Termoplam Ltd.
Testing laboratory

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Republic of Bulgaria, Sofia,
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TEST REPORT №231/30.03.2022

on the compliance of Rittium 20 ECO with the requirements of COMMISSION REGULATION (EU) 2015/1185 of 24 April 2015 and BImSchV-norm.

I. NAME AND SIGNATURE OF THE TESTED SAMPLE:
Pellet stove fired by solid fuel - wood pellets model Rittium 20 ECO with total heat output 20,0 kW.

II. NAME AND DESCRIPTION OF THE TESTED SAMPLE:
Pellet stove model: Rittium 20 ECO made of steel sheet metal by welding.

III. LEGAL DOCUMENT: COMMISSION REGULATION (EU) 2015/1185 of April 2015 and BImSchV-norm.

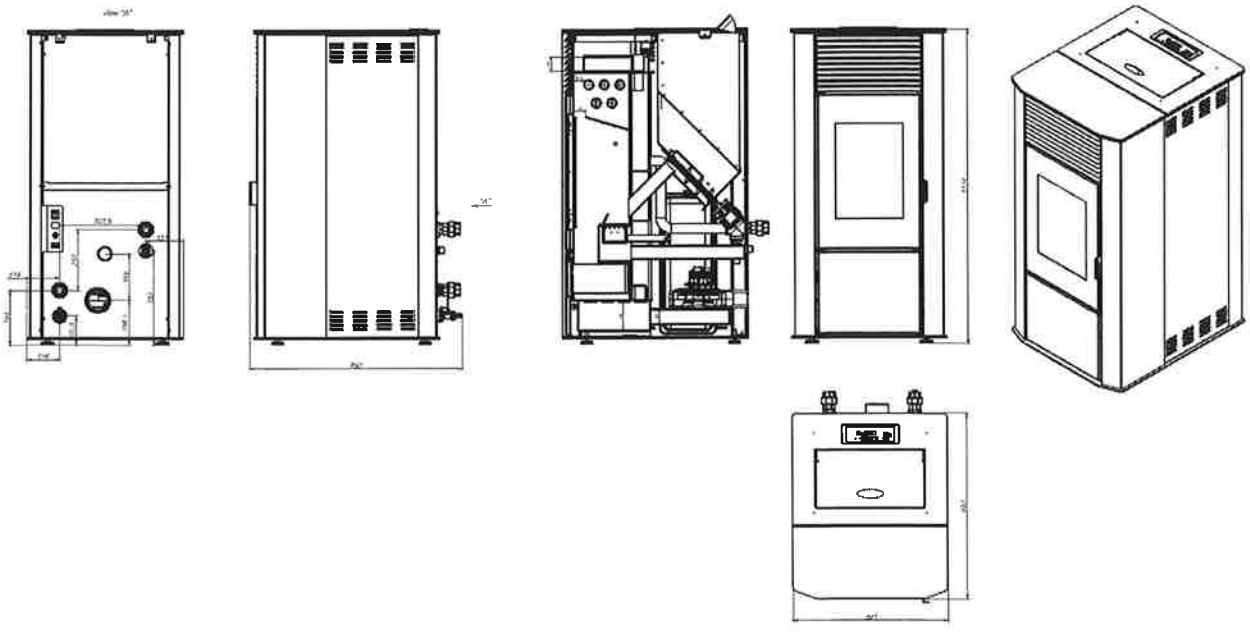
Picture of Rittium 20 ECO

IV. QUANTITY OF THE TESTED SAMPLES: The pellet stove model: Rittium 20 ECO is arbitrarily selected unit of regular production, 1 piece.

V. CUSTOMER:
"TIM SISTEM D.O.O" ; ul.Prva industrijska br.9;22330 Nova Pazova, Srbija;

VI. PURPOSE AND OBJECT OF THE TASK: Evaluation the compliance of Rittium 20 ECO with the requirements of BImSchV-norm and COMMISSION REGULATION (EU) 2015/1185 of 24 April 2015.

