

Task No.: 133000003/1

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TEST REPORT

OF FUNCTIONAL AND OPERATIONAL PROPERTIES

Product name – type: Roomheaters fired by solid fuel
solid fuel air heating stove “Gymnasist“

Manufacturer: OOO TERMOFOR
(Name and address) Mira street 62/3
Novosibirsk
Russia

Applicant: CERTUS LTD
(Name and address) Unijas Street 6
W-1084 Riga
Latvia

Data of sample delivery: submitted by manufacturer on 7th May , 2013
(Method, place, date, person) sample number 314/513/13/1

Number of samples: 1 piece of solid fuel air heating stove “Gymnasist“

Data of test method: EN 13240: 2001; EN 13240/A2:2004
(Procedure, standard)

Date of test performance: 27th- 29th of May, 2013

Test report made by: 20th of June, 2013 Ing. Peter Pollák
(Date, name, signature)

Responsible and approval person: 20th of June, 2013 Peter Summer
(Date, name, signature) Head of Testing Lab. TZBaS

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PROCESS AND RESULTS OF TESTS, MEASURING AND FINDING :

Used test method: EN 13240: 2001
 EN 13240/A2:2004
 MPS 314/3.1.1

Item No.	Requirement	Compliance with the requirement
EN 13240 clause 4 – MATERIALS, DESIGN AND CONSTRUCTION		
EN 13240 clause 4.2.1 - General construction:		
1.	Assurance of operational capability of the appliance in term of:	+
	• the shape and dimensions of the components and equipment	+
	• the method of design and manufacture	+
	• the method of assembly and installation if assembled on site	+
2.	• resistance of mechanical, chemical and thermal stresses	+
	Non-combustible materials shall be used, except that it shall be permissible to use combustible materials for the following applications:	+
	• components or accessories fitted outside the appliance	
	• internal components of controls and safety equipment	
	• operating handles	
• electrical equipment		
	<i>Used material are non – combustible and heat resistant..</i>	
	• no part of the appliance shall comprise any material known to be harmful	+
	<i>All used material are no harmful.</i>	
	• when fired with solid mineral fuels, the appliance shall have a bottomgrate and ashpan	0
	• all operations which the user carries out, including loading and emptying of the appliance, adjusting controls and de-ashing should be easy, safe and effective.	+
	<i>All operations are safety, easy and effective and they are described in the operational manual.</i>	
3.	Operational reliability and safety in term of:	+
	• prevention of combustion gas posing a hazard escape into the room in which the appliance is installed	
	<i>The design of stove prevents the escape of combustion gases into the room</i>	
	• prevention of embers fall out.	+
	<i>The design of stove prevents the falling out of embers.</i>	
4.	Component parts, which require periodic replacement and/or removal shall be either so designed or marked for identification to ensure correct fitting.	+
	<i>All parts of stove are marked for correct identification.</i>	
EN 13240 clause 4.2.2 – Integral boiler:		
	EN 13240 clause 4.2.2.1 – Boilers constructed of steel	0
	EN 13240 clause 4.2.2.2 – Boilers constructed of cast iron	

