



TEST REPORT

31-9616/T

Product: Hot-water boiler for wood pellets with automatic fuel supply

Type designation: WB MAGNA 250

Versions: WB MAGNA 250 - Pell 150
WB MAGNA 250 - Pell 300

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The results of tests and the evaluations relate only to the products tested.
(**) Thus indicated parts of the Report contain findings verified otherwise than by tests within the meaning of ČSN EN ISO/IEC 17025.



The tests were conducted on the basis of Order B-52207 dated 2015-02-10 (received on 2015-02-13), Contract B-52207/31 and amendment D1 to the contract B52207/31.

I. Product description, intended use and mode of application

The hot-water boiler WB MAGNA 250 (types of burners: Pell 150, Pell 300) for wood pellets - C1 with automatic fuel supply is intended for heating of family houses, office buildings, small businesses, etc.

Boiler body is made of high quality boiler steel sheets with thickness of 6 mm for the combustion chamber and 4 mm for the water mantle. The combustion is controlled by thermostatic draft regulator, which is a fully mechanical device boasting ultimate reliability. It controls the intensity of combustion by altering the flow of air intake. The flue gas makes a three pass movement around three water-filled barriers in the combustion chamber on its way to the chimney. This way the gas is cool when it leaves the boiler and its energy has been transferred to the water in the mantle. The water mantle embraces the combustion chamber in full to utilize the emitted heat most efficiently. To keep from losing heat into the ambience, the boiler is insulated on the outside by 50 mm high temperature wool. Convenient inspection door in the upper part of the boiler ensures easy cleaning of the flue exhaust tubes.

Further detailed descriptions of individual assembly groups are provided in the enclosed technical documentation to Task 31-9616.

II. Sample tested

Boiler output versions that are the subject of the proceedings:

Table 1

Boiler output version	EKV č.	Place of testing
WB MAGNA 250 - Pell 150	0211.15.16135.000	SZÚ Brno
WB MAGNA 250 - Pell 300		

Visual inspection, testing and evaluation were carried out by Ing. Marek Skřivan, Test Engineer, at Engineering Test Institute SZÚ Brno, from 03/2015 to 09//2015.

The tests were performed with the measurement and test equipment with valid calibration.



III. Measuring and test equipment

No.	Description	Inventory number	Calibration valid until	Accuracy
1.	Combustion product analyser, Horiba, type 680 P	92-0004	calibration prior to each measurement	see CRM 103000237769 see CRM 103000237770
2.	Weighing machine	02-2290	10/2015	see Calibration Sheet 6051-CS-H-0651-10
3.	Water meter, NW 20	02-1575	03/2017	see Calibration Sheet ACS-P/006/2009
4.	Data collection system	02-2241	12/2015	see Calibration Sheet 110002
5.	Moisture meter, thermometer	11-6258	11/2015	see Calibration Sheet 7630F/09
6.	Barometer	11-2541	11/2015	see Calibration Sheet 613-CS-K011-08
7.	Draught gauge	11-7275	01/2016	see Calibration Sheet 0144F/11
8.	Stop watch	99-0760	10/2015	see Calibration Sheet 2850E-07
9.	Calorimeter, IKA, type C 5000	02-2236	03/2017	$\pm 0,12$ MJ/kg
10.	Elemental analyser, Perkin Elmer, type 2400 CHNS	02-2107	03/2017	$\pm 0,2$ % rel.
11.	Gravimat, SHC 501	02-2328	12/2015	see Calibration Sheet 090177 (8,9), 090180
12.	Laboratory weighing machine	02-1458	06/2017	see Calibration Sheet 26/KA-15
13.	Weighing machine, Ohaus MB 45	02-2274	07/2017	see Calibration Sheet KLV-15K-101
14.	Manometer	18-0302	02/2016	see Calibration Sheet 140032
15.	Prandtl tube, 0.3 m	ME 484	11/2015	see Calibration Sheet 5012-CS-RS090-09
16.	Psychrometer H 4220	92-0005	12/2015	see Calibration Sheet 090176
17.	Electrometer	03524781	03/2022	see Calibration Sheet 002/12/E



IV. Results of tests and evaluation

No.	Requirement	Technical standard, regulation applied	Source materials	Evaluation	
				Test	Evaluation
1.	Pressurized component tightness and strength test (1001.1*)	ČSN EN 303-5:2013 Art. 5.4, 5.4.1, 5.4.2	Page 5	+	
2.	Surface temperature test (1003*)	ČSN EN 303-5:2013 Art. 5.12, 5.16.4, 4.3.6	Pages 6 ÷ 8	+	
3.	Test of heat output, input and efficiency (1004.1*) Test of combustion product temperature (1004.2*)	ČSN EN 303-5:2013 Art. 4.4.2, 4.4.3, 5.7, 5.8, 5.10 ČSN EN 303-5:2013 Art. 4.4.3	Pages 9 ÷ 13	+	
4.	Combustion efficiency test – emissions (1005.1*)	ČSN EN 303-5:2013 Art. 4.4.7, 5.7.3, 5.7.4, 5.9, 5.10.4	Pages 14 ÷ 15	+	
5.	Test of heat output, input and efficiency (1004.1*) Combustion efficiency test – emissions (1005.1*)	ČSN EN 303-5:2013 Annex C, Deviation from Austria, C.2.2, C.2.3	Pages 16 ÷ 17	+	
		ČSN EN 303-5:2013 Annex C, Deviation from Croatia, C.3	Pages 18 ÷ 19	0	
		ČSN EN 303-5:2013 Annex C, Deviation from Denmark, C.4.1, C.4.2	Pages 20 ÷ 21	+	
		ČSN EN 303-5:2013 Annex C, Deviation from Germany, C.5.1, C.5.2	Pages 22 ÷ 23	+	
		ČSN EN 303-5:2013 Annex C, Deviation from Switzerland, C.6	Pages 24 ÷ 25	+	
		ČSN EN 303-5:2013 Annex C, Deviation from Italy, C.8	Pages 26 ÷ 27	+	
6.	Test of control, regulation and safety elements (1006.1*) Combustion efficiency test – emissions (1005.1*)	ČSN EN 303-5:2013 Art. 5.13, 5.14, 5.16.2, 5.16.3 ČSN EN 303-5:2013 Art. 5.9, 5.10.4	Pages 28 ÷ 31	+	

Note:

No.:

(**) Not a test

Evaluation:

+ Requirement fulfilled
- Requirement not fulfilled
x Not assessed
0 Not applicable



Accredited test number: **1001.1*** Test title: **Pressurized component tightness and strength test**