VII. TECHNICAL FEATURES:



Scheme of Rittium 20 ECO (general)

VIII. TEST CONDITIONS:

8.1. Working condition of the combustion device - according to the requirements for tests at nominal output according to EN 14785:2006.
8.2. Processing of results – calculate according to normal physical conditions and at 13% O_2.
8.3 Used additional results for emissions from Laboratory Termoplam Sofia.
8.4. Used results from the Test Report № 180/30.03.2022 of Laboratory Termoplam Sofia.

IX. RESULTS FROM AND OBSERVATIONS :

- RESULTS BEFORE THE DASH RELATES TO NOMINAL HEAT OUTPUT;
-RESULTS AFTER THE DASH RELATES TO REDUCED HEAT OUTPUT;

9.1. Emissions:
9.1. Dust content of exhaust gases: PM* = 18/16 mg/Nm^3 ≤ [PM] = 20 mg/Nm^3; [PM] = 20 mg/Nm^3 in accordance with point 2 (a) (iii), of Annex II of the REGULATION (EU) 2015/1185.
- [PM] ≤ 20 mg/Nm^3 in accordance to BImSchV-norm (without water jacket).

9.2. CO of exhaust gases: CO** = 108/177 mg/Nm^3 ≤ [CO] = 300 mg/Nm^3;
- [CO] = 300 mg/Nm^3 in accordance with point 2 (c) (iii), of Annex II of the REGULATION (EU) 2015/1185.
- [CO] ≤ 250 mg/Nm^3 in accordance to BImSchV-norm.

9.3. OGC of exhaust gases: OGC* = 57/54 mg/Nm^3 ≤ [OGC] = 60 mg/Nm^3; [OGC] = 60 mg/Nm^3 in accordance with point 2 (b) (ii), of Annex II of the REGULATION (EU) 2015/1185.

9.4. NO_x of exhaust gases: NO_x* = 82/86 mg/Nm^3 ≤ [NO_x] = 200 mg/Nm^3. [NO_x] = 200 mg/Nm^3 in accordance with point 2 (d) (i), of Annex II of the REGULATION (EU) 2015/1185.

* Results from additional measurements of Laboratory Termoplam Sofia.

** Results from the Test Report № 180/30.03.2022 of Laboratory Termoplam Sofia.

9.5. Seasonal space heating energy efficiency:

η_s = 85,5 % > [η_s] = 79 %

Where:

- η_s = 85,5 % - the seasonal space heating energy efficiency in active mode is calculated as $\eta_{th,nom}$.

- $\eta_{th,nom}$ = 92,8 % is the useful efficiency at nominal heat output, based on NCV. Result from the Test Report № 180/30.03.2022 of Laboratory Termoplam, Sofia.

- [η_s] ≥ 79 % in accordance with point 1 (a) (iii), of Annex II of the REGULATION (EU) 2015/1185.

- [$\eta_{th,nom}$] ≥ 90 % in accordance to BImSchV-norm (with water jacket).

X. CONCLUSION:

Roomheater device Rittium 20 Eco is satisfying and fulfilling the requirements of REGULATION (EU) 2015/1185 and BImSchV-norm.

XI. ENCLOSURES:

10.1. Assembly drawing of the sample: 1.
10.2 Picture of the sample: 1.

MANAGER: .....
(eng. Pl. Iliev)

ТЕРМОПЛАМ" ЕООД * СОФИЯ *

NOTE:
The test results and conclusions relate only to the tested samples.
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HEAD OF LABORATORY:.....
(eng. Plamen. Iliev)

PROTOCOL
from
(type testing of the product)
№ 180/30.03.2022

I. OBJECT OF TEST:
Residential space heating appliance fired by wood pellets :
Rittium 20 ECO , 2022

(Name, type, model, serial number and year of manufacture of the product)

II. MANUFACTURER:

Tim Sistem d.o.o ul.Prva industrijska br.9;22330 Nova Pazova;Srbija

(Name and address)

III. APPLICANT FOR THE TEST:

Tim Sistem d.o.o ul.Prva industrijska br.9;22330 Nova Pazova;Srbija
Request № 180/23.03.2022

(Name, address, № and date of the request-query)

IV. NORMATIVE AND TECHNICAL BASIS FOR EXECUTION OF TEST:
EN 14785:2006 - Residential space heating appliances fired by wood pellets- Requirements and test methods;

