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**Accredited testing laboratory by EA BAS according to EN ISO/IEC 17025:2018  
Certificate № 122 ЛМ Dated September 16<sup>th</sup>, 2019 Valid until September 30<sup>th</sup>, 2020**



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## TEST REPORT

**№ of test report: SFB-07-2019**

**This document REPLACES TEST REPORT No PB-04-2014 / 18.12.2014.**

**Request:** № 25 / 08.10.2019

**Performance characteristics determined during the test:**

Based on the submitted request for testing, an initial type testing has been carried out in compliance with:

- EN 303-5:2012 "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.", regarding:

- Product emissions from burning – item 5.9; item 5.10.4; item 5.10.3.2;
- Surface temperature – item 5.12 ( item 5.10.3.2 );
- Temperature of the flue gases – item 5.7.3;
- Heat capacity / energy efficiency and determining the boiler class – item 5.8.1; item 5.8.2; item 5.8.3; item 5.8.5 (item 5.10.1; item 5.10.2; item 5.4) / item 5.8.4 (item 5.10.3).

**Object for testing:**

Model: "GRANDE"  
Serial № 5600042      Kind of the heating appliance: an automatic pellet boiler

Purpose: for heating of residential premises via hot water      Burning material: wood pellets

**Applicant's name:** "Alfa Plam" A. D., Radnička 1, 17500 Vranje, Serbia

**Producer:** "Alfa Plam" A. D., Radnička 1, 17500 Vranje, Serbia

**Duration of test:** 18.10.2019 ÷ 24.10.2019

**Place for testing:** Testing laboratory at "Kontrol 94" Ltd., Gorna Oryahovitsa

**Head of Laboratory:**



.....  
/ Dipl. Eng. Miroslav Raev /

Date: 25.10.2019  
Gorna Oryahovitsa



**Test Report No SFB-07-2019**

**1. Tests and measurements**

**Test conditions for the measurement of performance**

**The conditions at nominal heat, according to item 5.1 of EN 303-5:2012**

	Unit	Respond to EN 303-5:2012	Test conditions
Fuel type		Table 7	Wood pellets
Fire box			closed
Burning process			continuous burning
The mean flue draught	Pa	by manufacturer	12,0
The mean ambient room temperature - tr	°C	5.7.1	24,0
Atmospheric pressure	mbar		1003,0
Air humidity	%RH		43,4
Duration at nominal heat output	h	5.7.4.2	6,00
Duration of test period	h	5.7.4.2	6,00
Fuel load	kg/h	5.3	6,467
The heat output (manufacturer declared)	kW		28,00
Thermostat			switched off
Position at nominal heat			Auto P5 Auger: C 07 - 1900 Fan: U 07 - 2350
<b>Position of control devices:</b>			
- Primary air			opened

**1.1 Results obtained from the measurement of performance**

Characteristics	Unit	Respond to EN 303-5:2012	Requirements to EN 303-5:2012	Results	Uncertainty: ± U	
					Requirements	Value
The mean flue gas temperature	°C	5.7.3		111,00		3,39
The mean CO <sub>2</sub> emission	%	5.9; 5.10.4		10,95	0,62	0,48
The mean CO emission	ppm	5.9; 5.10.4		71,00	27,60	14,00
The mean CO emission at 10%O <sub>2</sub>	%			0,0069		
The mean CO emission at 10%O <sub>2</sub>	mg/m <sup>3</sup>		≤500 (Class 5)	86		-
The mean CxHy	ppm	5.9;	≤20 (Class 5)	11,28	5	1,12
The mean OGC emission at 10%O <sub>2</sub>	mg/m <sup>3</sup>	5.10.4		19,45		-
The mean NOx	ppm	5.9;		81,42	15	6,40
The mean NOx emission at 10%O <sub>2</sub>	mg/m <sup>3</sup>	5.10.4		194,29		
The heat input	kW	5.10.2		30,72		-
Efficiency – indirect method - η	%	5.10.3.2	> 88,45 (Class 5)	91,52		-
Efficiency – direct method - η	%	5.10.3.1		90,82		-
The heating output (from the test) indirect / direct method	kW	5.10.1		28,11 / 27,90		-
Flue gas mass flow	g/s			17,18		-
The mean value of dust in the flue gas at 10%O <sub>2</sub>	mg/m <sup>3</sup>	5.9; 5.10.4	≤40 (Class 5)	38,50	10	2,35
<b>Water section</b>						
Water temperature out	°C	5.8.2	≥ 70 and ≤ 90	72,90		0,18
Water temperature in	°C			50,50		0,20
Rate of input water	m <sup>3</sup> /h	5.8.1		1,0710		0,0074



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**Test conditions for the measurement of performance**

<b>The conditions at reduced heat, according to item 5.1 of EN 303-5:2012</b>			
	Unit	Respond to EN 303-5:2012	Test conditions
Fuel type		Table 7	Wood pellets
Fire box			closed
Burning process			continuous burning
The mean flue draught	Pa	by manufacturer	10,5
The mean ambient room temperature - tr	°C	5.7.1	24,5
Atmospheric pressure	mbar		998,5
Air humidity	%RH		38,5
Duration at nominal heat output	h	5.7.4.2	6,00
Duration of test period	h	5.7.4.2	6,00
Fuel load	kg/h	5.3	1,803
The heat output (manufacturer declared)	kW		9,50
Thermostat			switched off
Position at reduced heat		Auto P1	Auger: C 03 – 600 Fan: U 03 – 740
<b>Position of control devices:</b>			
- Primary air			opened

**1.2 Results obtained from the measurement of performance**

Characteristics	Unit	Respond to EN 303-5:2012	Requirements to EN 303-5:2012	Results	Uncertainty: ± U	
					Requirements	Value
The mean flue gas temperature	°C	5.7.3		53,00		3,39
The mean CO <sub>2</sub> emission	%	5.9; 5.10.4		9,06	0,62	0,48
The mean CO emission	ppm	5.9; 5.10.4		328,00	27,60	14,00
The mean CO emission at 10%O <sub>2</sub>	%			0,0385		-
The mean CO emission at 10%O <sub>2</sub>	mg/m <sup>3</sup>		≤500 (Class 5)	481		-
The mean CxHy	ppm	5.9; 5.10.4		9,58	5	1,12
The mean OGC emission at 10%O <sub>2</sub>	mg/m <sup>3</sup>			≤20 (Class 5)	19,73	
The mean NOx	ppm	5.9; 5.10.4		70,92	15	6,40
The mean NOx emission at 10%O <sub>2</sub>	mg/m <sup>3</sup>				172,74	
The heat input	kW	5.10.2		8,57		-
Efficiency – indirect method - η	%	5.10.3.2	> 87,90 (Class 5)	94,52		-
Efficiency – direct method - η	%	5.10.3.1		91,68		-
The heating output (from the test) indirect / direct method	kW	5.10.1		8,10 / 7,86		-
Flue gas mass flow	g/s			5,68		-
The mean value of dust in the flue gas at 10%O <sub>2</sub>	mg/m <sup>3</sup>	5.9; 5.10.4	≤40 (Class 5)	38,60	10	2,35
<b>Water section</b>						
Water temperature out	°C	5.8.3	≥ 70 and ≤ 90	73,70		0,18
Water temperature in	°C			59,30		0,20
Rate of input water	m <sup>3</sup> /h	5.8.1		0,4700		0,0074