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Item No.	Requirement	Compliance with the requirement
EN 13240 clause 4.2.2.2.1 - Cast iron parts subject to water pressure		
5.	The mechanical properties of cast iron used for parts subject to water pressure: Grey cast iron (In accordance with EN 1561:1997): • tensile strength $R_m > 150 \text{ N/mm}^2$ • Brinell hardness 160 HB to 220 HB	0
	Spheroidal graphite iron (In accordance with EN 1563:1997) • tensile strength $R_m > 400 \text{ N/mm}^2$ • elongation 18 % A3	0
EN 13240 clause 4.2.2.2.2 - Minimum wall thicknesses (cast iron)		
6.	Nominal heat output < 30 : • grey cast iron 3,5 mm • spheroidal graphite cast iron 3,0mm	0
7.	Nominal heat output ≥ 30 and < 50 : • grey cast iron 4,0 mm • spheroidal graphite cast iron 3,5 mm	0
EN 13240 clause 4.2.2.3 - Boiler shell tappings		
8.	The threads of boiler shell tappings, for flow and return pipes, shall be not less than the minimum designation thread size: Nominal heat output ≤ 22 : • gravity circulation thread size designation - 1" • pumped circulation thread size designation - 1/2"	0
9.	Nominal heat output $> 22 < 35$: • gravity circulation thread size designation - 1 1/4" • pumped circulation thread size designation - 1"	0
10.	Nominal heat output $> 35 < 50$: • gravity circulation thread size designation - 1 1/4" • pumped circulation thread size designation - 1"	0
11.	If boilers are supplied with reducing bushes in horizontal flow tappings, these shall be eccentric and fixed so that the reduced outlet is uppermost. The minimum depth of tapping or length of thread shall conform: • thread size designation 1/2" to 1 1/4" - minimum depth or length of thread 16 mm • thread size designation 1 1/2" - minimum depth or length of thread 19 mm	0
12.	Where a drain socket is provided in the boiler shell, it shall be a minimum thread size designation of 1/2" and shall be in accordance with ISO 7-1:1994 and ISO 7-2:2000 or ISO 228-1:2000 and ISO 228-2:1987	0
EN 13240 clause 4.2.2.4 - Boiler waterways		
EN 13240 clause 4.2.2.4.1 - Design of all boiler waterways		
13.	The design of the boiler shall ensure a free flow of water through all parts. To minimize the build up of sediments, sharp or wedge-shaped waterways with a taper towards the bottom shall be avoided.	0
14.	Where inspection holes are provided in the boiler to give access for inspection and cleaning of the waterways, they shall be a minimum of 70 mm x 40 mm or have a minimum diameter of 70 mm and be sealed with a gasket and cap.	0

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Item No.	Requirement	Compliance with the requirement
EN 13240 clause 4.2.2.4.2 - Boiler waterways used with indirect water systems		
15.	The minimum internal dimension of waterways throughout the main body of the appliance shall be not less than 20 mm except where waterways have to be locally reduced to facilitate manufacture or are in areas not in direct contact with burning fuel, in these cases the width of the waterways shall not be less than 15 mm.	0
EN 13240 clause 4.2.2.4.3 - Boiler waterways used with direct water systems		
16.	The minimum internal dimensions of waterways in boilers designed for direct water systems shall be not less than 25 mm.	0
EN 13240 clause 4.2.2.4.4 - Venting of the water sections		
17.	The boiler and its components shall be designed in such a way that their respective water sections can be vented.	0
18.	The boiler shall be so designed that under normal operation in accordance with the manufacturer's installation instructions, no undue boiling noises occur.	0
EN 13240 clause 4.2.2.4.5 - Water tightness		
19.	Holes, for screws and similar components, which are used for the attachment or removal of parts, shall not open into waterways or spaces through which water flows. NOTE This does not apply to pockets for measuring, control and safety equipment.	0
EN 13240 clause 4.2.3 - Cleaning of heating surfaces:		
20.	All heating surfaces shall be accessible from the flue gas side	+
21.	Where cleaning and servicing of the boiler and its components require the use of special tools, these shall be supplied by the appliance manufacturer.	0
EN 13240 clause 4.2.4 - Flue spigot or socket:		
22.	For horizontal flue connection, the flue spigot/socket shall be designed to allow fitting, internal or external, over a length of at least 40 mm, of a flue gas connector.	0
23.	For vertical flue connection, the fitting shall overlap by at least 25 mm. <i>The overlapping for chimney connection is 40 mm.</i>	+
EN 13229 clause 4.2.5 - Flueways:		
24.	It shall be possible to clean the flueways of the appliance completely using commercially available tools or brushes, unless special tools or brushes are provided by the appliance manufacturer.	+
25.	The size of the flueway: <ul style="list-style-type: none"> • in its minimum dimension shall be not less than 30 mm • except it shall be permissible to reduce it to not less than 15 mm for appliances designed only to burn fuels other than bituminous coals and peat briquettes, and where an access door(s) is provided for cleaning the flueway. 	0
EN 13240 clause 4.2.6 - Ashpan and ash removal:		
26.	Ashpan volume shall be capable of containing the combustion residue from two full charges of fuel.	0
27.	Location of the ashpan in the appliance shall locate in the ashpit in such a way that it allows the free passage of primary air and in such a position that it does not obstruct any primary air inlet control.	0
28.	Design and construction of the ashpan shall ensure: <ul style="list-style-type: none"> • effective collects the residue from beneath the bottomgrate • easy and safe withdrawn, carried and emptied, without undue spillage of residue material. • when hot, the tool(s) for manipulation shall be provided 	0