Test method: ČSN EN 303-5:2013 Art. 5.4, 5.4.1, 5.4.2

Sample tested: WB MAGNA 250-PELL150, WB MAGNA 250-PELL300

Measuring equipment used: Chapter III - Measuring and test equipment

Test results:

Requirement	Requirement specification	Test evaluation	Note
Pressure test for boilers of sheet or sheet metal of non-ferrous metal	ČSN EN 303-5:2013 Art. 5.4		
<p>Tests to be carried out before production</p> <p>The type test pressure is $2 \times PS$ using hydraulic pressure where PS is the maximum permissible operating pressure. The test period shall be at least 10 min and if it is to apply to a range of boilers, the test shall be carried out on at least 3 boiler sizes (smallest, medium, and largest size). No leakage or noticeable permanent deformation shall occur during the test.</p> <p>A record shall be made of the test, including the following details:</p> <ul style="list-style-type: none"> - exact description of the boiler tested by stating the drawing number; - test pressure in bar and duration of the test; - test result; - place and date of the test, including the names of persons carrying out the test. <p>The test report shall be signed by, as a minimum, the works tester responsible and one witness.</p>	ČSN EN 303-5:2013 Art. 5.4.1	<p style="text-align: center;">+</p> <p style="text-align: center;">+</p> <p style="text-align: center;">+</p> <p style="text-align: center;">+</p> <p style="text-align: center;">+</p>	Enclosed technical documentation.
<p>Test during production</p> <p>Each boiler shall be tested during the production and the test pressure shall be at least $1.43 \times PS$.</p>	ČSN EN 303-5:2013 Art. 5.4.2	+	

Test evaluation: No leakages or visible permanent deformations appeared during the test.



Accredited test number: **1003*** Test title: **Surface temperature test**

Test method: ČSN EN 303-5:2013 Art. 5.12, 5.16.4, 4.3.6

Sample tested: WB MAGNA 250-PELL150, WB MAGNA 250-PELL300

Measuring equipment used: Chapter III - Measuring and test equipment

Test results:

Requirement	Requirement specification	Test evaluation	Note
<p>Surface temperature The mean surface temperature shall be measured at nominal heat output. In order to do this, a minimum of 5 points on each boiler surface shall be measured. Under the same conditions, the critical temperatures (e.g. boiler doors, operating levers) shall be measured.</p>	<p>ČSN EN 303-5:2013 Art. 5.12</p>	+	
<p>The surface temperature on the outside of the boiler (including the bottom and doors but not including the flue gas outlet and maintenance openings of natural draft boilers) shall not exceed the room temperature by more than 60 K when tested in accordance with 5.12. The requirement for the bottom is not applicable for instances when the manufacturer declares that the boiler is to be installed on a non-combustible base. When tested in accordance with 5.12, the surface temperature of operating levers and all parts which shall be touched by hand during operation of the boiler shall not exceed the room temperature by more than the following values:</p> <ul style="list-style-type: none"> - 35 K for metals and similar materials; - 45 K for porcelain and similar materials; - 60 K for plastics and similar materials. 	<p>ČSN EN 303-5:2013 Art. 4.3.6</p>	+	
<p>Resistance to thermal conductance Temperature measurement shall be performed on the surface of the stoking device at the place next to the fuel line but within a maximum distance which shall be less than 1 m against the feeding direction from the inner wall of the combustion chamber. For boilers with integrated hopper, the temperature measurement shall be performed on the surface of the stoking device at the place next to the integrated hopper but within a maximum distance which shall be less than 1 m against the feeding direction from the inner wall of the combustion chamber. In addition, the highest surface temperature of the hopper shall be measured.</p>	<p>ČSN EN 303-5:2013 Art. 5.16.4</p>	+	



Measurement results: WB MAGNA 250-PELL150

Average temperatures of boiler walls, doors and covers (°C):		
Boiler type	WB MAGNA 250-PELL150	
Fuel type	Wood Pellets - C1	
Heat output	Nominal	Minimal
Date	2015-03-11	2015-03-12
Front wall	37.0	31.2
Rear wall	27.8	26.7
Right wall	26.5	25.2
Left wall	24.5	25.0
Upper wall	30.5	30.1
Lower wall	32.1	32.0
Temperatures of control elements (°C):		
El. control panel (plastic)	23.0	
Handle of upper door (plastic)	27.0	
Temperature of fuel line tube (metal)	23.0	

Measurement uncertainty: 2 °C for temperatures within the range of (0 ÷ 250) °C

"The above-specified extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient, k=2, corresponding to the coverage certainty of 95% as regards standard classification. The uncertainties do not reflect the impact of sample taking and lack of homogeneity. The standard uncertainty was determined in accordance with Document EA 4-02."

Test evaluation: The specified temperature rise values have not been exceeded.



Measurement results: WB MAGNA 250-PELL300

Average temperatures of boiler walls, doors and covers (°C):		
Boiler type	WB MAGNA 250-PELL300	
Fuel type	Wood Pellets - C1	
Heat output	Nominal	Minimal
Date	2015-03-09	2015-03-10
Front wall	39.5	31.6
Rear wall	25.4	28.1
Right wall	23.2	25.8
Left wall	20.7	24.0
Upper wall	29.2	29.8
Lower wall	28.8	31.9
Temperatures of control elements (°C):		
El. control panel (plastic)	20.0	
Handle of upper door (plastic)	26.0	
Temperature of fuel line tube (metal)	19.0	

Measurement uncertainty: 2 °C for temperatures within the range of (0 + 250) °C

"The above-specified extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient, k=2, corresponding to the coverage certainty of 95% as regards standard classification. The uncertainties do not reflect the impact of sample taking and lack of homogeneity. The standard uncertainty was determined in accordance with Document EA 4-02."

Test evaluation: The specified temperature rise values have not been exceeded.