(№ and name of the legal document)

V. TEST RESULTS:
The test results are given in Table 1 and Table 2.

Table 1

1	2	3	4	5	6
№	**Essential Characteristics**	**Unit**	**Test results**	**Value and tolerance of the indicator; Point from the standard**	**Test Cond.**
	Fire safety				
p.4.2	**General construction**		Yes		
	Containing asbestos and cadmium		No		
	Reliable and safe work		Yes		
p.4.3	**Flue spigot or socket**		≥25 Yes	≥25 Φ≤160mm	
p.4.7	**Firedoors** (Safe and tightly closed)		Yes		
p.4.8	**Combustion air supply** (Clear, durable marking)		Electronic Regulator Not applicable		
p.4.10	**Retort (Burner)** (Unique mounting)		Yes		
p.4.11	**Ashpan and ash removal** (For internal-to collect the ashes of 2 bunkers) Sufficient volume of air, Handling while hot)		Yes		
p.5.1	**Temperatures of adjacent combustible materials**	°C	75.536 -Yes Back Panel 57.824 -Yes Back Panel	Tr+65°C=25+65=90.0°C -nominal output Tr+65°C=19.6+65=84.6°C -minimum output	Trnom = 25.0 °C Trmin = 19.6 °C
p.5.3	**Safety test** (Escaping gas and fire)		No		
p.5.4	**Temperature in the fuel hopper**	°C	54.655 Yes 46.753 Yes	Tr+65°C=25+65=90.0°C -nominal output Tr+65°C=19.6+65=84.6°C -minimum output	Trnom = 25.0 °C Trmin = 19.6 °C
p.5.5	**Safety of fuel container** (Safety against back burning through the fuel conveyor system)	°C	54.655 Yes 46.753 Yes	Tr+65°C=25+65=90.0°C Tr+65°C=19.6+65=84.6°C	Trnom = 25.0 °C Trmin = 19.6 °C
p.5.8	**Strength of boiler shells** (Density and resistance to deformation)		Yes		
	Emissions from combustion products				
p.4.2	**General construction - emissions** (Escaping gas and zest)		Yes		
p.4.3	**Flue spigot or socket** (Density and reliability)		Yes		
p.4.7	**Firedoors** (Density and reliability)		Yes		
p.4.8	**Combustion air supply** (Thermostat in a water jacket-automatic)		Yes		
p.4.9	**Internal flue gas diverter** (Unique, easy installation and indication)	mm	Yes		
p.4.14	**Cleaning of heating surfaces** (Ease and accessibility devices)		Yes		
p.5.3	**Safety Testing** (Escaping gas and zest)		No		
p.5.4	**Temperature in the fuel hopper**	°C	54.655 Yes 46.753 Yes	Tr+65°C=25+65=90.0°C -nominal output Tr+65°C=19.6+65=84.6°C -minimum output	Trnom = 25.0 °C Trmin = 19.6 °C
p.6.3	**Carbon monoxide emissions** (CO emissions limits)	%	0.0086 0.0142	≤ 0,04% ≤ 0,06%	Nominal Minimum
	Release of harmful substances		No	ZA.1	

