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Test report

on the initial type test of a sauna stove fired by natural wood logs
according to EN 15821

Test laboratory	TÜV SÜD Industrie Service GmbH Feuerungs- und Wärmetechnik Notified Body 0036 according to CPR
Subject of test	Sauna stove fired by natural wood logs according to EN 15821
Appliance	HEAT 18
Models	HEAT 18 HEAT 18 O Intended use: space heating of a sauna room Fuel: natural wood logs
Customer	Cozy Heat Ltd Harku tee 7 76901 Tabasalu, Harju County Estonia
Scope of order	Initial type test in the AVCP procedure according to Regulation (EU) No. 305/2011 (CPR)
Expert	Dipl.-Ing. Dirk Weisgerber
Period of Test	September to November 2020
Basis of test	DIN EN 15821:2011-01

Date: 2020-11-05

Our reference:
IS-TAF-MUC/weisg-di

Report No. W-O 1565-00/20
Order no.: 3307426

This Document consists of
8 Pages and 17 Annexes.
Page 1 of 8

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The test results refer exclusively
to the units under test.





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1 Summary

Customer	Cozy Heat Ltd
Subject of test	Sauna stove fired by natural wood logs according to EN 15821
Type	HEAT 18
Models	HEAT 18 (octagonal geometry of the mesh cover) Heat 18 O (round geometry of the mesh cover)
General design	Combustion chamber: steel Body of the appliance: steel Cover of the appliance: mesh cover Arrangement of the stones: between body and mesh cover and on top of stove front fire door with glass inset Manual stoking and manual deashing with bottom grate and ashpan Manually adjustable control of the combustion air (position of the ash-tray) and adjustable secondary combustion air inlet control
Intended use	Space heating of the sauna room
Fuel	Natural wood logs

Characteristics at nominal heat output

Heat output	kW	10,1
Fuel rate	kg/h	2,9
CO-Emission (13% Vol. O ₂)	Vol. %	0,093
CO-Emission (13% Vol. O ₂)	mg/m ³	1164
Dust-Emission (13% Vol. O ₂)	mg/m ³	35
Efficiency	%	81,3
Flue-gas temperature in the measuring section	°C	234
Flue-gas temperature behind the stove in the spigot	°C	499
Flue draught	Pa	12
Flue gas mass flow	g/s	9,1
Heated sauna room volume	m ³	9 - 18
Distance to combustible	cm	23 (rear wall) / 23 (side wall) / 50 (front) 134 (top of stove to ceiling)



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The essential characteristics according to appendix ZA.1 of DIN EN 15821 for sauna stoves fired by natural wood logs were tested and the requirements are fulfilled, if the measures in clause 6 have been taken into account. This result is a prerequisite for performing the process of AVCP (Assessment and Verification of Constancy of Performance) and CE marking by the manufacturer.

Feuerungs- und Wärmetechnik

A handwritten signature in blue ink, appearing to read 'J. Steiglechner'.

Johannes Steiglechner
Head of department
Feuerungs- und Wärmetechnik

Expert of Notified Body 0036
according to Regulation (EU)
No. 305/2011 (CPR)

A handwritten signature in blue ink, appearing to read 'D. Weisgerber'.

Dirk Weisgerber



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2 Basis of test

- 2.1 DIN EN 15821:2011-01 Multi-firing sauna stoves fired by natural wood logs - Requirements and test methods
- 2.2 DIN EN 16510-1:2018-11 „Residential solid fuel burning appliances Part 1: General requirements and test methods“
- 2.2 Documents of the customer

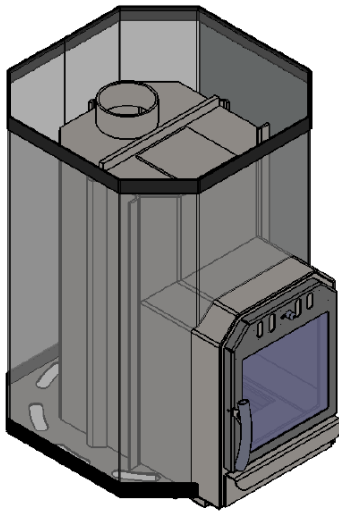
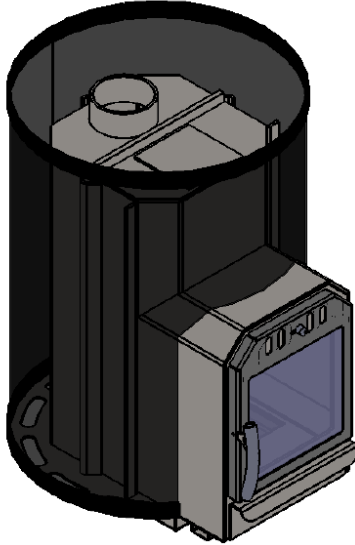
3 List of enclosed documents