**Test Report No SFB-07-2019**

**Test conditions in measuring surface temperatures at nominal heat, according to item 5.12 EN 303-5:2012**



	Unit	Respond to EN 303-5:2012	Test conditions
Fuel		Table 7	Wood pellets
The mean of ambient temperature	°C	5.7.1	24,0
The mean flue draught	Pa	by manufacturer	12,0
Operating tools			NA

**1.3 Results obtained from the measurement surface temperatures at nominal heat, according to item 5.12 EN 303-5:2012**

	Unit	Requirements	Results	Uncertainty: $\pm U$	
				Requirements	Value
<b>Maximum temperature to the operating components - according to item 4.3.6 / 5.12 EN 303-5:2012</b>					
Upper left door handle	°C	<b>Plastic</b> <60 + tr	33,0	2 + tr	0,3
Upper right door handle	°C		26,0		0,3
Bottom left door handle	°C		37,0		0,3
Bottom right door handle			27,0		0,3
Handle of the hopper cover			26,0		0,3
Display	°C		27,0		0,3
<b>The mean temperature of the walls and the doors - according to item 5.12 EN 303-5:2012</b>					
Front wall	°C	< 60 + tr	32,2	2 + tr	0,6
Upper wall	°C		31,2		0,6
Right wall	°C		30,8		0,6
Left wall	°C		29,6		0,6
Rear wall	°C		26,0		0,6
The floor	°C		62,1		0,8
<b>Caused residual deformation in appliance from the test: None!</b>					

**1.4 Electrical consumption, according to item 5.8.5 EN 303-5:2012**

Power	Unit	Measured value
<b>Maximum heat output</b>	W	55
<b>Reduced heat output</b>	W	35
<b>Standby</b>	W	5

**Test Report No SFB-07-2019****Test conditions in measuring of the water boiler under pressure,  
according to item 5.4 EN 303-5:2012**

	Unit	Value	Test conditions
Maximum working pressure of the water, declared by the producer	bar	2,0	-
Pressure during the test	bar	4,0	Yes
Duration of the test	min	10	Yes

**1.5 Results obtained from measuring of the water boiler under pressure,  
according to item 5.4 EN 303-5:2012**

	Results obtained	Requirement is met
Density of the water system	-	Pass
Presence of residual deformations	-	None

**1.6 Determined water side resistance of the boiler, according to item 5.11  
of EN 303-5:2012**

Temperature difference between boiler inlet and outlet water	Water side resistance value
$\Delta t = 10 \text{ K}$	6,87 mbar
$\Delta t = 20 \text{ K}$	11,28 mbar



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The description of the test steps and the aggregated results of measurement and calculation of the performance of the appliance are given in Appendixes A to the test report.

**2. A list of enclosed documents**

- A1** – Required documentation for testing and description of tested boiler.
  - A2** – Photos of product.
  - A3** – Verification of conformity of materials, design and construction.
  - A4** – Test requirements for safety.
  - A5** – Conditions and requirements for measuring performance.
  - A6** – Verification of compliance with the instructions of the boiler.
  - A7** – Verification of conformity marking the boiler.
  - A8.1** – Leakage of the combustion system.
  - A8.2** – Function check of the temperature controller and safety temperature limiter;
    - Function test for the rapidly disconnectable firing system;
    - Function test on the device for dissipating excess heat.
  - A9** – Test fuels and list of technical means used for test and measurement during the test.
  - A10** – Requirements for Regulation (EU) 2015/1189 and results obtained.
  - A11** – Results of determining energy efficiency classes, according to DELEGATED REGULATION (EU) 2015/1187.
  - A12** – Summary results of the measurement and calculation of the performance of the boiler.
- Documents A1 to A12 contain services that are not within the scope of the accreditation.**

**ATTENTION!**

**The measurements made under points 1.1, 1.2, 1.3, 1.4, 1.5 and 1.6 are made under accreditation conditions.**

The results obtained from the measurements and calculations made under points 1.1; 1.2; 1.3; 1.4 and 1.5 indicate that the boiler complies with the requirements of EN 303-5:2012.

**Declared compliance:**

Head of Laboratory: .....  
/ Dipl. Eng. M. Raev /

The reported expanded measurement uncertainty had obtained as a work of the standard uncertainty and the coverage multiplier  $k = 2$ , which at normal distribution corresponds to a coverage probability of approximately 95%. The standard measurement uncertainty is determined in accordance with the requirements of EA 4/16G.

The results from the test refer only to the tested sample.

Reproducing the present test report is allowed only in a complete form from "Kontrol 94" Ltd.

**Declaration of discharge:**

The company "Kontrol 94" Ltd. is not responsible for false, incomplete or incorrect information provided by the customer.

The laboratory is not responsible for the sampling for tests. It is provided by the customer.

**Testing carried out by:**

.....  
/ Dipl. Eng. P. Nikolova /

.....  
/ Dipl. Eng. D. Mollov /

**Head of Laboratory:**

.....  
/ Dipl. Eng. M. Raev /



## Test Report No SFB-07-2019

### **1. Required documentation for testing:**

- 1.1 Grounds for testing: Requestor's documentation for the testing.
- 1.2 Normative documents for the testing:
  - 1.2.1 EN 303-5:2012 "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."
  - 1.2.2 EN 304:2017 "Heating boilers - Test code for heating boilers for atomizing oil burners"
  - 1.2.3 CEN / TS 15883:2009 "Residential solid fuel burning appliances – Emission test methods".

### **2. Description of tested boiler**

#### **2.1 Construction**

- A pellet boiler consisting of a combustion chamber, a boiler, a flue gas pipe collector, a fan sucking the flue gases out of the combustion chamber (flue aspirator), a pellet auger feed, an igniter, a device for automatic control of the pellet boiler through a control panel equipped with the necessary sensors for controlling the process and the pellet auger feed, the igniter, the flue aspirator and the fluid pump;
- On the front side of the boiler there are four decorative metal doors. The above two doors close the space between the detached bottom of the hopper and the upper part of the combustion chamber (the point where the flue gases pass). The walls of boiler are insulated with mineral wool. Bottom left decorative door closed combustion chamber and the lower right - closes an inspection opening for cleaning;
- The combustion chamber door has an in-built fireproof glass at the front for inspection of the flame and sealed with sealing rope. It is made of sheet steel. The firing door is insulated with the vermiculite;
- Automatic regulation of the primary air through regulating the revolutions of the flue gases fan motor;
- Automatic pellet feeding from the pellet tank, inbuilt in the pellet boiler, through a conveyor worm batch feeder. Pellet tank capacity – 200 kg.
- All walls of the combustion chamber are made of sheet steel. The rear wall are part of boiler;
- A circular retort made of cast iron with dimensions  $\varnothing$  209,1 mm and height 71,0 mm with holes (81 – on the bottom  $\varnothing$  6 mm, 13 with  $\varnothing$  8,5 mm and one hole for lighter). Fireproof insulation rope is fitted where the pot and the sheet steel box meet;
- The ash is collected at the bottom of the combustion chamber. Manual ash cleaning;
- The inspection opening for cleaning closed with a metal door. It is insulated with the vermiculite and sealed with sealing rope;
- Operation is permissible only with a closed door;
- Two inbuilt safety temperature switches, an inbuilt safety pressure switch;
- An inbuilt electronic controller with a control panel which allows setting the device for working at different modes during the weekdays. The same shows emergency modes and alarms;
- The boiler has regulated legs with height 25 mm.