Accredited test number: **1004.1*** Test title: **Test of heat output, input and efficiency**
1004.2* **Test of combustion product temperature**

Test method: ČSN EN 303-5:2013 Art. 4.4.2, 4.4.3, 5.7 to 5.10
 Sample tested: WB MAGNA 250-PELL150, WB MAGNA 250-PELL300
 Measuring equipment used: Chapter III - Measuring and test equipment

Test results:

Average measured and calculated values (solid fuels):

Test:	I.	II.
Boiler type:	WB MAGNA 250-PELL150	
Output tested:	Nominal	Minimal
Fuel type:	Wood pellets - C1	
Combustion period, (automatic) stoking	Minimally 6 hours	
Nominal heat output (specified by manufacturer) [kW]	130.0	130.0
Flue gas temperature [°C]	118.8	71.9
Fuel mass added [kg/h]	29.350	8.115
Inlet water temperature [°C]	60.4	57.9
Outlet water temperature [°C]	80.8	76.8
Temperature of the entering cold water [°C]	8.4	8.9
Cooling water flow rate [m3/h]	1.5600	0.4480
Draught [Pa]	36.0	12.0
Ambient temperature [°C]	19.7	19.3
Relative air humidity [%]	29.8	22.1
Barometric pressure [kPa]	99.86	99.46

Analysis of combustion products:

Test (period of burning) :	I.	II.
Oxygen O ₂ [%]	4.57	9.47
Carbon dioxide CO ₂ [%]	13.15	7.70
Carbon monoxide CO [ppm]	32	19
Higher hydrocarbons THC/OGC [ppm]	6	3
Nitrogen oxides NOx [ppm]	99	29
Sulfur oxides SO ₂ [ppm]	0	0



Auxiliary combustion values (solid fuels):

Test (period of burning) :		I.	II.
Stoichiometric oxygen volume	[m ³ /kg]	0.923	0.912
Stoichiometric air volume	[m ³ /kg]	4.397	4.343
Stoichiometric volume of dry combustion products	[m ³ /kg]	4.336	4.282
Maximum content of CO ₂	[%]	19.87	19.86
Stoichiometric air multiple	[-]	1.27	1.81
Volume of dry combustion products. actual	[m ³ /kg]	6.548	11.043
Content of H ₂ O in combustion air	[m ³ /kg]	0.039	0.039
Content of H ₂ O in combustion products	[m ³ /kg]	0.786	0.787

Calculated values - thermal overview:

Test (period of burning) :		I.	II.
Loss of sensible heat of combustion products	[%]	5.7	4.8
Loss of gas underburning	[%]	0.0	0.0
Loss of mechanical underburning	[%]	0.9	2.1
Loss of heat transfer into environment	[%]	0.8	2.5
Total loss	[%]	7.5	9.4
Efficiency – indirect method	[%]	92.5	90.6
Fuel mass added - actual	[kg/h]	29.628	8.243
Heat input	[kW]	143.5	39.9
Heat output	[kW]	131.7	35.9
Uncertainty of determining heat output	[kW]	5.5	1.5
Efficiency – direct method	[%]	91.8	89.9
Output / nominal output	[%]	101.3	27.6

At nominal output, when burning **Wood pellets - C1**, the boiler efficiency meets the requirements applicable to **Class 5** as per ČSN EN 303-5:2013, Fig. 1.

Test evaluation:

The measured heat output is within the ± 8% tolerance;
Boiler Class 5;
At nominal output, combustion product temperature is less than 160 K above the ambient temperature;
When burning Wood pellets - C1, the period of burning is more than 6 hours;
The minimum heat output is less than 30% of nominal heat output.



Test results:

Average measured and calculated values (solid fuels):

Test:		I.	II.
Boiler type:		WB MAGNA 250-PELL300	
Output tested:		Nominal	Minimal
Fuel type:		Wood pellets - C1	
Combustion period, (automatic) stoking		Minimally 6 hours	
Nominal heat output (specified by manufacturer)	[kW]	230.0	230.0
Flue gas temperature	[°C]	108.1	82.6
Fuel mass added	[kg/h]	49.455	14.915
Inlet water temperature	[°C]	62.2	65.1
Outlet water temperature	[°C]	77.6	82.2
Temperature of the entering cold water	[°C]	8.1	8.4
Cooling water flow rate	[m ³ /h]	2.7600	0.7760
Draught	[Pa]	32.0	20.0
Ambient temperature	[°C]	17.8	18.7
Relative air humidity	[%]	27.2	21.8
Barometric pressure	[kPa]	99.72	99.32

Analysis of combustion products:

Test (period of burning) :		I.	II.
Oxygen, O ₂	[%]	6.01	8.44
Carbon dioxide CO ₂	[%]	11.88	10.04
Carbon monoxide CO	[ppm]	24	64
Higher hydrocarbons THC-OGC	[ppm]	1	3
Nitrogen oxides NO _x	[ppm]	77	56
Sulfur oxides SO ₂	[ppm]	0	0

Auxiliary combustion values (solid fuels):

Test (period of burning) :		I.	II.
Stoichiometric oxygen volume	[m ³ /kg]	0.924	0.919
Stoichiometric air volume	[m ³ /kg]	4.399	4.374
Stoichiometric volume of dry combustion products	[m ³ /kg]	4.337	4.313
Maximum content of CO ₂	[%]	19.87	19.86
Stoichiometric air multiple	[-]	1.39	1.66
Volume of dry combustion products, actual	[m ³ /kg]	7.251	8.527
Content of H ₂ O in combustion air	[m ³ /kg]	0.034	0.035
Content of H ₂ O in combustion products	[m ³ /kg]	0.782	0.782



Calculated values - thermal overview:

Test (period of burning) :		I.	II.
Loss of sensible heat of combustion products	[%]	5.7	4.6
Loss of gas underburning	[%]	0.0	0.0
Loss of mechanical underburning	[%]	0.9	1.4
Loss of heat transfer into environment	[%]	0.4	1.5
Total loss	[%]	7.0	7.6
Efficiency – indirect method	[%]	93.0	92.4
Fuel mass added - actual	[kg/h]	49.916	15.096
Heat input	[kW]	241.7	73.1
Heat output	[kW]	223.1	67.2
Uncertainty of determining heat output	[kW]	9.4	2.8
Efficiency – direct method	[%]	92.3	91.9
Output / nominal output	[%]	97.0	29.2

At nominal output, when burning **Wood pellets - C1**, the boiler efficiency meets the requirements applicable to **Class 5** as per ČSN EN 303-5:2013, Fig. 1.

The measured heat output is within the $\pm 8\%$ tolerance;
 Boiler Class 5;

Test evaluation:

At nominal output, combustion product temperature is less than 160 K above the ambient temperature;

When burning Wood pellets - C1, the period of burning is more than 6 hours;

The minimum heat output is less than 30% of nominal heat output.