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Item No.	Requirement	Compliance with the requirement
EN 13240 clause 4.2.7 - Bottomgrate:		
29.	Where the bottomgrate is removable it shall be so designed or marked as to ensure correct fitting.	0
30.	If a de-ashing mechanism is fitted it shall be capable of effectively de-ashing the fuelbed.	0
31.	The de-ashing should be possible without undue effort.	0
32.	If it is necessary to remove the ashpit door to de-ash the fire, the appliance should be designed to minimise ash or fuel spillage during the de-ashing operation.	0
EN 13240 clause 4.2.8 - Combustion air supply:		
EN 13240 clause 4.2.8.1 - Primary air inlet control:		
33.	Primary air inlet control shall be fitted: • with thermostatic control, or	0
	• with manual control	+
	• only with thermostatic control for boiler outputs over 7,5 kW.	0
34.	The adjusting control shall be: • clearly visible or	+
	• permanently marked so that its operation is readily understandable.	0
35.	The design shall be such that during operation of the appliance, neither ash nor unburned fuel can prevent the movement or closure of the air inlet control.	+
EN 13240 clause 4.2.8.2 - Secondary air inlet control:		
36.	The secondary air entry shall be so designed that the passage of air is not restricted when the firebox is filled to the manufacturer's recommended capacity.	0
EN 13240 clause 4.2.9 - Control of flue gas:		
37.	The flue damper : • must not block the flue totally	+
	• shall be easy to operate	+
	• shall incorporate an aperture within the blade, which in a continuous area occupies at least 20 cm ² or 3% of the cross-sectional area of the blade if this is greater	+
	• the position of the damper shall be recognizable from the setting of the device	+
38.	If a draught regulator is fitted the minimum cross sectional area requirement shall not be applicable but the device shall be easily accessible for cleaning.	0
EN 13240 clause 4.2.10 - Firedoors and charging doors:		
39.	The charging door shall be large enough to allow the appliance to be filled with the commercial fuels recommended by the manufacturer.	+
40.	The firedoors and charging doors shall be designed to prevent accidental opening and to facilitate positive closure.	+
EN 13240 clause 4.2.11 - Flue bypass device:		
41.	Shall be easily operable	0
42.	The extreme positions corresponding to full opening and closing shall be stable and easily identifiable.	0
EN 13240 clause 4.2.12 – Front firebars and/or deepening plate:		
43.	The removable front firebars and/or deepening plate, they shall be of a design such that they can neither be incorrectly fitted nor accidentally dislodged.	0
44.	The front firebars shall be designed to retain the fuel or ash such that there is no undue spillage of ash or burning fuel from the roomheater during normal operations, particularly during refuelling or de-ashing.	+