For additional data the wiring diagram, drawings and instructions presented by the producer have to be used.

#### **2.2 Overall dimensions in cm: 97,9 x 76,13 x 140,0 ( width x depth x height )**

#### **2.3 Air for burning:**

**2.3.1 Primary air:** air for burning which comes in through a steel pipe with  $S = 8,04 \text{ cm}^2$  situated on the back wall of the boiler and reaching the combustion chamber. The primary air enters the on which is placed the retort. The flue aspirator creates sub pressure in the combustion chamber and by regulating the revolutions of the same the necessary air for burning is provided.

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**2.4 Leading out the flue gases and connecting with the chimney:** Above the burning chamber (the place for burning) the flue gases change their direction of movement when reaching a shield of still sheet, part of boiler and through 40 pipes with turbulators and a chimney, they move to the flue gases fan. From the fan the flue gases go out of a horizontally installed tubular extension with Ø80 mm. There are sensors inside the blower chamber for controlling the temperature of the outgoing flue gases (safety temperature switch) and the safety pressure switch.

**2.5 Marking:** A printed design is presented at the moment of issuing the test report for the label and the tests are done with a sample label attached to the appliance. The data on the label has to be fulfilled by the producer in accordance with the data in this test report. The sample label is clearly and durably marked and it is mounted on such a place that the marking is preserved.





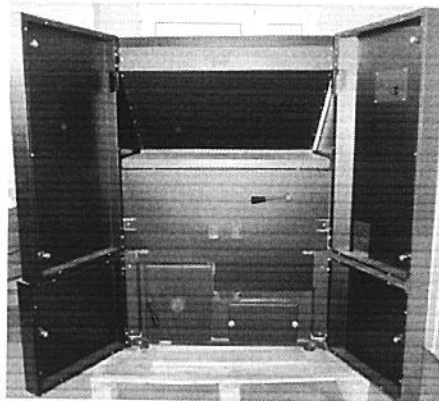
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**Photos of product:**



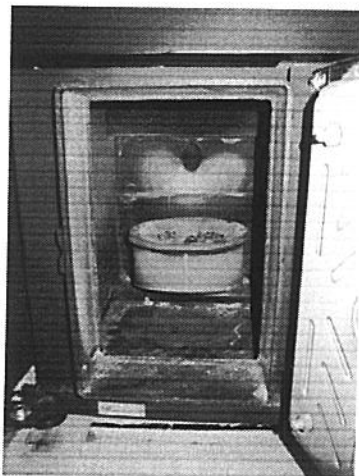
The front view



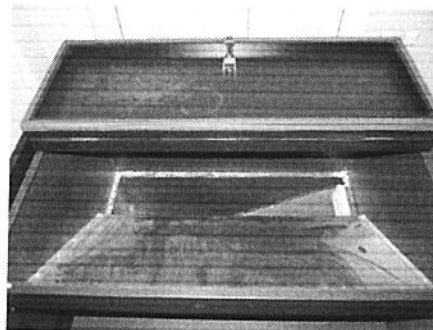
The front view with open doors



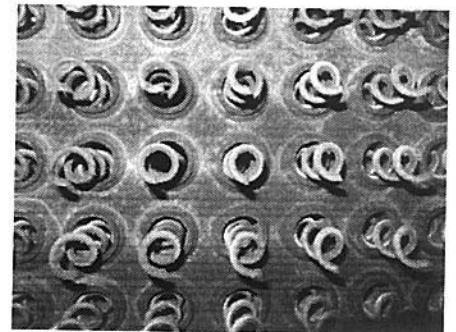
The back view



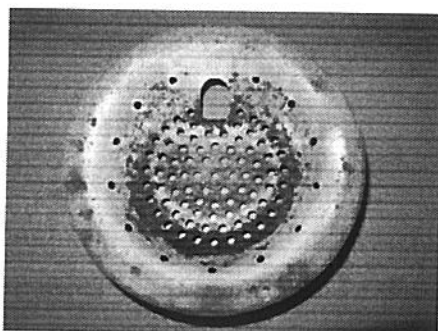
The combustion chamber



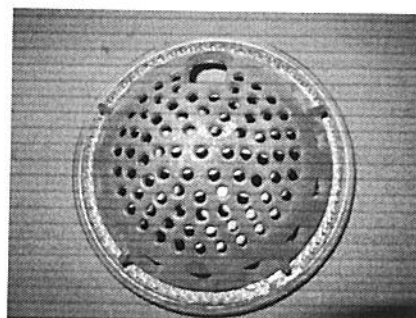
The fuel hopper



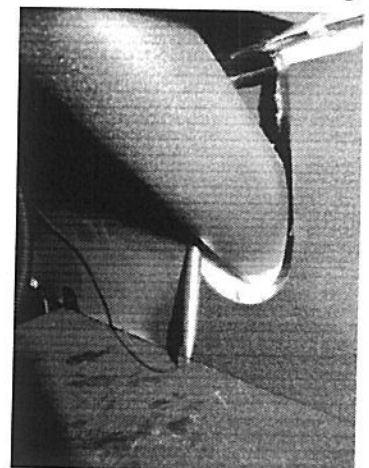
The brushes for cleaning



The upper view of the retort



The bottom view of the retort



The safety temperature limiter  
ST pellets

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**Verification of conformity of materials, design and construction, according to item 4.1 and 4.2**