Test results:

WB MAGNA 250-PELL150	
Electricity consumption	
During the tests, the electrical consumption shall be determined according to EN 15456.	
The values for maximum consumption, for stand-by, nominal heat output and minimum heat output shall be stated in the test report. For boilers with automatic feeding systems (fuel line), the electrical consumption of the boiler and the fuel line shall be determined and stated separately.	
The average electrical power consumption during stand by shall be measured for a minimum duration of 10 min and shall be stated in watts. In cases where control operations influence the intrinsic energy consumption, a longer duration might be necessary.	
Maximum electrical input	465 W
Electrical input at nominal heat output	98 W
Electrical input at minimum heat output	38 W
Electrical input for STAND BY mode	3 W
Maximum electrical input for ignition system	305 W
Maximum electrical input for fuel supply (fuel line)	60 W



WB MAGNA 250-PELL300	
Electricity consumption	
During the tests, the electrical consumption shall be determined according to EN 15456.	
The values for maximum consumption, for stand-by, nominal heat output and minimum heat output shall be stated in the test report. For boilers with automatic feeding systems (fuel line), the electrical consumption of the boiler and the fuel line shall be determined and stated separately.	
The average electrical power consumption during stand by shall be measured for a minimum duration of 10 min and shall be stated in watts. In cases where control operations influence the intrinsic energy consumption, a longer duration might be necessary.	
Maximum electrical input	560 W
Electrical input at nominal heat output	160 W
Electrical input at minimum heat output	41 W
Electrical input for STAND BY mode	3 W
Maximum electrical input for ignition system	305 W
Maximum electrical input for fuel supply (fuel line)	110 W

Fuel analysis:

Fuel type	Wood pellets - C1			
	Symbol	Unit	Value	Uncertainty
Analytical indicator				
Higher heating value	Q_s	[MJ/kg]	18.90	0.14
Lower heating value	Q_j	[MJ/kg]	17.43	0.14
All water in original condition	W_t^r	[% by weight]	7.21	0.01
Ash	A	[% by weight]	0.44	0.02
Carbon	C	[% by weight]	47.07	0.25
Hydrogen	H	[% by weight]	5.93	0.10
Nitrogen	N	[% by weight]	0.08	0.10
Sulphur	S	[% by weight]	0.000	0.000
Chlorine	Cl	[% by weight]	0.005	0.001
Oxygen – calculation for 100%	O	[% by weight]	39.27	
Conversion factor f_{emis} for emissions in [mg/m ³] to [mg/MJ]	f_{emis}	[-]	0.25163	

Note: Sample in original condition

Measurement uncertainty: Specified in Measurement results

“The above-specified extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient, $k=2$, corresponding to the coverage certainty of 95% for standard classification. The uncertainties do not reflect the impact of sample taking and lack of homogeneity. The standard uncertainty was determined in accordance with Document EA 4/02”.



Accredited test number: **1005.1*** Test title: **Combustion efficiency test - emissions**

Test method: ČSN EN 303-5:2013 Art. 4.4.7, 5.7.3, 5.7.4, 5.9, 5.10.4

Sample tested: WB MAGNA 250-PELL150, WB MAGNA 250-PELL300

Measuring equipment used: Chapter III - Measuring and test equipment

Requirement	Requirement specification	Test evaluation	Note
Emission limits Combustion shall be of low-emission. This requirement shall be satisfied if the emission values shown in Table 6 are not exceeded when operating at nominal heat output or, in the case of boilers with heat output range, when operating at nominal heat output and minimum heat output, in accordance with 5.7, 5.9 and 5.10.	ČSN EN 303-5:2013 Art. 4.4.7	+	

Table 6

Stoking	Fuel	Nominal heat output kW	Emission limits								
			CO			OGC/THC mg/m ³ at 10% O ₂			Dust		
			Class 3	Class 4	Class 5	Class 3	Class 4	Class 5	Class 3	Class 4	Class 5
Manual	Biogenic	≤ 50	5000	1200	700	150	50	30	150	75	60
		> 50 ≤ 150	2500			100					
		> 150 ≤ 500	1200			100					
	Fossil	≤ 50	5000			150			125		
		> 50 ≤ 150	2500			100					
		> 150 ≤ 500	1200			100					
Automatic	Biogenic	≤ 50	3000	1000	500	100	30	20	150	60	40
		> 50 ≤ 150	2500			80					
		> 150 ≤ 500	1200			80					
	Fossil	≤ 50	3000			100			125		
		> 50 ≤ 150	2500			80					
		> 150 ≤ 500	1200			80					

NOTE 1: The dust values in this Table are based on the experience of the gravimetric filter method. The method used needs to be referred to in the test report. The particulate matter emission measured according to this European Standard does not include condensable organic compounds which may form additional particulate matter when the flue gas is mixed with ambient air. The values are therefore not directly comparable with values measured by dilution tunnel methods. Neither can they be directly translated into ambient air particulate concentrations.

NOTE 2: Additional test methods and emission limits which apply in some countries are given in the A-Deviations in Annex C.

^a Referred to dry exit flue gas, 0 °C, 1013 mbar.

^b Boilers of class 3 for type E-fuels according to 1.2.1 or e-fuels according to 1.2.3 in this Table and marked with the classification E-fuels and e-fuels do not need to fulfil the requirements for the dust emissions. The actual value shall be stated in the technical documentation and shall not exceed 200 mg/m³ at 10 % O₂.



Measurement results: WB MAGNA 250-PELL150 – Wood pellets - C1

Boiler output	Average values									
	Measured values						Converted values O ₂ =10%			
	O ₂ [%]	CO ₂ [%]	CO [ppm]	OGC/THC [ppm]	NO _x [ppm]	Dust [mg/m ³]	CO [mg/m ³]	OGC/THC [mg/m ³]	NO _x [mg/m ³]	Dust [mg/m ³]
Nominal	4.57	13.15	32	6	99	36	27	7	137	24
Minimal	9.47	7.70	19	3	29	25	22	5	56	24

Test evaluation:

WB MAGNA 250-PELL150 – Wood pellets - C1 meets at nominal and minimal output the emission requirements for **Class 5**, as per ČSN EN 303-5:2013 Table 6.

Measurement results: WB MAGNA 250-PELL300 – Wood pellets - C1

Boiler output	Average values									
	Measured values						Converted values O ₂ =10%			
	O ₂ [%]	CO ₂ [%]	CO [ppm]	OGC/THC [ppm]	NO _x [ppm]	Dust [mg/m ³]	CO [mg/m ³]	OGC/THC [mg/m ³]	NO _x [mg/m ³]	Dust [mg/m ³]
Nominal	6.01	11.88	24	1	77	36	22	1	116	27
Minimal	8.44	10.04	64	3	56	19	70	4	100	17

Test evaluation:

WB MAGNA 250-PELL300 – Wood pellets - C1 meets at nominal and minimal output the emission requirements for **Class 5**, as per ČSN EN 303-5:2013 Table 6.