Item No.	Requirement	Compliance with the requirement
EN 13240 clause 5 – SAFETY		
EN 13240 clause 5.1 - Natural draught:		
45.	The total quantity of carbon monoxide in the flue gas, for a continuous burning appliance, shall not be greater than 250 dm ³ .	0
46.	Such an appliance shall be clearly labelled to indicate whether or not it can be installed into a shared flue. <i>The manufacturer indicates in the operational manual that the stove are intended to connect into no shared chimney.</i>	+
EN 13240 clause 5.2 - Operation with open firedoors:		
47.	The operation of an appliance with an open firebox shall only be permitted when: <ul style="list-style-type: none"> • any escape of harmful combustion gases 	+
	<ul style="list-style-type: none"> • any loss of the firebed from the appliance, does not occur under the test conditions described in section A.4.9.1. 	+
EN 13240 clause 5.3 - Strength and leaktightness of boiler shells		
48.	The boiler shell and its water carrying components shall not leak or become permanently deformed when subjected to the type pressure test.	0
EN 13240 clause 5.5 - Temperature rise of the operating components:		
49.	<p>If the manipulation of the operating components does not require the assistance of tools, the surface temperatures, measured only in the areas to be touched, shall not exceed the ambient room temperature by more than the following when tested in accordance with A.4.7:</p> <ul style="list-style-type: none"> • 35 K for metal • 45 K for porcelain, vitreous enamel or similar materials • 60 K for plastics, rubber or wood <p>If these temperatures are exceeded, the manufacturer shall indicate in the instructions the need to use an operating tool. This tool shall be supplied with the appliance.</p> <p>Measured surface temperatures :</p> <p><i>firedoor handle (metal)</i>..... 42,2°C</p> <p><i>primary air regulator (metal)</i>..... 43,3°C</p> <p><i>average ambient temperature</i> 21,9°C</p> <p><i>In the operational manual the producer indicates using of operational tools and gloves delivered with appliance.</i></p>	+

Item No.	Requirement	Compliance with the requirement
EN 13240 clause 5.6 - Temperature of adjacent combustible materials:		
50.	<p>When tested, during the test performance related to the nominal heat output and the temperature safety test, and when the appliance is installed in accordance with the clearance distances specified in the manufacturer's installation instructions, the temperature of the test hearth and walls and/or ceiling or any other structure surrounding the appliance comprising combustible material shall not exceed the ambient temperature by more than 65 K.</p> <p><i>Measured temperatures in distance to 600 mm from stove:</i></p> <p><i>right side of stove</i> 31,1°C</p> <p><i>left side of stove</i>..... 29,3°C</p> <p><i>back side of stove</i>..... 34,4°C</p> <p><i>floor</i>..... 56,5°C</p> <p><i>average ambient temperature</i> 21,9°C</p> <p><i>In the operational manual the producer indicates the safety distances of stove from combustible materials 500 mm and indicates the preparation of floor for installation of stove.</i></p>	+
N 13240 clause 5.7 - Thermal discharge control		
51.	For appliances fitted with a boiler designed to operate on a sealed system and where a thermal discharge control is fitted as part of the appliance, when tested in accordance with A.4.9.5, the control shall operate when the water flow temperature exceeds either 105 °C or the manufacturer's declared operating temperature, whichever is the lower.	0
EN 13240 clause 6 – PERFORMANCE		
EN 13240 clause 6.1 - Flue gas temperature		
52.	<p>The average flue gas temperature of the flue gas temperature measured during the test of the operational properties at the nominal heat output shall be recorded in the installation instructions.</p> <p><i>The average measured flue gas temperature at nominal heat output</i>..... 254,82°C</p>	+
EN 13240 clause 6.2 - Carbon monoxide emission		
53.	<p>When measured in accordance with A.4.7, the mean carbon monoxide (CO) concentration calculated to 13% oxygen (O₂) content in the flue gas shall be less than or equal to the manufacturer's declared value and shall not exceed 1,0%.</p> <p><i>The average CO concentration calculated to 13% O₂ at nominal heat output</i>..... 0,336 CO</p>	+
EN 13240 clause 6.3 - Efficiency at nominal heat output:		
54.	<p>When tested in accordance with A.4.7, the measured total efficiency from the mean of at least two test results at nominal heat output shall be greater than or equal to the manufacturer's declared value and shall equal or exceed 50 %.</p> <p><i>Primary air inlet open to 100%</i></p> <p><i>Damper open to 100%.</i></p> <p><i>The average efficiency at nominal heat output</i>..... η = 58,39%</p>	+
EN 13240 clause 6.4 - Flue draught:		
55.	<p>The flue draught value, related to the appliance's nominal heat output, shall be 12 Pa . Where the flue draught value needs to be exceeded in order to obtain the manufacturer's declared nominal output, the required flue draught shall be clearly stated in the appliance's installation instructions.</p> <p><i>The average draught at nominal heat output</i>..... 12,0 Pa</p>	+
EN 13240 clause 6.5 – Recovery		
56.	Recovery shall be deemed to be satisfactory if the refuel charge is visibly ignited within a time of 20 minutes.	0