- A1 - A13 Results and analysis of the test, measuring device, photos
- B1 - B4 Drawings

4 Description of the roomheater ¹⁾

4.1	Appliance	Manually fuelled intermittent burning multi-firing sauna stove		
4.2	Intended use	Heating of the space where it is installed		
4.3	Defined fuel	Natural wood logs		
4.4	Appliance	Heat 18		
4.5	Models	Heat 18, Heat 18 O		
4.6	Heated volume of the sauna room	9 m ³ - 18 m ³		
4.7	Dimension		Heat 18	HEAT 18 O
		Height:	75 cm	75 cm
		Depth:	59 cm	59 cm
		Width:	50 cm	Ø 50 cm
4.8	Weight of the sauna stove	no information available		
4.9	Comparability	The combustion chamber, the combustion air supply to the combustion chamber and the flue ways are identical for all models listed. The only difference between the sauna stove HEAT 18 and the sauna stove HEAT 18 O is the different geometry of the outer mesh cover.		
4.10	Sauna stones	weight of stones 122 kg		
4.11	fire door	front fire door with glass inset		
4.12	General construction	▪ combustion chamber: steel ▪ body of the appliance: steel ▪ arrangement of the stones: lateral and on top of stove between body and mesh cover ▪ with bottom grate ▪ with ash drawer ▪ manual fed and manual deashing		

¹⁾ Overview drawings of the test sample are summarized in the annex B of this test report. Further detailed information on the test sample are available at the laboratory.

4.13	Schematic view	 HEAT 18  HEAT 18 O
4.14	Material (manufacturer information)	no information available
4.15	Operation method	no room sealed operation

4.16	Combustion air	4 adjustable secondary combustion air inlet openings in the firedoor 14 mm x 40 mm - Manually adjustable control of the primary combustion air (position of the ash-tray)  Stove with closed firedoor 4 openings  Stove with opened firedoor and combustion air pipes												
4.17	Flue gas connector	flue gas spigot for top connection (diameter 114 mm)												
4.18	<table><tr><td>Distance from the side wall</td><td>23 cm</td></tr><tr><td>Distance from the rear wall</td><td>23 cm</td></tr><tr><td>Distance to the front</td><td>50 cm</td></tr><tr><td>Distance from top of stove to the ceiling</td><td>134 cm</td></tr><tr><td>Distance from top of the horizontal flue gas pipe to the ceiling</td><td>72 cm</td></tr><tr><td>Floor</td><td>Installation of the stove only on non combustible floor</td></tr></table>		Distance from the side wall	23 cm	Distance from the rear wall	23 cm	Distance to the front	50 cm	Distance from top of stove to the ceiling	134 cm	Distance from top of the horizontal flue gas pipe to the ceiling	72 cm	Floor	Installation of the stove only on non combustible floor
Distance from the side wall	23 cm													
Distance from the rear wall	23 cm													
Distance to the front	50 cm													
Distance from top of stove to the ceiling	134 cm													
Distance from top of the horizontal flue gas pipe to the ceiling	72 cm													
Floor	Installation of the stove only on non combustible floor													
4.19	Marking	The type plate was not available at the time of the issue of the report. The content of the type plate has to be in line with the results of this report. The type plate must be marked permanently and arranged readable, also in mounted situation. If a printed label is used it shall be durable and abrasion proof. Under normal operating conditions, the label shall not dis-colour, thus making the information difficult to read. Self-adhesive labels shall not become detached as a result of moisture or temperature.												

5 Performance of the test

The initial type test in accordance to DIN EN 15821, Annex ZA included the following parameters

- fire safety
- emission of combustion products
- release of dangerous substance
- surface temperature
- thermal output
- energy efficiency

The test of the user's manual, the installation manual and the marking was not part of the test order.

The sauna stove model HEAT 18 was tested. The only difference between the sauna stove HEAT 18 and the sauna stove HEAT 18 O is the different geometry of the outer mesh cover.

The combustion chamber, the combustion air supply to the combustion chamber and the flue ways are identical. The weight of the sauna stones and the distance from the steel body to the outer mesh cover is also comparable. The results can therefore be transferred to the other model.

The measurement and evaluation of the emissions NO_x and dust was carried out in accordance with DIN EN 16510-1:2018-11 "Residential solid fuel burning appliances - Part 1: General requirements and test methods".