Accredited test number: **1004.1*** Test title: **Test of heat output, input and efficiency**
1005.1* **Combustion efficiency test - emissions**

Test method: ČSN EN 303-5:2013 Annex C,
Deviation from Austria, C.2.2, C.2.3

Sample tested: WB MAGNA 250-PELL150, WB MAGNA 250-PELL300

Measuring equipment used: Chapter III - Measuring and test equipment

Test results:

Requirement		Requirement specification	Test evaluation	
Boiler efficiency for nominal heat output and minimum heat output		ČSN EN 303-5:2013 Annex C, Deviation from Austria, C.2.2	Wood Pellets – C1	
Boiler	Minimum efficiency		+	
Heating boilers for solid fuels			75 %	
a) manually loaded				
up to 10 kW			79 %	
>10 to 200 kW			(71.3 + 7.7 log Pn) %	
>200 kW			89	
b) automatically loaded				
up to 10 kW			80 %	+
>10 to 200 kW			(72.3 + 7.7 log Pn) %	+
>200 kW		90 %		
NOTE: Pn is the nominal heat output (Qn in this standard)				

Requirement					Requirement specification	Test evaluation
Emission limits					ČSN EN 303-5:2013 Annex C, Deviation from Austria, C.2.3	Wood Pellets - C1
Small burners used for solid fuels automatically loaded						
Parameter	Emission limits mg-MJ					
	Wooden Wood Pellets Room heaters	Wooden Wood Pellets Central heaters	Other wooden fuels	Other standardised biogenous fuels		
CO	500 ^a	250 ^a	250 ^a	500 ^a		
NO _x	100	100	100	300		+
OGC/THC	30	20	30	20		
Dust	25	20	30	35		
^a The limit value can be exceeded by 50 % during partial load operation at 30 % of nominal heat output.						



Measurement results: WB MAGNA 250-PELL150 – Wood pellets - C1

Boiler output	Minimum efficiency	Measured efficiency
Nominal	88.6	91.8
Minimal		89.9

Test evaluation:

The measured efficiency of WB MAGNA 250-PELL150 – Wood pellets - C1 is **higher** than required.

Measurement results: WB MAGNA 250-PELL300 – Wood pellets - C1

Boiler output	Minimum efficiency	Measured efficiency
Nominal	90.0	92.3
Minimal		91.9

Test evaluation:

The measured efficiency of WB MAGNA 250-PELL300 – Wood pellets - C1 is **higher** than required.

Measurement results: WB MAGNA 250-PELL150 – Wood pellets - C1

Boiler output	Average values								
	Measured values					Converted values O ₂ =0%			
	O ₂ [%]	CO [ppm]	NO _x [ppm]	OGC/THC [ppm]	Dust [mg/m ³]	CO [mg/MJ]	NO _x [mg/MJ]	OGC/THC [mg/MJ]	Dust [mg/MJ]
Nominal	4.57	32	99	6	36	13	65	3	11
Minimal	9.47	19	29	3	25	10	26	2	11

Test evaluation:

The measured emission values for WB MAGNA 250-PELL150 – Wood pellets - C1 **do not exceed** the specified values.

Measurement results: WB MAGNA 250-PELL300 – Wood pellets - C1

Boiler output	Average values								
	Measured values					Converted values O ₂ =0%			
	O ₂ [%]	CO [ppm]	NO _x [ppm]	OGC/THC [ppm]	Dust [mg/m ³]	CO [mg/MJ]	NO _x [mg/MJ]	OGC/THC [mg/MJ]	Dust [mg/MJ]
Nominal	6.01	24	77	1	36	11	55	1	13
Minimal	8.44	64	56	3	19	33	47	2	8

Test evaluation:

The measured emission values for WB MAGNA 250-PELL300 – Wood pellets - C1 **do not exceed** the specified values.



Accredited test number: **1004.1*** Test title: **Test of heat output, input and efficiency**
1005.1* **Combustion efficiency test - emissions**

Testing method: EN 303-5:2012 Annex C,
 Deviation from Croatia, C.3

Sample tested: WB MAGNA 250-PELL150, WB MAGNA 250-PELL300

Measuring equipment used: see in (III. Measuring and testing equipment)

Requirement		Specification of requirement	Test evaluation	
Maximum heat losses by combustion products		EN 303-5:2012 Annex C, C.3 Deviation from Croatia	Wood Pellets - C1	
Nominal heat output, kW	Heat losses, %		+	
100 – 1000 kW	17 %			
Emission limits for solid fuels^a				+
Nominal heat output, kW	CO mg/m³ at 7 % O ₂ for coal at 11 % O ₂ for wood and biomass			
100 – 1000 kW	1000 mg/m ³			
^a Emissions are referred to dry exit flue gas, 0 °C, 1013,3 mbar.				

Test results: WB MAGNA 250-PELL150 – Wood Pellets - C1

Boiler capacity	Measurement heat losses %
Nominal	7.5
Minimal	9.4

Test results: WB MAGNA 250-PELL300 – Wood Pellets - C1

Boiler capacity	Measurement heat losses %
Nominal	7.0
Minimal	7.6

Test evaluation:

The measured heat losses values WB MAGNA 250-PELL150, WB MAGNA 250-PELL300 **do not exceed** prescribed values.



Test results: WB MAGNA 250-PELL150 – Wood Pellets - C1

Boiler capacity	CO mg/m³ at 11 % O ₂ for wood and biomass
Nominal	24
Minimal	20

Test results: WB MAGNA 250-PELL300 – Wood Pellets - C1

Boiler capacity	CO mg/m³ at 11 % O ₂ for wood and biomass
Nominal	20
Minimal	64

Test evaluation:

The measured emission values WB MAGNA 250-PELL150, WB MAGNA 250-PELL300 **do not exceed** prescribed values.