Requirement	Requirement in compliance with	Requirement is met
<b>EN 303-5:2012</b>		
<b>1</b>	<b>2</b>	<b>3</b>
<b>General requirements</b>	4.1	Yes
<p>◆ Boilers shall be fire-resistant and safe to operate. They shall be made of non-combustible materials according to EN 13501-1 and shall be resistant to deformation. They shall be made such that:</p> <ul style="list-style-type: none"> <li>- they can withstand stresses arising during normal operation;</li> <li>- the heat carrier (water) does not become heated to a dangerous extent (<math>\leq 110^{\circ}\text{C}</math>);</li> <li>- gases do not leak from the boiler or the stoking device or from an integrated hopper in dangerous quantities into the place of installation or into the fuel line - this requirement is deemed to be fulfilled if the requirements of the leakage of the boiler and of the emissions are met and there is no visible smoke emerging from the boiler into the test room at normal operation during type test;</li> <li>- flames do not flare out and embers do not fall out when the boiler is operated correctly;</li> <li>- dangerous accumulations of combustible gases (<math>&gt; 5\% \text{ CO}</math>) in the combustion chamber and in the flues are prevented. For the evaluation of the hazardous situation, the CO-concentration in the flue gas measuring section should not exceed the critical values for a time period greater than 1 min.</li> </ul>	a)	Yes
	b)	Yes
	c)	Yes
	d)	Yes
	e)	Yes
<p>◆ Combustible materials shall be allowed for the following:</p> <ul style="list-style-type: none"> <li>- internal components of controls and safety equipment;</li> <li>- operating handles;</li> <li>- electrical equipment;</li> <li>- components of accessory (e.g. burner cover);</li> <li>- additional or supplemental optical outer covers (e.g. an additional decorative cover).</li> </ul>	f)	Yes
	g)	Yes
	h)	Yes
	i)	NA
	j)	NA
<p>◆ Component parts of Covers, operating controls, safety devices and electrical accessories shall be:</p> <ul style="list-style-type: none"> <li>- fulfil the requirements of resistance against heat and fire in either EN 60335-1 or EN 60730-1.</li> <li>- arranged in such a way that their surface temperatures, under steady state conditions, do not exceed those specified either by the manufacturer or in the component part standard.</li> </ul>		Yes
		Yes

**Test Report No SFB-07-2019****Check of materials, design and construction in compliance with item 4.1 and 4.2**

1	2	3
<ul style="list-style-type: none"> <li>◆ The materials for the parts subject to pressure shall be in accordance with generally accepted technical requirements. They shall be suitable for the purpose and intended use. Documented proof of mechanical and physical properties of materials used and their chemical composition shall be obtained from the supplier.</li> <li>◆ The design of the boiler shall be such that it can be handled safely. It shall be designed and packaged so that it can be stored safely and without damage.</li> <li>◆ Where the weight, size or shape of the boiler or its components prevents them from being moved by hand, they shall be fitted with means to lift them easily.</li> <li>◆ Constructional parts accessible during use and maintenance shall be free from sharp edges and corners that might cause damage or personal injury during use or maintenance.</li> <li>◆ Motors and fans shall be mounted in such a way as to minimize noise and vibration.</li> </ul>		<p style="text-align: center;">Yes</p> <p style="text-align: center;">Yes</p> <p style="text-align: center;">NA</p> <p style="text-align: center;">Yes</p> <p style="text-align: center;">Yes</p>
<p><b><u>Construction requirements</u></b></p> <p><b><u>Production documentation</u></b></p> <p><b><u>Drawings</u></b></p> <p>The drawings and/or the relevant documentation shall include at least the following information:</p> <ul style="list-style-type: none"> <li>◆ the specification of the material;</li> <li>◆ the welding process, the seam type (generally the symbol for the seam type is sufficient) and the welding fillers;</li> <li>◆ the maximum allowable operating temperature, in °C;</li> <li>◆ the maximum allowable operating pressure, in bar;</li> <li>◆ the type test pressure, in bar;</li> <li>◆ the nominal heat output or the heat output range for every boiler size, in kW, in accordance with the fuel(s) recommended for use in the boiler.</li> </ul>	<p style="text-align: center;">4.2</p> <p style="text-align: center;">4.2.1 4.2.1.1</p> <p style="text-align: center;">a) b)</p> <p style="text-align: center;">c) d) e) f)</p>	<p style="text-align: center;">Drawing KPG-03.00</p> <p style="text-align: center;">Yes / 95°C Yes / 2,0 bar Yes / 4,0 bar Yes</p>
<p><b><u>Heating boilers made of steel and non-ferrous materials</u></b></p> <p><b><u>Execution of welding work</u></b> - shall meet the requirements of EN 287-1 and EN ISO 9606-2.</p>	<p style="text-align: center;">4.2.2</p> <p style="text-align: center;">4.2.2.1</p>	<p style="text-align: center;">Welder's Qualification Test Certificate № 0307975744114 / 07.03.2017</p>



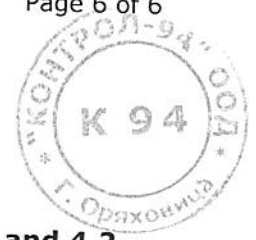
**Test Report No SFB-07-2019**

Check of materials, design and construction in compliance with item 4.1 and 4.2

1	2	3
<p><b>Design requirements</b> <b>Venting of the water sections</b></p>	<p>4.2.4 4.2.4.1</p>	<p>Drawing KPG-03.00</p>
<ul style="list-style-type: none"> <li>◆ The boiler and its components shall be designed in such a way that their respective water sections can be fully vented.</li> <li>◆ The boiler shall be designed in a way that under normal operation in accordance with the manufacturer's instructions no undue boiling occurs.</li> <li>◆ Boiling can be detected by boiling noise.</li> </ul>		<p>Yes</p> <p>Yes</p> <p>No noise</p>
<p><b>Cleaning of heating surfaces</b></p> <ul style="list-style-type: none"> <li>◆ All heating surfaces have to be accessible for cleaning.</li> <li>◆ A sufficient number and appropriate arrangement of cleaning openings shall be provided.</li> <li>◆ If special tools (for example special brushes) are required for cleaning and maintenance of the boiler, these shall be supplied.</li> </ul>	<p>4.2.4.2</p>	<p>Drawing KPG-00.00</p> <p>Yes</p> <p>Yes</p> <p>NA</p>
<p><b>Inspection of the flame</b></p> <ul style="list-style-type: none"> <li>◆ The facility shall be provided which allows inspection of the flame or fire bed.</li> </ul>	<p>4.2.4.3</p>	<p>Yes</p>
<p><b>Water tightness</b></p> <ul style="list-style-type: none"> <li>◆ Holes for screws and similar components which are used for the attachment of removable parts shall not enter into spaces through which water flows.</li> </ul>	<p>4.2.4.4</p>	<p>Yes</p>
<p><b>Replacement parts</b></p> <ul style="list-style-type: none"> <li>◆ Replacement and spare parts (e.g. inserts, shaped firebricks, turbulators etc.) shall be designed, made or marked in such a way that their installation shall be correct in accordance with the manufacturer's instructions.</li> </ul>	<p>4.2.4.5</p>	<p>Yes</p> <p>See manuals</p>