The evaluation of test results with regard to conformity with the test specification was exclusively based on the requirements formulated in the test specification. For measurement results the actually measured values resp. the values converted to standard conditions according to the test specification were used. For the evaluation of test results tolerances or measurement uncertainties were not taken into account.

The description of the test assembly, the test results and the list of measurement devices are documented in enclosure A of this test report.

A description of the test procedure is given in the European standard as well as in the above mentioned enclosures of this test report.



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6 Summary

The	sauna stove fired by natural wood logs according to EN 15821, designed as freestanding, inter- mittent burning appliance for the operation with closed fire door
Appliance	HEAT 18
Models	HEAT 18 HEAT 18 O
manufactured by the company	Cozy Heat ltd Harku tee 7 76901 Tabasalu, Harju County Estonia

was tested according to the basis of test mentioned in clause 2.

The result of the examination is:

The essential requirements according to appendix ZA1 of DIN EN 15821 for sauna stoves fired by natural wood logs are fulfilled, if the following measures are applied:

- The floor below the stove shall be made of non-combustible material.
- The arrangement of the stones (no direct heat radiation from the surface of the steel body inside the mesh cover to the surrounding) shall be documented in the installation manual.
- The primary air inlet to the combustion chamber is adjusted by the opening of the ash tray (2 mm opened at nominal heat output). This shall be marked for example by a notch and information about this marking shall be included in the operation manual.
- The adjustment of the secondary combustion air inlet control shall be marked (75 % opened at nominal heat output) and information about this marking shall be included in the operation manual.
- An operating tool shall be supplied with the appliance (for example suitable gloves).

The further test results are documented in detail in enclosure A of this test report.

The initial type test by the Notified Body within the procedure of the system of AVCP for CE marking has been carried out with positive result. All other tasks in accordance with DIN EN 15821 Annex ZA2, such as the factory production control, the requirements on the documentation and on the marking have to be fulfilled by the manufacturer.

National rules for use must be met.

Feuerungs- und Wärmetechnik

Johannes Steiglechner
Head of department
Feuerungs- und Wärmetechnik

Expert of Notified Body 0036
according to Regulation (EU)
No. 305/2011 (CPR)

Dirk Weisgerber

Remark:

Notwithstanding from page 1 this test report may be used also without accompanying enclosures, otherwise, however, completely.



on	Requirements	according EN 15821	Requirem. fulfilled
	<u>Materials, design and construction</u>	4	
	<u>Production documentation</u>	4.1	
	The documentation and/or the drawings shall include at least the following information:		
	- The specification of the materials used in the construction of the appliance - The fuel loading mass and, if applicable, the number and mass of any fuel mass charges		1) 1)
	Additional details for sauna stoves, which are supplied as pre-designed units consisting of prefabricated components, designed to be assembled on site:		
	- Detailed assembly instructions for the construction of the appliance - Details of making a gas tight connection between the chimney, the appliance and the flue gas connector		n.a. n.a.
	<u>Construction</u>	4.2	
	<u>General construction</u>	4.2.1	
	<u>Design, manufacture and assembly</u>	4.2.1.1	
	- The shape and dimensions of the components and equipment and the method of design and manufacture and, if assembled on site, the method of assembly and installation shall ensure that, when operated in accordance with the provisions of the appropriate test and exposed to the associated mechanical, chemical and thermal stresses, the appliance shall operate reliably and safely such that during normal operation no combustion gases posing a hazard can escape into the room in which the appliance is installed nor can embers fall out. - 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 - No part of the appliance shall comprise any material known to be harmful - Component parts, which require periodic replacement and/or removal shall be either so designed or marked for identification to ensure correct fitting		yes ²⁾³⁾ yes yes ²⁾ yes
	<u>Durability</u>	4.2.1.2	
	The durability aspects of the multi firing sauna stove shall be deemed to be satisfied if it is shown to meet the constructional requirements specified in 4.2.2 to 4.2.10		3)
	<u>Cleaning of heating surfaces</u>	4.2.2	
	All heating surfaces shall be accessible from the flue gas side for inspection and cleaning with brushes, scrapers or chemical agents by means of sufficient cleaning openings		yes ²⁾
	<u>Flue spigot or socket</u>	4.2.3	
	- The flue spigot or socket shall be designed to enable a gas tight connection to be made between the flue gas connector and the multi-firing sauna stove - Where the flue gas connector fits over an outlet spigot, the overlap shall be a minimum of 25 mm. Where the flues gas connector fits into a socket, the insertion depth shall be a minimum of 25 mm		yes yes

n.a. not applicable

¹⁾ The test of the documentation was not part of the test order

²⁾ According to visual test

³⁾ During the tests for nominal heat output and test of fire safety the requirements were met. Other requirements e.g. terms of durability have not been verified in the scope of this test. The requirements have to be fulfilled.