Accredited test number: **1004.1*** Test title: **Test of heat output, input and efficiency**
1005.1* **Combustion efficiency test - emissions**

Test method: ČSN EN 303-5:2013 Annex C,
 Deviation from Denmark, C.4.1, C.4.2

Sample tested: WB MAGNA 250-PELL150, WB MAGNA 250-PELL300

Measuring equipment used: Chapter III - Measuring and test equipment

Test results:

Requirement	Requirement specification	Test evaluation
Boiler Efficiency	ČSN EN 303-5:2013 Annex C, Deviation from Denmark, C.4.1	Wood Pellets - C1
According to the Danish Construction Code BR08, Clause 8.5.1.4, Sub-clause 7, boilers for coal, coke, bio fuel or biomass shall have an efficiency equivalent to Class 3 in EN 303-5.		
Minimum efficiency $(67 + 6 \log Q_n) \%$		
For boilers above 300 kW, the requirement corresponding to 300 kW shall be used.		
		+

Requirement	Requirement specification	Test evaluation																					
Emission limits	ČSN EN 303-5:2013 Annex C, Deviation from Denmark, C.4.2	Wood Pellets - C1																					
According to the Danish EPA Statutory Order no. 1432 of 11-12-2007, only Class 3 (or higher) is acceptable for Denmark.																							
<table border="1"> <thead> <tr> <th rowspan="2">Stoking</th> <th rowspan="2">Fuel</th> <th rowspan="2">Nominal heat output</th> <th colspan="3">Emission limit values ^a</th> </tr> <tr> <th>CO</th> <th>OGC/THC</th> <th>Dust</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td colspan="3" style="text-align: center;">mg-m⁻³ at 10% O₂</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">kW</td> <td colspan="3" style="text-align: center;">Class 3</td> </tr> </tbody> </table>			Stoking	Fuel	Nominal heat output	Emission limit values ^a			CO	OGC/THC	Dust				mg-m ⁻³ at 10% O ₂					kW	Class 3		
Stoking						Fuel	Nominal heat output	Emission limit values ^a															
			CO	OGC/THC	Dust																		
					mg-m ⁻³ at 10% O ₂																		
				kW	Class 3																		
Manual			Biogenic	≤ 50	5000	150	150																
				> 50 to 150	2500	100																	
				> 150 to 300	1200																		
Fossil		≤ 50	5000	150	125																		
		> 50 to 150	2500	100																			
		> 150 to 300	1200																				
Automatic	Biogenic	≤ 50	3000		150																		
		> 50 to 150	2500	80																			
		> 150 to 300	1200																				
	Fossil	≤ 50	3000	100	125																		
		> 50 to 150	2500																				
		> 150 to 300	1200	80																			
					+																		

^a Referring to dry exit flue gas, 0 °C, 1 013 mbar.



Measurement results: WB MAGNA 250-PELL150 – Wood pellets - C1

Boiler output	Minimum efficiency	Measured efficiency
Nominal	79.7	91.8
Minimal		89.9

Test evaluation:

Measured efficiency for WB MAGNA 250-PELL150 – Wood pellets - C1 is **higher** than required.

Measurement results: WB MAGNA 250-PELL300 – Wood pellets - C1

Boiler output	Minimum efficiency	Measured efficiency
Nominal	81.2	92.3
Minimal		91.9

Test evaluation:

Measured efficiency for WB MAGNA 250-PELL300 – Wood pellets - C1 is **higher** than required.

Measurement results: WB MAGNA 250-PELL150 – Wood pellets - C1

Boiler output	Average emission values						
	Measured values				Converted values O ₂ =10%		
	O ₂ [%]	CO [ppm]	OGC/THC [ppm]	Dust [mg/m ³]	CO [mg/m ³]	OGC/THC [mg/m ³]	Dust [mg/m ³]
Nominal	4.57	32	6	36	27	7	24
Minimal	9.47	19	3	25	22	5	24

Test evaluation:

The measured emission values for WB MAGNA 250-PELL150 – Wood pellets - C1 **do not exceed** the specified values.

Measurement results: WB MAGNA 250-PELL300 – Wood pellets - C1

Boiler output	Average emission values						
	Measured values				Converted values O ₂ =10%		
	O ₂ [%]	CO [ppm]	OGC/THC [ppm]	Dust [mg/m ³]	CO [mg/m ³]	OGC/THC [mg/m ³]	Dust [mg/m ³]
Nominal	6.01	24	1	36	22	1	27
Minimal	8.44	64	3	19	70	4	17

Test evaluation:

The measured emission values for WB MAGNA 250-PELL300 – Wood pellets - C1 **do not exceed** the specified values.



Accredited test number: **1004.1*** Test title: **Test of heat output, input and efficiency**
 1005.1* **Combustion efficiency test - emissions**

Test method: ČSN EN 303-5:2013 Annex C,
 Deviation from Germany, C.5.1, C.5.2

Sample tested: WB MAGNA 250-PELL150, WB MAGNA 250-PELL300

Measuring equipment used: Chapter III - Measuring and test equipment

Test results:

Requirement					Requirement specification	Test evaluation
Emission limits					ČSN EN 303-5:2013 Annex C, Deviation from Germany, C.5.1	Wood Pellets - C1
Table 7 – Emission limits The emission limits are regulated in Chapter 2, paragraphs 4, 5 and Annex 2 of the German Immission Control Ordinance "Erste Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Verordnung über kleine und mittlere Feuerungsanlagen - 1. BImSchV)". Boilers operated with solid fuels shall only be installed, possess the quality and be put into operation if they fulfil the following specifications of the 1. BImSchV:						
	Fuel acc. to §3 (1)	Nominal output range kW	Dust g/m³	CO g/m³		
Stage 2: Appliances, which will be installed after 31.12.2014	Numbers 1 to 5a	≥ 4	0.02	0.4		
	Numbers 6 to 7	≥ 30 ≤ 500 > 500	0.02	0.4 0.3		
	Numbers 8 to 13	≥ 4 < 100	0.02	0.4		
+						
NOTE Differing from sentence 1 for firing systems (appliances) which will exclusively be fired by fuels according §3 article 1 Number 4 in the form of split logs, the limits according Stage 2 apply for firing systems (appliances) if they are installed after 31.12.2016.						



Measurement results: WB MAGNA 250-PELL150 – Wood pellets - C1

Boiler output	Average emission values				
	Measured values			Converted values O ₂ =13%	
	O ₂ [%]	CO [ppm]	Dust [mg/m ³]	CO [g/m ³]	Dust [g/m ³]
Nominal	4.57	32	36	0.019	0.017
Minimal	9.47	19	25	0.016	0.017

Test evaluation:

The measured emission values for WB MAGNA 250-PELL150 – Wood pellets - C1 **do not exceed** the specified values.

Measurement results: WB MAGNA 250-PELL300 – Wood pellets - C1

Boiler output	Average emission values				
	Measured values			Converted values O ₂ =13%	
	O ₂ [%]	CO [ppm]	Dust [mg/m ³]	CO [g/m ³]	Dust [g/m ³]
Nominal	6.01	24	36	0.016	0.019
Minimal	8.44	64	19	0.051	0.012

Test evaluation:

The measured emission values for WB MAGNA 250-PELL300 – Wood pellets - C1 **do not exceed** the specified values.