**Test Report No SFB-07-2019****Check of materials, design and construction in compliance with item 4.1 and 4.2**

<b>1</b>	<b>2</b>	<b>3</b>
<p><b><u>Boiler shell tappings</u></b></p> <ul style="list-style-type: none"> <li>◆ Boiler shell tappings shall comply with EN 10226-1, ISO 7-2, EN ISO 228-1, EN ISO 228-2; flange connections shall comply with ISO 7005-1, ISO 7005-2 and ISO 7005-3.</li> <li>◆ The boiler shall have at least one connection for filling and emptying.</li> <li>◆ The size of the connection shall be as a minimum:               <ul style="list-style-type: none"> <li>– G 1/2 for nominal heat outputs up to 70 kW;</li> <li>– G 3/4 for nominal heat outputs above 70 kW.</li> </ul> </li> </ul>	4.2.4.6	Drawing KPG-03.00 Yes  Yes  Yes NA
<p><b><u>Immersion pockets for control and indicating equipment, and safety temperature limiter</u></b></p> <ul style="list-style-type: none"> <li>◆ The minimum nominal diameter for a pipe connection shall be G 1/2.</li> </ul> Requirements on safety valves in compliance with EN 12828.	4.2.4.7	Yes  Drawing KPG-03.00
<p><b><u>Thermal insulation</u></b></p> <ul style="list-style-type: none"> <li>◆ Must has thermal insulation.</li> <li>◆ The thermal insulation shall withstand normal thermal and mechanical stresses.</li> <li>◆ It shall be made of non-combustible material and shall not give off fumes during normal running.</li> </ul>	4.2.4.8	Yes Yes  Yes
<p><b><u>Water side resistance of the boiler</u></b></p> <ul style="list-style-type: none"> <li>◆ Measured and specified by the manufacturer water resistance must meet the nominal heat output with two temperature differences of 10 K and 20 K between the flow and return connections of the boiler.</li> </ul>	4.2.4.9	No
<p><b><u>Integral fuel hopper</u></b></p> <ul style="list-style-type: none"> <li>◆ The boiler with integral fuel hopper shall be made of fire resistant material according to EN 13501-2.</li> <li>◆ The volume shall be limited to a maximum of 1,5 m<sup>3</sup>.</li> <li>◆ The hopper shall be designed in such a way that the fuel moves freely until the hopper is empty.</li> </ul>	4.2.4.10	Yes  200 kg Yes



**Test Report No SFB-07-2019**

**Check of materials, design and construction in compliance with item 4.1 and 4.2**

<b>1</b>	<b>2</b>	<b>3</b>
<p><b><u>Fuel chamber</u></b></p> <p>◆ The fuel chamber shall be designed in such a way that the fuel moves freely and the duration of the combustion period is assured.</p>	4.2.4.11	Yes
<p><b><u>Ash chamber</u></b></p> <p>◆ The capacity of the ash chamber shall be adequate for a combustion period of at least 12 h using the stipulated fuel at nominal heat output.</p> <p>◆ Must be ensure the unobstructed flow of combustion air under the grate.</p> <p>◆ If the system is designed with devices for automatic ash and clinker removal, the above requirements shall be considered as met.</p>	4.2.4.12	Yes
		Yes
		NA

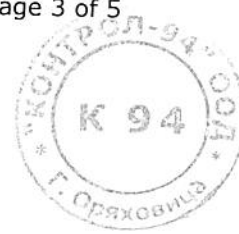
**Test Report No SFB-07-2019****Safety test in compliance with item 4.3**

Requirement	Requirement in compliance with	Requirement in compliance with	Requirement is met
EN 303-5:2012			
1	2	3	4
<b><u>Safety requirements</u></b> <b><u>General</u></b>  <b><u>Manual stoking</u></b>  ♦ Boilers with manual stoking shall be designed in such a way that, when the boiler is operated the operator does not run the risk of a hazardous operation mode (e.g. by ignition of gases).	4.3 4.3.1  4.3.2		NA
<b><u>Safety against back burning for automatic stoked boilers</u></b> <b><u>General</u></b>  ♦ Automatic stoking systems shall be designed to prevent back burning. ♦ Safety devices: - work always in the closed circuit current principle; - avoid a back burning in the state of loss of power supply; - avoid a back burning in the state of failure of stoking device or interruption of stoking device. ♦ At least one of the safety systems shall continue to provide protection in the event of interruption of the fuel feed (e.g. blockage of the feed screw).	4.3.3 4.3.3.1  a) b) c)		Yes  Yes Yes Yes  Yes
<b><u>Thermal conductance</u></b>  ♦ The surface temperature of the stoking device of the boiler (without insulation) or integrated hopper shall not exceed 85°C in any operating state or in case of a failure. Criteria to verify the design of accepted solutions - Table B.1.	4.3.3.2	5.7; 5.13 to 5.16	Yes Hopper 37°C Screw conveyor 63°C
<b><u>Back flow of ignitable combustion gases into the fuel line or integral hoppers</u></b>  ♦ The use of a flue gas fan to assure negative pressure condition in the boiler compared to pressure in the fuel line or hopper. Criteria to verify the design of accepted solutions - Table B.1.	4.3.3.3	5.7; 5.13 to 5.16	Yes



**Test Report No SFB-07-2019****Safety test in compliance with item 4.3**

1	2	3	4
<p><b><u>Fire propagation into the fuel line or integral hopper</u></b></p> <p>♦ Fire propagation into the fuel line or integral hopper shall be avoided in any operational state. Criteria to verify the design of accepted solutions - Table B.1.</p> <p>♦ Constructive solutions to hinder fire propagation to the fuel line:</p> <ul style="list-style-type: none"> <li>- an extinguishing device, e.g. water sprinkler system and an STB adjusted to a maximum of 95 °C;</li> <li>- a safety device to seal continuously the supply line in combination with a design to prevent overfilling;</li> <li>- a safety device to seal the fuel line not during fuel supply but during all other phases of operation;</li> <li>- an emergency discharge device emptying the stoking device without overfilling the boiler, which is reacting at a temperature limit not exceeding 95 °C;</li> <li>- inclined auger in combination with fuel transport slide to/in the combustion chamber and a safety limiter reacting at a temperature not exceeding 95 °C.</li> </ul>	4.3.3.4	5.7; 5.13 to 5.16	<p>Yes</p> <p>NA</p> <p>NA</p> <p>NA</p> <p>NA</p> <p>Yes STB switches off at t = 88,1 °C</p>
<p><b><u>Alternative verification of safety against back burning</u></b></p> <p>♦ In case of any deviations regarding 4.3.3.2 to 4.3.3.4, the safety against back burning shall be verified combining a risk assessment including reliable tests of the alternative safety devices with reference to the criteria in 5.16.1., if:</p> <ul style="list-style-type: none"> <li>- no accepted solution is chosen, or</li> <li>- the risk assessment ensures no suitability of a accepted solution for the boiler design, or</li> <li>- the accepted solutions against back burning are not applicable (e.g. the suitability of constructional means or devices or the tightness criterion for certain boiler designs), further tests shall be performed (see 5.16.5).</li> </ul>	4.3.3.5	<p>5.16.1</p> <p>5.16.5</p>	NA