on	Requirements	according EN 15821	Requirem. fulfilled
<u>Ashpan and ash removal</u>		4.2.4	
	- A means for the removal of the ash residue from the multi-firing sauna stove shall be provided - When an ashpan is provided, it shall be capable of containing the combustion residue from two full charges of fuel whilst retaining sufficient space above to allow adequate primary air flow through the bottom grate or firebed. - If the ashpan resides in the multi-firing sauna stove, it 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. - The ashpan shall be designed and constructed to ensure that it effectively collects the residue from beneath the bottomgrate - The ashpan shall be designed and constructed to ensure that it can be easily and safely withdrawn, carried and emptied when hot, using the tool(s) provided, without undue spillage of residue material.		yes yes yes yes yes
<u>Bottomgrate</u>		4.2.5	
	- Where the bottomgrate is removable, it shall be so designed or marked as to ensure correct fitting. - If a de-ashing mechanism is fitted, it shall be capable of effectively de-ashing the fuelbed without undue effort. - If it is necessary to remove the ashpit door to de-ash the fire, the multi-firing sauna stove shall be designed to minimise ash or fuel spillage during the de-ashing operation.		yes n.a. n.a.
<u>Combustion air supply</u>		4.2.6	
<u>Primary air inlet control</u>		4.2.6.1	
	- The appliance shall be fitted with either a thermostatically controlled primary air inlet control or a manual primary air inlet control. - The adjusting control shall be clearly visible or shall be permanently marked so that its operation is readily understandable. - 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. - The cold setting of the air inlet control shall be clearly marked or the method of adjustment shall be described in the user instructions. - The thermostat shall have a variable temperature range and be of the immersion or dry pocket type.		yes 1) yes 1) n.a.
<u>Secondary air inlet control</u>		4.2.6.2	
	Where a secondary air inlet control is provided, the position of air entry shall be so designed that the passage of air is not restricted when the firebox is filled to the recommended capacity.		yes ¹⁾
<u>Control of flue gas</u>		4.2.7	
If a flue damper is fitted:			
	- The damper shall be easy to operate - The damper incorporate an aperture within the blade, which in a continuous area occupies at least 20 cm² 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 - 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		n.a. n.a. n.a. n.a.

n.a. not applicable

¹⁾ Requirements have to be fulfilled in the final design, see chapter 6

Anlage A3

Reference/Date: IS-TAF-MUC/weisg-di /2020-11-05

Document: WO15650020_CozyHeat_Heat18_EN15821_wei.docx

Report No. W-O 1565-00/20



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on	Requirements	according EN 15821	Requirem. fulfilled
<u>Firedoors and charging doors</u>		4.2.8	
If the multi-firing sauna stove is equipped with a charging door:			
That door shall be large enough to allow the appliance to be filled with the recommended commercial fuels in accordance with the user operating instructions.			yes
Fire doors and charging doors shall be designed to prevent accidental opening and to facilitate positive closure.			yes
<u>Flue bypass device</u>		4.2.9	
Any flue bypass device shall be easily operable.			n.a.
The extreme positions corresponding to full opening and closing shall be easily and readily identifiable.			n.a.
<u>Front firebars and/or deepening plate</u>		4.2.10	
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 sauna stoves during normal operations, particularly during refueling or de-ashing.			yes
If the appliance is fitted with removable front firebars and/or deepening plate, they shall be of a design such that they can neither be incorrectly fitted nor accidentally dislodged.			n.a.

n.a. not applicable



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on	Requirements	according EN 15821	Test according	Requirem. fulfilled
	<u>Safety requirements</u>	5		
	<u>Temperature rise of the operating components</u>	5.1	A.4.6	
	- Temperatures, measured only in the areas to be touched, shall not exceed the ambient room temperature outside of the test room by more than ≤ 55 K for metal ≤ 65 K for porcelain, vitreous enamel or similar materials ≤ 80 K for plastics, rubber or wood 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.			1)
	<u>Temperature of adjacent combustible materials</u>	5.2	A.4.6 / A.4.7	
	- The temperature of the the sauna test room walls and/or ceiling or any other structure surrounding the appliance comprising combustible material as measured by the wooden rod shall not exceed either the ambient temperature by more than - 115 K during the nominal heat output test (A.4.6) nor - 140 K during the safety test (A.4.7) - If, according to the installation instructions, the sauna stove can be installed on a combustible base, then the floor temperature shall be measured and the temperature shall not exceed the ambient air temperature outside the sauna test room by more than 65 K. - If necessary the floor shall be protected in accordance with the installation instructions, and the temperatures shall be measured below the floor protection device.			yes yes yes yes ²⁾

n.a. not applicable

¹⁾ A operating tool shall be supplied with the appliance.