Accredited test number: **1004.1*** Test title: **Test of heat output, input and efficiency**
1005.1* **Combustion efficiency test - emissions**

Test method: ČSN EN 303-5:2013 Annex C
 Deviation from Switzerland, C.6

Sample tested: WB MAGNA 250-PELL150, WB MAGNA 250-PELL300

Measuring equipment used: Chapter III - Measuring and test equipment

Test results:

Requirement		Requirement specification	Test evaluation											
Emission limits		ČSN EN 303-5:2013 Annex C C.6 Deviation from Switzerland	Wood Pellets - C1											
Clause 4.4.7, Table 7 The emission limits are regulated in Annex 4 of the Swiss Ordinance on Air Pollution Control ([OAPC] SR 814.318.142.1) of 1985-12-16 (as at 2010-07-15). Boilers operated with woody biomass shall only be put on the market if they fulfil the following specifications of the OAPC: – declarations of conformity (Figure 20 OAPC); – Figures 1, 212, 23 Annex 4 OAPC; – Figures 31, 32 Annex 5 OAPC. Emissions for boilers operated with coal or wood fuels shall not exceed the following limits:														
Type of installation	Particular requirements (emission limits)^a for carbon monoxide (CO) and particulate matter (dust)													
	<table border="1"> <thead> <tr> <th></th> <th>CO (mg·m⁻³)</th> <th>Dust (mg·m⁻³)</th> </tr> </thead> <tbody> <tr> <td>Boilers for log wood and boilers for coal, manual stoking</td> <td>800</td> <td>50</td> </tr> <tr> <td>Boilers for chipped wood and boilers for coal, automatic stoking</td> <td>400</td> <td>60</td> </tr> <tr> <td>Boilers for Wood Pellets, automatic stoking</td> <td>300</td> <td>40</td> </tr> </tbody> </table>				CO (mg·m ⁻³)	Dust (mg·m ⁻³)	Boilers for log wood and boilers for coal, manual stoking	800	50	Boilers for chipped wood and boilers for coal, automatic stoking	400	60	Boilers for Wood Pellets, automatic stoking	300
	CO (mg·m ⁻³)			Dust (mg·m ⁻³)										
Boilers for log wood and boilers for coal, manual stoking	800	50												
Boilers for chipped wood and boilers for coal, automatic stoking	400	60												
Boilers for Wood Pellets, automatic stoking	300	40												
^a Referred to oxygen basis: – for boilers for natural state wood 13 % volume; – for boilers for coal 7 % volume.														
The sulphur content of coal, coal briquettes and coke shall not exceed 3 %. Boilers operated with non-woody biomass shall comply with the following specifications of the OAPC: – Figures 741, 742, 743 Annex 2 OAPC; – Figures 81, 82 Annex 3 OAPC. According to Figure 743, Annex 2 OAPC, non-woody biomass, such as biogenic waste and products from agriculture, may only be burnt in boilers with a heat input of at least 70 kW. Such units need an approval and shall meet stronger emission limits according to Figure 742, Annex 2 OAPC.		0												



Measurement results: WB MAGNA 250-PELL150 – Wood pellets - C1

Boiler output	Average emission values				
	Measured values			Converted values O ₂ =13%	
	O ₂ [%]	CO [ppm]	Dust [mg/m ³]	CO [mg/m ³]	Dust [mg/m ³]
Nominal	4.57	32	36	19	17
Minimal	9.47	19	25	16	17

Test evaluation:

The measured emission values for WB MAGNA 250-PELL150 – Wood pellets - C1 **do not exceed** the specified values.

Measurement results: WB MAGNA 250-PELL300 – Wood pellets - C1

Boiler output	Average emission values				
	Measured values			Converted values O ₂ =13%	
	O ₂ [%]	CO [ppm]	Dust [mg/m ³]	CO [mg/m ³]	Dust [mg/m ³]
Nominal	6.01	24	36	16	19
Minimal	8.44	64	19	51	12

Test evaluation:

The measured emission values for WB MAGNA 250-PELL300 – Wood pellets - C1 **do not exceed** the specified values.



Accredited test number: **1004.1*** Test title: **Test of heat output, input and efficiency**
 1005.1* **Combustion efficiency test - emissions**

Test method: ČSN EN 303-5:2013 Annex C,
 Deviations from Italy, C.8

Sample tested: WB MAGNA 250-PELL150, WB MAGNA 250-PELL300

Measuring equipment used: Chapter III - Measuring and test equipment

Requirement	Specification of requirement		Test evaluation
Italian emission limits for heating plants fuelled with biomass solid fuels	Emissions refer to an 11% O ₂		Wood Pellets - C1
Plant nominal thermal output (MW)	>0,035 ÷ <0,15 (>35kW÷<150kW)	>0,15 ÷ <1 (>150kW÷<1000kW)	
Total Particulate Matter	200mg-Nm ³	100mg-Nm ³	+
Total Organic Carbon (COT)		-	
Carbon Monoxide (CO)		350 mg-Nm ³	
Nitrogen Dioxide (expressed as NO ₂)		500 mg-Nm ³	
Sulphur Dioxide (expressed as SO ₂)		200mg-Nm ³	
Italian emission limits for heating plants fuelled with non-biomass solid fuels			
	Emissions refer to an 6% O ₂		
Nominal Thermal output (MW)	>0.35 (350kW)		
Total Particulate Matter	50 mg-Nm ³		



Measurement results: WB MAGNA 250-PELL150 – Wood pellets - C1

Boiler output	Average emission values				
	Measured values			Converted values O ₂ =11%	
	O ₂ [%]	CO [ppm]	Dust [mg/m ³]	CO [mg/m ³]	Dust [mg/m ³]
Nominal	4.57	32	36	24	22
Minimal	9.47	19	25	20	22

Test evaluation:

The measured emission values for WB MAGNA 250-PELL150 – Wood pellets - C1 **do not exceed** the specified values.

Measurement results: WB MAGNA 250-PELL300 – Wood pellets - C1

Boiler output	Average emission values				
	Measured values			Converted values O ₂ =11%	
	O ₂ [%]	CO [ppm]	Dust [mg/m ³]	CO [mg/m ³]	Dust [mg/m ³]
Nominal	6.01	24	36	20	24
Minimal	8.44	64	19	64	15

Test evaluation:

The measured emission values for WB MAGNA 250-PELL300 – Wood pellets - C1 **do not exceed** the specified values.



