRACTOR will propose a basic division of components according to their good practice.

Document statuses

In accordance with ČSN EN ISO19650, the following statuses are recorded for all documents (without exception) within the CDE:

- Work in progress (the document is being developed / its revision is in progress) (
- Shared (the document is shared with the CLIENT / sent for approval by the CLIENT),
- Published (the document that passed the WF approval process and was approved by the CLIENT
- Archived (the document that passed the WF approval process and was not approved by CLIENT

The “archived” status is used for the purpose of preservation of an overview of all information containers that have been shared and published in the course of the information management process, and of audit records about their sequential involvement.

Approval procedures (workflow)

They will be supplemented after the contract is signed.

File marking system

All project documents will be marked in a unified manner and named in accordance with the Client's method (particularly in case of document shares through the CDE). The marking system principle is described in the form of an example in Annex A13, document „PA7-2_2024-06-17 BCDE - značení dokumentace.xlsx“.

The marking system will be further specified with PMC's participation in the course of the preparation of BEP.

13 Bill of quantities / Dimension Statement

The Dimension statement will be created according to the selected price list system. The information model is the source of the data and manual calculations are minimized unless otherwise specified in exceptional cases. It is required to link the model to the creation of the Dimension statement in the main volumes, i.e. excavations, reinforced concrete structures. No binding is required for formwork calculation. A list of elements will also be generated from the model.

The dimension statements included in the list of works must match the dimensions included in the model.

14 Annexes

It will be supplemented in the BEP.