1	2	3	4	5	6
	Surface temperature				
p.4.2	**General construction** (Safe work)		Yes		
p.4.13	**Control of flue gas** (Value, clear marking)	cm^2 %	Not applicable ≥ 3%	≥ 20 cm^2 or ≥ 3%	
p.5.1	**Temperatures of adjacent combustible materials**	°C	75.536 -Yes Back Panel 57.824 -Yes Back Panel	Tr+65°C=25+65=90.0°C -nominal output Tr+65°C=19.6+65=84.6°C -minimum output	Trnom = 25.0 °C Trmin= 19.6 °C
p.5.2	**Operating tools**	°C	 50.130-Yes 44.335-Yes	for metal Tr+35K=60.0 °C-nominal Tr+35K=54.6°C-minimal	Trnom = 25.0 °C Trmin= 19.6 °C
p.5.4	**Temperature in the fuel hopper**	°C	54.655 Yes 46.753 Yes	Tr+65°C=25+65=90.0°C -nominal output Tr+65°C=19.6+65=84.6°C -minimum output	Trnom = 25.0°C Trmin = 19.6 °C
p.5.5	**Safety of fuel container**	°C	54.655 Yes 46.753 Yes	Tr+65°C=25+65=90.0°C -nominal output Tr+65°C=19.6+65=84.6°C -minimum output	Trnom = 25.0 °C Trmin = 19.6°C
p.5.9	**Electrical safety**		Yes	EN 60335-2-102:2016	
	Cleanability				
p.4.5	**Flue ways** (Accessibility and cleaning)	mm	≥ 40 mm Yes		
p.4.6	**Cleaning tools** (Instrument-presence)		No		
p.4.10	**Retort (Burner)** (Unique mounting)		Yes		
p.4.12	**Integral boiler** (Requirements to parts of the water system)	mm - mm mm	6 Yes ≥70x40mm -	 Certificate Opening≥70x40mm Opening Φ≥70mm	Thickness Number Contour Diameter
	Max. working pressure (Only for devices with water jacket)				
p.4.2	**General construction**	bar	3	p_{test}=2 x p_{nom}=2x1.5=3 bar for t≥10 min A.4.9.2	p_{nom}=1.5 bar
p.5.6	**Safety from overheating** (Safety device)	°C	Yes	≤105 °C	
p.5.7	**Safety in closed sys.** (Safety device)	- °C	Not applicable	≤105 °C	
p.6.2	**Temperature of flue gases-ta**	°C	112/109		
	Mechanical strength				
p.4.2	**General construction** (Safe and secure work)		Yes		
p.4.3	**Flue spigot or socket**		≥25mm - Yes	Overlap ≥25mm Φ≤160 mm	
	Heat transfer (Energy efficiency)				
p.6.1	**Flue draught** (in chimney)	Pa	 Yes Yes	for P ≤ 25 kW 12±2 Pa 10±2 Pa	P≤25kW Nominal Minimum
p.6.4	**Efficient energy utilization**	%	η 92.8 89.4	 η ≥ 75 % η ≥ 70 %	- Nominal Minimum load

VI. TEST OBJECTIVES:

6.1 Nominal heat flow (nominal power);
6.2 Heat capacity of the water jacket;
6.3 Test duration at low heat flow;
6.4 Testing of safety;
6.5 Testing and sample pressurized plumbing parts;

VII. USED EQUIPMENT:

7.1 Air speed meter TESTO 405-V1.
7.2 Digital thermometer MS8127 with perceiver - DS18B20 to ambient temperature, water temperatures and walls of the test area;
7.3 Vacuum-gauge - Testo 512;
7.4 Electronic stopwatch Casio FA109;
7.5 Thermohygrometer HAMA;
7.6 Gas analyzer – KANE KM800;
7.7 Scales up to 510 kg - to measure the weight of the testing device;
7.8 Scales from 5 g to 40 kg - measuring the weight of the fuel;
7.9 Tape measure;
7.10 Caliper;
7.11 Pressure gauge;
7.12 Flowmeter Gardena, Type: 203.B;
7.13. Analog thermometers FIMET water temperature;
7.14 Auxiliary devices: PC package applications;

VIII. REQUIREMENTS:

8.1 Safety measures are met in accordance with paragraph 5 and p.6.10; Yes
8.2 The test device complies to the installation and exploitation manual in accordance with paragraph 7; Yes
8.3 Presence of plate accodring p.8: Yes
8.4 Requirements regarding the type of fuel - see. Annex B, dimensions and arrangement , and that the camera meets the manufacturer's instructions; Yes
8.5 Real values of measuring thicknesses and others along with additional certificates for the plumbing parts - after the test according A.4.9.2; There are no leaks

$p_{test} = 2 * p_{nom} = 3$ bar leaks and visible deformation (elastic and plastic)
$p_{nom} = 1.5$ bar