Accredited test number: **1006.1*** Test title: **Function test of control, regulation and safety elements**
1005.1* **Combustion efficiency test - emissions**

Test method: ČSN EN 303-5:2013
 Art. 5.13, 5.14, 5.16.1, 5.16.2, 5.16.3
 ČSN EN 303-5:2013
 Art. 5.9, 5.10.4

Sample tested: WB MAGNA 250-PELL150, WB MAGNA 250-PELL300

Measuring equipment used: Chapter III - Measuring and test equipment

Test results:

Requirement	Requirement specification	Test evaluation	Note
<p>Function check of the temperature controller and safety temperature limiter at the boiler</p> <p>The water-side flow rate shall comply with that specified for the nominal heat output test. The flow temperature of 75 °C shall not be exceeded at the start of the test °C.</p> <p>Adjust the firing so that it corresponds to the nominal heat output Q_N of the boiler. A steady state condition shall be reached and the outlet pressure at the flue gas section shall be according to the nominal heat output setting. For manual stoked boilers, the boiler shall be refuelled after reaching steady state with a full batch before starting the test.</p> <p>The dissipated output shall be reduced to (40 ± 5) % of the nominal heat output of the boiler, circulating pump running in continuous operation; temperature controller adjusted to maximum set value.</p> <p>When the temperature controller is operating normally, the measured flow temperature shall not exceed 100 °C; the safety temperature cut out or limiter or the device for dissipating excess heat shall not trigger.</p> <p>Repeat the test with the temperature controller out of function. This time, check if the safety temperature limiter-detector switches off the firing system at the highest value specified by the boiler manufacturers and if all hazardous operation states are avoided (see 4.1).</p>	<p>ČSN EN 303-5:2013 Art. 5.13</p>	<p>+</p>	



Requirement	Requirement specification	Test evaluation	Note
<p>Function test for the rapidly disconnectable firing system</p> <p>– Sudden absence of heat dissipation</p> <p>The water-side flow rate shall comply with that specified for the nominal output test. The flow temperature of 75 °C shall not be exceeded at the start of the test.</p> <p>Adjust the firing so that it corresponds to the nominal heat output Q_N of the boiler, a steady state condition is reached and the outlet pressure at the flue spigot is according to the rated heat output.</p> <p>The heat consumption is set to 0; water circulation in the boiler is permitted; temperature controller is adjusted to manufacture recommended maximum set value.</p> <p>Check if the safety temperature limiter or the temperature controller switches off the firing system and all hazardous operation states are avoided.</p> <p>- Loss of the electrical power supply</p> <p>The water-side flow rate shall comply with that specified for the nominal heat output test. The flow temperature of 75 °C shall not be exceeded at the start of the test.</p> <p>Adjust the firing so that it corresponds to the nominal heat output Q_N of the boiler, a steady state condition is reached and the outlet pressure at the flue gas section is according to the rated heat output.</p> <p>The electrical power supply including the circulation is cut off, check that no hazardous operation conditions occur.</p> <p>For the evaluation of the temperatures and the CO-concentrations, only mean values at a maximum average time of one minute shall be considered.</p>	<p>ČSN EN 303-5:2013 Art. 5.14</p>	<p>+</p>	
<p>Safety test of consequences of fuel overload and effect of a blockage of the fuel supply</p> <p>The safety of the boiler shall be checked at continuous operation of the boiler with the fuel feed rate of the stoking device set at possible maximum capacity, taking into account failures according to the risk analyses and the electrical safety. If other fuel feed rates lower than the maximum are categorized as critical by the risk analysis, these shall also be tested.</p> <p>The functionality of the safety device for the shut-down of the fuel shall occur by prevention of the ignition after release of fuel if no or insufficient combustion in the combustion chamber occurs.</p> <p>The test for blocked fuel line shall be achieved by deactivating the stoking device.</p> <p>The requirements specified in 4.3.4 shall be satisfied.</p>	<p>ČSN EN 303-5:2013 Art. 5.16.2</p>	<p>+</p>	



Requirement	Requirement specification	Test evaluation	Note
<p>Loss of combustion air supply The safety of the heating boiler shall be checked at maximum heat input under the following conditions:</p> <ul style="list-style-type: none"> - failure of combustion air fan; - failure to close of the adjustable combustion air supply. <p>In each case, only one failure shall be simulated. The CO concentrations in the boiler shall not exceed 5 % volume. The measurement of CO concentration shall be carried out in the flue gas measuring section. Test of combustion air supply loss</p>	<p>ČSN EN 303-5:2013 Art. 5.16.3</p>	+	

Note:

+	Compliant
-	Non-compliant
0	Not applicable
x	Not assessed

Measurement results: WB MAGNA 250-PELL150

Temperature controller		
Temperature	[°C]	Note:
Pre-set	85.0	Temperature set on the operating thermostat regulator
Shutdown	83.5	Fan and stoking switched off (suppression mode)
Restoration of operation	63.0	Fan and stoking restored

Temperature limiter (manual restoration of temperature) STB		
Temperature	[°C]	Note:
Pre-set	95.0	Temperature set on the temperature limiter
Shutdown	89.7	Fan and stoking switched off
Restoration of operation	The boiler irreversibly switched off. In order to restore operation, a manual intervention required, after the temperature drops under the limiter switching temperature	

Test evaluation:

Proper functioning of safety elements has been verified.



Measurement results: WB MAGNA 250-PELL300

Temperature controller		
Temperature	[°C]	Note:
Pre-set	85.0	Temperature set on the operating thermostat regulator
Shutdown	83.8	Fan and stoking switched off (suppression mode)
Restoration of operation	61.0	Fan and stoking restored

Temperature limiter (manual restoration of temperature) STB		
Temperature	[°C]	Note:
Pre-set	95.0	Temperature set on the temperature limiter
Shutdown	90.3	Fan and stoking switched off
Restoration of operation	The boiler irreversibly switched off. In order to restore operation, a manual intervention required, after the temperature drops under the limiter switching temperature	

Test evaluation:

Proper functioning of safety elements has been verified.

Tested by: Ing. Marek Skřivan Date: 2015-09-14

Signed: _____

Reviewed by: Ing. Stanislav Buchta Date: 2015-09-14

Signed: _____

The test methods in this Report were applied without deviations, additions or exceptions.



V. List of source materials

The tests were performed based on

- Order B-52207 dated 2015-02-10 (received on 2015-02-13)
- Contract B-52207/31
- Amendment D1 to the contract B-52207/31
- ČSN EN 303-5:2013 – Heating boilers - Part 5: Heating boilers for solid fuels, manually and automatically stoked, nominal heat output of up to 500 kW - Terminology, requirements, testing and marking
- Technical documentation to Task 31-9616
- A set of required drawing documentation as per ČSN EN 303-5:2013

The persons named below are accountable for the accuracy of the above-specified data:

Ing. Stanislav Buchta
Head of Boilers and Industrial Heat
Equipment Department



Milan Holomek
Head of Heat and Environment-
Friendly Equipment Test Station