Item No.	Requirement	Compliance with the requirement
EN 13240 clause 6.6 - Refuelling intervals		
57.	When the appliances is operated with closed doors, the minimum times for maintenance of combustion with one added test load of fuel shall be not less than the values given in Table 10. Where the refuelling interval declared by the manufacturer is greater than the minimum refuelling interval given in Table 10, then the manufacturer's declared value shall be verified when tested during the tests.	+ 1 hour
EN 13240 clause 6.7 - Space heating output		
58.	The space heating output declared by the manufacturer shall not exceed the space heating output measured in accordance with A.4.7. The average heating output at nominal heat output.....	+ 6,14 kW
EN 13240 clause 6.8 - Water heating output		
59.	The water heating output declared by the manufacturer shall not exceed that measured under the conditions described in A.4.7.	0

Key: - does not meet requirement
+ meets requirement
0 requirement does not refer to the tested product

Used testing equipment and measures:

- weight: Mettler Toledo, type ID plus 0÷1500 kg
- differential Manometer: Rosemont, type 3051
- differential manometer KIMO type CP30, +/- 100Pa
- flue gas analyser HORIBA 661
- analyser THERMOFID "ES"
- dust analyser TCR TECORA
- analyser of fuel moisture KERN type MLB 50-3N

CONCLUSION

Test results – meet / do not meet requirement:

Basic Characteristics	Technical Specification	meets /does not meet
MATERIALS, DESIGN AND CONSTRUCTION	EN 13240 clauses: 4.2.1, 4.2.3, 4.2.4, 4.2.5, 4.2.8; 4.2.9, 4.2.10, 4.2.12	+
SAFETY	EN 13240 clauses: 5.1; 5.2; 5.5, 5.6	+
PERFORMANCE	EN 13240 clauses: 6.1; 6.2; 6.3; 6.4; 6.6; 6.7	+

Key: + meets requirement
- does not meet requirement

Peter Summer
The Head of Testing Lab. TZBaS

TEST REPORT
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Annex 1

Photos of solid fuel air heating stove “Gymnast” during the tests



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Annex 2

Test results summarization of fuel air heating stove “Gymnasist” at nominal heat output:

	Measuring 1	Measuring 2	Average	Unit
Fuel	beech wood			-
Fuel efficiency	16850			kJ/kg
Fuel humidity	9,44			%
Fuel consumption	2,210	2,282	2,246	kg/hod
Test duration	60	60	60	min
Average heat output	6,04	6,23	6,14	[kW]
Average efficiency	58,44	58,34	58,39	[%]
Average measured O₂ concentration	16,43	15,79	16,11	[%]
Average measured CO₂ concentration	3,84	4,32	4,08	[%]
Average measured CO concentration	1796	2331	2063	[ppm]
Average CO concentration calculated to 13 % O₂	0,315	0,358	0,336	[%]
Average measured NO_x concentration	31	36	33	ppm
Average NO_x concentration calculated to 13% O₂	112	113	112	[mg/m ³]
Average measured OGC concentration	187	239	213	[mg/m ³]
Average OGC concentration calculated to 13 % O₂	328	366	347	[mg/m ³]
Average measured dust concentration	90	63	77	[mg/m ³]
Average dust concentration calculated to 13 % O₂	157	110	133	[mg/m ³]
Average flue gas mass flow	8,931	8,624	8,777	g/s
Average draught	12,1	11,9	12,0	[Pa]
Average combustion gas temperature	241,5	268,2	254,8	[°C]
Average ambient temperature	21,4	22,4	21,9	[°C]

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Annex 3

Emission curves chart of fuel air heating stove “Gymnasist” at nominal heat output