Certificate Number: № 4496/27.01.2012 of KONDOR I D.O.O, SMEDEREVO

8.6 Testing of the thermal protection of outputs (Safety of closed water jacket)
Safety Device installed according to p.5.7; Yes
Safety Device - activates at ≤ 105 °C accordance with the requirements of p 5.7; Not applicable
8.7 Distance from the unit to the part with the highest measured temperature of trihedrone accordance with p. 5.1; 470/470mm Back Panel
Type of fuel:
- Wood pellets with humidity W=5,21 ± 0,16% with a test report № 2155/29.10.2020 г. issued by, the EUROTEST - Control SA

8.8 Mass of test fuel burnt per 1h (according to A.4.2); nom.B= 4.43 kg/h min.B= 1.52 kg/h
8.9 Mass flow rate of the exhaust gases (according to p.A.6.2.5); nom.M= 14.9 g/s min.M= 7.8 g/s

Table 2

1	2	3	4	5	6	7
№	**Essential Characteristics**	**Unit of value**	**№ of specimen**	**Test results** nom/min	**Value and tolerance of indicator Standard & Norm. doc**	**Test conditions** nom/min
1	Ambient temperature- Tr	°C		25.0/19.6		25.0 ° C/
2	Temperature of flue gases-ta	°C		112/109		19.6 °C
3	CO	%		0.0086/ 0.0142	≤0.0400 nom. ≤0.0600 min.	≤ 0.01 m/s ≤ 0.01 m/s
4	CO_2	%		9.4/6.2		
5	M_w	kg/h		240/59		
6	t ent.water	°C		15.404/14.101		
7	t exit water	°C		76.320 75.400		
8	η	%		92.8/ 89.4	≥75 % nom. ≥70 % min.	
9	O_2	%		11.2/14.5		
10	Mass of fireplace (dry/wet)	kg		215/253.5		
11	Spatial thermal power	kW		2.9/2.4		
12	Water heat output	kW		17.1/4.2		
13	Total thermal power	kW		20.0/6.6		
14	Volume of pellet fuel tank	kg		40		

Note: The results before the slash refer to a test at nominal power and then to a partial load test (reduced power).

CONDUCTING THE TEST:.....
(eng. Georgi Iliev)

CAUTION:

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The calculation of the energy efficiency index EEI and the determination of the energy efficiency class of the Pellet stove RITTIUM 20 ECO produced by the factory- "TIM SISTEM D.O.O" ; ul.Prva industrijska br.9;22330 Nova Pazova, Srbija;

I. The energy efficiency index:

Pellet stove RITTIUM 20 ECO has an energy efficiency index **EEI = 127,2**.

The energy efficiency index is calculated according to:

1.1. The requirements and the formulas of ANNEX VIII of REGULATION (EU) 2015/1186;

1.2. The energy efficiency index is calculated on the database provided by manufacturer for Pellet stove RITTIUM 20 ECO and protocol № 180/30.03.2022 of the laboratory TERMOPLAM Sofia;

1.3. The energy efficiency index is set for preferred fuel: Wood pellets with humidity W = 5,21 ± 0,16% with a test report № 2155/29.10.2020 issued by the EUROTEST – Control SA.

II. Energy efficiency class:

Pellet stove RITTIUM 20 ECO has an energy efficiency class **A+**.

2.1. Energy efficiency class A+ is determined based on the energy efficiency index EEI = 127,2 according to Table 1 of ANNEX II of REGULATION (EU) 2015/1186.

Sofia
30.03.2022

Compiled: .....
Mr. Laboratory Termoplam / eng. Pl. Iliev /

ENERG Y IJA IE IA

енергия · ενεργεια

TIM SISTEM d.o.o

RITTIUM 20 ECO

A++

A+

A

B

C

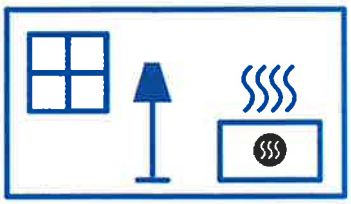
D

E

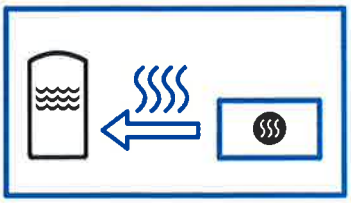
F

G

A+



2,9 kW



17,1 kW

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