**Test Report No SFB-07-2019****Safety test in compliance with item 4.3**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<p><b><u>Safety against fuel overload of the boiler or interruption in fuel supply</u></b></p> <ul style="list-style-type: none"> <li>◆ During start up and continuous operation of the boiler have not dangerous situation shall occur.</li> <li>◆ The boiler shall be equipped with a safety device that stops the fuel supply in the event that there is either insufficient or no combustion in the burner head.</li> <li>◆ In the ignition phase, a safety device shall stop the fuel supply after a safety time, of the burner start up function, if there is no or insufficient combustion.</li> </ul>	4.3.4	5.16.2	<p>Yes</p> <p>Yes</p> <p>Yes</p>
<p><b><u>Safety against lack of air supply or insufficient combustion</u></b></p> <ul style="list-style-type: none"> <li>◆ The CO concentration in the boiler shall not exceed 5 % volume.</li> </ul>	4.3.5	5.16.3	NA
<p><b><u>Surface temperatures</u></b></p> <ul style="list-style-type: none"> <li>◆ 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 ( 60 + tr ). For determining the surface temperature is taken the average value measured at least at five points on any surface. 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.</li> <li>◆ 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: <ul style="list-style-type: none"> <li>– 35 K ( 35 + tr ) for metals and similar materials;</li> <li>– 45 K ( 45 + tr ) for porcelain and similar materials;</li> <li>– 60 K ( 60 + tr ) for plastics and similar materials.</li> </ul> </li> </ul>	4.3.6	<p>5.12</p> <p>5.9 and 5.10 from EN 304:2017</p>	<p>See item 1.3 of the test report</p>
<p><b><u>Leakage of the combustion system</u></b></p> <ul style="list-style-type: none"> <li>◆ The leakage rate based on mass flow shall not exceed 2% of the flue gas mass flow at the nominal heat output.</li> <li>◆ For boilers designed to operate with negative pressure, the leakage rate characterizes the boiler.</li> </ul>	4.3.7	5.6	<p>NA</p> <p>Yes</p>

**Test Report No SFB-07-2019****Safety test in compliance with item 4.3**

1	2	3	4
<b>Temperature control and limiting devices</b> <b>General</b>	4.3.8		
<p>♦ The control and safety devices shall be supplied by the boiler manufacturer along with the boiler.</p>	4.3.8.1		Yes
<b>Temperature control and limiting devices for open vented systems</b>	4.3.8.2	EN 14597	
<p>♦ When used in physically protected heating installations (the temperature is limited by installation pressure) the following equipment shall be provided:</p> <ul style="list-style-type: none"> <li>- a temperature controller;</li> <li>- a safety temperature limiter (manual reset).</li> <li>- The safety temperature limiter is not necessary in cases where the firing system is neither rapidly nor partly disconnectable.</li> </ul>			NA
<b>Temperature control and limiting devices for closed vented systems</b>	4.3.8.3	EN 12828	
<p>♦ When used in thermostatically protected heating installation, the firing system shall be either rapidly or partly disconnectable; and/or the heat or residual heat output not absorbed by the heating system shall be dissipated reliably using a safety heat exchanger or equivalent devices.</p>			Yes
<ul style="list-style-type: none"> <li>- The firing system is rapidly disconnectable; the necessary equipment shall consist of:</li> </ul>	a)		Yes
<ul style="list-style-type: none"> <li>1) a temperature controller;</li> <li>2) a safety temperature limiter (manual reset).</li> </ul>			Yes
<ul style="list-style-type: none"> <li>- The firing system is partly disconnectable; the necessary equipment shall consist of:</li> </ul>	b)		NA
<ul style="list-style-type: none"> <li>1) a temperature controller;</li> <li>2) a safety temperature limiter (manual reset);</li> </ul>			
<ul style="list-style-type: none"> <li>3) a thermal discharge safety device for dissipating the maximum heat output possible in the event of a malfunction.</li> </ul>		4.3.8.4	
<ul style="list-style-type: none"> <li>- The heating system is not disconnectable and the nominal heat output is</li> </ul>	c)		NA

**Test Report No SFB-07-2019****Safety test in compliance with item 4.3**

1	2	3	4
<p>&lt; 100 kW; the necessary equipment shall consist of: 1) a temperature controller; 2) a thermal discharge safety device for dissipating the maximum heat output possible in the event of a malfunction.</p> <p><b><u>Devices for dissipating excess heat</u></b></p> <p>◆ The safety heat exchanger or other devices for dissipating excess heat shall ensure that a maximum boiler water temperature of 110°C is not exceeded. ◆ All devices for dissipating excess heat are only admissible for: – boilers without a disconnect able firing system with rated heat outputs of maximum 100 kW; – boilers with a partly disconnect able firing system with residual heat outputs of up to 100 kW.</p>	4.3.8.4	4.3.8.4  EN 14597	NA
<p><b><u>Heating boiler accessories</u></b> <b><u>General</u></b></p> <p>◆ If the boiler is factory equipped with additional fittings which need to be serviced to ensure their correct operation and the safety of the boiler, the design shall ensure ease of access without requiring extensive dismantling work.</p> <p><b><u>Electrical safety</u></b></p> <p>◆ When the unit has a built electrical it must meet the requirements for electrical safety.</p> <p><b><u>Electromagnetic compatibility</u></b></p> <p>◆ The EMC requirements shall be fulfilled.</p>	4.3.9 4.3.9.1  4.3.9.2  4.3.9.3	EN 60335-2-102  EN 61000-6-2 and EN 61000-6-3	Yes  Confirmation of conformity <i>Nº P08191946.001</i> <i>31.10.2019</i>  Confirmation of conformity Nº P07190380500 / 10.09.2019

**Test Report No SFB-07-2019****Requirements to the technical characteristics in compliance with item 4.4**

Requirement	Requirement in compliance with	Requirement in compliance with	Requirement is met
<b>EN 303-5:2012</b>			
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<p><b><u>Performance requirements</u></b> <b><u>General</u></b></p> <p>◆ Performance requirements are measured during tests using the appropriate fuel recommended by the manufacturer, according to Table 7.</p>	4.4. 4.4.1	Table 7	Yes
<p><b><u>Boiler efficiency</u></b></p> <p>◆ The boiler efficiency, when tested must shall not be less than:</p> <ul style="list-style-type: none"> <li>- <b>class 5:</b> <math>Q &lt; 100 \text{ kW}</math> <math>\eta_k = 87 + \log Q</math></li> <li>- <b>class 4:</b> <math>Q &lt; 100 \text{ kW}</math> <math>\eta_k = 80 + 2 \log Q</math></li> <li>- <b>class 3:</b> <math>Q &lt; 300 \text{ kW}</math> <math>\eta_k = 67 + 6 \log Q</math></li> </ul>	4.4.2	5.7; 5.8; 5.10  Figure 1	Yes  NA  NA
<p><b><u>Flue gas temperature</u></b></p> <p>◆ For boilers which operate with a flue gas temperature below 160 K and above room temperature at nominal heat output, the boiler manufacturer shall make recommendations regarding the flue installation in order to ensure sufficient draught and to prevent the chimney sooting up and condensation.</p>	4.4.3		Yes
<p><b><u>Draught</u></b></p> <p>◆ The manufacturer shall specify the minimum draught at the flue gas outlet of the boiler needed for correct operation of the boiler. Where the manufacturer gives no detailed values, the figures according to Table B.2 of EN 13384-1 shall apply.</p>	4.4.4	5.7.1; The manufacturer / Table B.2 of EN 13384-1	11,5 ± 2 Pa by manufacturer
<p><b><u>Combustion period</u></b> <b><u>Heating boilers with manual stoking</u></b></p> <p>◆ The combustion period for hand-stoked boilers at nominal heat output shall be stated by the manufacturer and shall be at least:</p> <ul style="list-style-type: none"> <li>- 2 h for biogenic and other solid fuels;</li> <li>- 4 h for fossil fuels.</li> </ul>	4.4.5	5.7.4.1	NA

**Test Report No SFB-07-2019****Requirements to the technical characteristics in compliance with item 4.4**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<p><b><u>Heating boilers with automatic stoking</u></b></p> <p>– test duration at nominal heat output shall be at least 6 h;  – test duration at minimum continuous heat output shall be at least 6 h;  – test duration at minimum heat output in intermittent operation shall be at least 6 h plus the time taken to finish the last “on-off” period.</p> <p>♦ For automatically fed wood log boilers, the test conditions shall be applied according to boilers with automatic stoking devices for pellets and chipped wood.</p> <p>♦ For automatically fed wood log boilers, the testing period shall include at least two stoking intervals.</p>		5.7.4.2	<p>Yes</p> <p>Yes</p> <p>NA</p> <p>NA</p> <p>NA</p>
<p><b><u>Minimum heat output</u></b></p> <p>♦ For automatically stoked boilers, the minimum heat output shall not exceed 30% of the nominal heat output.</p> <p>♦ For manually stoked boilers where the manufacturer specifies that the boiler shall be connected to an accumulator tank, the minimum continuous heat output can be greater than 30% of nominal heat output.</p> <p>♦ For heating boilers using several allowable fuels, the tank size shall be based on the fuel which requires the largest accumulator tank. The minimum volume of the accumulator tank shall be 300 l.</p>	4.4.6	5.8.3	<p>Yes</p> <p>NA</p> <p>NA</p>
<p><b><u>Emission limits</u></b></p> <p>♦ Combustion shall be of low-emission.</p>	4.4.7	Table 6 5.7; 5.9; 5.10	<p>Yes</p> <p>Class 5</p>

**Test Report No SFB-07-2019****Marking of the appliance in compliance with item 7**

Requirement	Requirement in compliance with	Requirement is met
<b>EN 303-5:2012</b>		
<b><u>Marking General</u></b> <ul style="list-style-type: none"> <li>◆ Each heating boiler shall have a data plate.</li> <li>◆ The boiler data plate shall be written in the language of the country of destination and be affixed in an accessible spot.</li> </ul>	7 7.1	Yes Yes
<b><u>Information on the boiler plate</u></b> <ul style="list-style-type: none"> <li>◆ The information on the plate of the appliance has to be complete – check of information (If the requirements under item 7.2 are not met, see below *1).</li> </ul>	7.2	Yes
<b><u>Boiler plate requirements</u></b> <ul style="list-style-type: none"> <li>◆ The material and labelling used for the plate shall be durable.</li> <li>◆ The labelling shall be abrasion-proof. Under normal operating conditions the plate shall not discolor so as to make its information difficult to read.</li> <li>◆ Self-adhesive plates should not become detached as a result of moisture and temperature. (If the requirements under item 7.3 are not met, see below *2).</li> </ul>	7.3	Yes Yes Yes
*1 - The following data under item 7.2 are missing: there are no such		
*2 - The following requirements under item 7.3 have not been met: there are no such		

**Test Report No SFB-07-2019****Instructions for the appliance in compliance with item 8**

Requirement	Requirement in compliance with	Requirement is met
<b>EN 303-5:2012</b>		
<p><b><u>Technical documentation, supplied with boiler</u></b>  <b><u>General</u></b></p> <p>◆ For each boiler, the documents listed below shall be made available in the language of the boiler's country of destination.</p>	8 8.1	Yes
<p><b><u>Technical information and installation instructions</u></b></p> <p>◆ Check of requirements - these documents shall contain at least all requirements under item 8.2 (If the requirements under item 8.2 are not met, see below *1).</p>	8.2	Yes
<p><b><u>Operating instruction</u></b></p> <p>◆ Check of requirements - the instruction for operation has to include at least all requirements under item 8.3 (If the requirements under item 8.3 are not met, see below *2).</p>	8.3	Yes
<p><b>*1</b> - The following requirements under item 8.2 have not been met: there are no such</p>		
<p><b>*2</b> - The following requirements under item 8.3 have not been met: there are no such</p>		





**Test Report No SFB-07-2019**

**Leakage of the combustion system, according to item 5.6 EN 303-5:2012**

	<b>Unit</b>	<b>Value</b>
The flue gas mass flow at nominal heat output	g/s	17,18
Requirement - < 2% of flue gas mass flow at nominal heat output	g/s	NA
Test pressure	Pa	20
Measured value	g/s	0,344

**Note:** The boiler work with negative pressure in the burning chamber.



**Test Report No SFB-07-2019**

**Test conditions for function check of the temperature controller and safety temperature limiter at the boiler, according to item 5.13**

Test conditions	Requirement / Value	Requirement fulfilled
The water-side flow rate it corresponds to the nominal heat output of the boiler	EN 303-5:2012 5.13	Yes
The flow temperature of 75°C shall not be exceeded at the start of the test		
The dissipated output shall be reduced to (40 ± 5)% of the nominal heat output of the boiler		
Circulating pump running in continuous operation	Included	Yes
Temperature controller adjusted to maximum set value	Included	Yes
Safety temperature limiter	Shall not trigger	Yes

**Results obtained from function check of the temperature controller and safety temperature limiter at the boiler, according to item 5.13**

	Results	Requirement fulfilled
When the temperature controller is operating normally, the measured flow temperature shall not exceed 100°C	76,0°C	Yes
<b>Caused residual crippling in appliance from the test: None!</b>		

**Test conditions where repeat the test for function check of the temperature controller and safety temperature limiter at the boiler, according to item 5.13**

Test conditions	Requirement / Value	Requirement fulfilled
Temperature controller must be switched off	switched off	Yes

**Results obtained when repeating the test from function check of the temperature controller and safety temperature limiter at the boiler, according to item 5.13**

	Results	Requirement fulfilled
When the safety temperature limiter is operating normally, the measured flow temperature shall not exceed 110°C	90,3°C	Yes
<b>Caused residual crippling in appliance from the test: None!</b>		

**Test Report No SFB-07-2019****Function test for the rapidly disconnectable firing system, according to item 5.14**

	Requirement / measured	Requirement fulfilled
<b>Sudden absence of heat dissipation: - NA</b>		
The water-side flow rate it corresponds to the nominal heat output of the boiler	5.14 EN 303-5:2012	
The flow temperature of 75°C shall not be exceeded at the start of the test		
The heat consumption is set to 0	0	
Water circulation in the boiler is permitted	pump running is included	
Temperature controller is adjusted to manufacture recommended maximum set value		
The safety temperature limiter or the temperature controller switches off the firing system and all hazardous operation states are avoided		
<b>Loss of the electrical power supply ( For abnormal operation as fault condition according to 19.11.2 of EN 60335-2-102:2006 )</b>		
The water-side flow rate it corresponds to the nominal heat output of the boiler	5.14 EN 303-5:2012	Yes
The flow temperature of 75°C shall not be exceeded at the start of the test		
Maximum temperature in the fuel hopper	38,0°C	Yes
Maximum temperature in the fuel conveyor system	65,0°C	Yes
Back burning	not occur	Yes
Operation of the safety systems	It is working properly	Yes
<b>Caused residual crippling in appliance from the test: None!</b>		

**Function test on the device for dissipating excess heat (partly or non-disconnectable firing system), according to item 5.15 - NA**

	Requirement	Requirement fulfilled
Adjust the firing so that it corresponds to the nominal heat output of the boiler		
The temperature controller out of function	disconnected	Yes
The heat consumption is set to 0		
Water circulation in the boiler is permitted	pump running is included	
The safety temperature limiter is included		off the firing system
The device for dissipating excess heat works properly		
The cold water shall be kept at a temperature of (10 ± 5)°C		
The pressure of maximum 2 bar	-	Yes

**Test Report No SFB-07-2019****TEST FUELS**

<b>Analysis and calorific value for test fuel, according to table B.1</b>						
<b>Test fuel</b>	<b>Wet W, %</b>	<b>Carbon C, %</b>	<b>Hydrogen H, %</b>	<b>Ash A, %</b>	<b>Calorific value Hu, kJ/kg</b>	<b>Size: Length / Diameter mm</b>
Wood pellets <sup>1)</sup>	6,20	47,25*	5,27*	0,48	17100*	4÷23/6

**1)** According Test report № 32-Л-ПИ-531 issued by the "LABORATORY FOR RESERACH AND CERTIFICATION OF SOLID BIOFUELS AND COMPOST"

\* - Values, calculated on a working fuel basis

**List of technical means used for test and measurement during the test:**

<b>№</b>	<b>Name of technical equipment for testing and measuring</b>	<b>Identification number</b>
1	Gas Analyzer Type: "Ecom-J2KN"	3041
2	Thermometer Type: "Testo 925" by technical means Type: K for temperature measurement № 0602 0393	34726599/304
3	Multipurpose device Type: "AT 4532X" with electric thermocouples (thermocouples) Type: K - 32 pcs. with conditional numbers from № 001 to № 032 and length L = 3 m and 32 pcs. with reference numbers from 001 to 032 and length L = 4 m	4532X1705113
4	Pressure gauge Type: "Testo 512"	AD111330/403
5	Weighing machine with non-automatic action-electronic Type: "GAB 30K0.2N"	WF1425618
6	Weighing machine with non-automatic action-electronic Type: ABJ 220-4NM"	WB15AL0745
7	Electronic Stopwatch "Q&Q" Type: HS 43	159/07
8	Measuring steel roller blinds Type: Class II	P-01
9	Thermohygrometer Type: "Testo 608-H1"	34863016
10	Barometer type: „MP55"	1P150928532
11	Ultrasonic Flow Meter "PolluStat E" with measuring probes №1 (hot water) and №2 (cold water)	61960373
12	A device for taking a sample for measurement of dust "Wöhler SM 96"	560
13	A device for measuring the leakage "Wöhler DP 600"	1337
14	Combined appliance, Type: "K 50"	5316



**Test Report No SFB-07-2019**

**This annex is made at the request of the applicant and is informative only - according to Regulation (EU) 2015/1189 and EN 303-5:2012.**

**Measuring emissions**

**Applicant's name:** "Alfa Plam" A. D., Radnička 1, 17500 Vranje, Serbia

**Producer:** "Alfa Plam" A. D., Radnička 1, 17500 Vranje, Serbia

**Object of test:** "GRANDE" (Boiler with automatic fuel feed)

**Nominal power:** 27,90 kW; Class 5

**Specific ecodesign requirements for solid fuel boilers under Regulation (EU) 2015/1189**

Seasonal space heating emissions	Unit	Limits	Average	O <sub>2</sub> emission	Fuel
The mean value of dust in the flue gas	mg/m <sup>3</sup>	≤40	38,6	10%O <sub>2</sub>	wood pellets Class A1
The mean value of CO	mg/m <sup>3</sup>	≤500	422		
The mean value of OGC	mg/m <sup>3</sup>	≤20	19,69		
The mean value of NOx	mg/m <sup>3</sup>	≤200	175,97		
The seasonal space heating energy efficiency	%	≥77	87,53		



**Test Report No SFB-07-2019**

**Results of determining energy efficiency classes of solid fuel boilers, according to  
DELEGATED REGULATION (EU) 2015/1187**

**( without packages of a solid fuel boiler, supplementary heaters, temperature  
controls and solar devices )**

<b>Model: "GRANDE"</b>		<b>Serial № 5600042</b>	
<b>Fuel</b>			Wood pellets
<b>Heat output</b>	<b>nominal</b>	kW	27,9
	<b>reduced</b>	kW	7,9
<b>Seasonal space heating energy efficiency</b>	<b>at nominal heat output</b>	%	90,8
	<b>at minimum heat output</b>	%	91,7
<b>Electric power</b>	<b>at nominal heat output</b>	kW	0,055
	<b>at minimum heat output</b>	kW	0,035
	<b>in standby mode</b>	kW	0,005
<b>The energy efficiency index (EEI)</b>		%	129
<b>Energy efficiency class</b>			<b>A<sup>++</sup></b>



**Test Report No SFB-07-2019**

**Summary results of the measurement and calculation of the performance of the boiler**

<b>Model: "GRANDE"</b>		<b>Serial № 5600042</b>	
<b>Class boiler: 5</b>			
	<b>Unit</b>	<b>Date</b>	
		<b>Nominal heating output</b>	<b>Reduced heating output</b>
Fuel	-	Wood pellets	
Fuel consumption	kg/h	6,467	1,803
The heat input	kW	30,72	8,57
The heat output ( indirect / direct method )	kW	28,11 / 27,90	8,10 / 7,86
Efficiency ( indirect / direct method )	%	91,52 / 90,82	94,52 / 91,68
The mean CO at 10%O <sub>2</sub>	mg/m <sup>3</sup>	86	481
The mean OGC at 10%O <sub>2</sub>	mg/m <sup>3</sup>	19,45	19,73
The mean value of dust at 10%O <sub>2</sub>	mg/m <sup>3</sup>	38,5	38,6
Flue gases temperature	°C	111	53
Mass of the flue gases	g/s	17,18	5,68
Draught	Pa	12,0	10,5
Maximum operating pressure	bar	2,0	
The mean NOx at 10%O <sub>2</sub>	mg/m <sup>3</sup>	194,29	172,74

The basic characteristics of the appliance have been tested in compliance with EN 303-5:2012 when using wood pellets, class A1 as fuelling in conformity with the producer's instruction for exploitation.

The requirements, given in the instruction for mounting and operation as well as all legal national norms concerning the boiler, have to be observed.

As according to the presented documents (certificates) during the pellet boiler manufacturing, materials are used which are not expected to release dangerous substances. The producer has to keep this information as a proof.

The results from the test refer only to the tested sample.

Head of Laboratory:.....  
/ Dipl. Eng. M. Raev /