²⁾ The sauna stove has to be installed on a non combustible base.



on	Requirements	according EN 15821	Test according	Requirem. fulfilled
	<u>Performance requirements</u>	6		
	<u>Flue gas temperature</u>	6.1	A.4.6	
	The flue gas temperature shall be measured and the mean calculated and recorded in the installation instructions			yes
	<u>Carbon monoxide emission</u>	6.2	A.4.6	
	Carbon monoxide content $CO \leq 1,0 \text{ Vol.} \%$ (related to $13 \% O_2$)			yes
	<u>Efficiency at nominal heat output</u>	6.3	A.4.6	
	Efficiency $\geq 50\%$			yes
	<u>Flue draught</u>	6.4		
	Flue static pressure $12 \pm 2 \text{ Pa}$		A.4.6	yes
	Flue static pressure $(12 \text{ Pa} + 3 \text{ Pa}) \pm 2 \text{ Pa}$		A.4.7	yes
	<u>Refuelling loads</u>	6.5	A.4.6	
	The mass of the total amount of fuel and the refuelling interval(s) and/or the number and mass of batch charges, shall be as stated in the operating instructions.			1)
	Any batch charge shall not be less than 20% of the total fuel load.			yes
	The minimum fuel burning period shall not be less than 30 minutes.			yes
	The total amount of fuel fired shall be enough to heat up the temperature of the sauna test room to at least 90°C.			yes
	The slope formed by the test load shall not obstruct, even partially, any flue.			yes
	<u>Space heating output</u>	6.6	A.4.6	
	The space heating output declared by the manufacturer shall not exceed the space heating output measured			1)
	<u>Release of dangerous substance</u>	ZA	-	2)

n.a. not applicable

1) The test of the documentation was not part of the test order.

2) According to visual test materials are used with which an emission of dangerous substances is not to be expected. During the test at nominal heat output and at the safety test it was proved that in the combustion process no dangerous substances are released in critical amount in the surroundings.

During the safety test with overloading of the combustion chamber the CO emission value was more than $5.8 \text{ Vol.} \%$. CO emission exceeding $5 \text{ Vol.} \%$ may already lead to dangerous conditions (explosive atmosphere). DIN 15821 has no requirements for critical CO concentrations.



on	Requirements according EN 15821:2011-01	according EN 15821	Test according	Requirem. fulfilled
<u>Instructions</u>		7		1)
<u>Appliance instructions</u>		7.1		
- In the language of the country in which it is to be operated - Shall not be in contradiction to the requirements or test results				
<u>Installation instructions</u>		7.2		
The installation instructions shall contain at least the following information: - A statement to the fact that "all local regulations, including those referring to national and European standards need to be complied with when installing the appliance" - The type (model or number) of the appliance - The nominal heat output(s) in kW or W - The safety clearances against combustible materials, and the other protective measures that shall be taken to protect the building construction - The requirements for the supply of combustion air, for the simultaneous operation with other appliances and for the operation of exhaust air devices - The need of any air inlet grilles to be so positioned that they are not liable to blockage - A note that extractor fans when operating in the same room or space as the appliance may cause problems - The minimum size of the opening for combustion and ventilation air into the room in which the appliance is installed; - The mass of the appliance in kg - the minimum flue draught (Pa) for nominal heat output - The need to install the appliance on a non combustible base - The flue gas mass flow in g/s (where applicable, with open and closed firedoors) - Whether the appliance is suitable for installation in a shared flue system - The flue gas temperature directly downstream of the flue spigot/socket in °C under nominal heat output conditions - Floor: the appliance shall be installed on floors with an adequate load-bearing capacity. If an existing construction doesn't meet this prerequisite, suitable measures (e.g. load distributing plate) shall be taken to achieve it - The assembly of the appliance on-site, if applicable - Advice on the need to provide access for cleaning the appliance - Advice on the need to provide access for cleaning the flue gas connector - Advice on the need to provide access for cleaning the chimney flue - The installation of the damper device, if applicable - A statement of the size of room in which the appliance can be installed - Minimum and maximum volume of sauna room in which the appliance can be installed - Minimum dimensions of chimney				

¹⁾ The test of the documentation was not part of the test order. Requirements have to be fulfilled.



on	Requirements according EN 15821:2011-01	according EN 15821	Test according	Requirement fulfilled
<u>User operating instructions</u> Each appliance shall be accompanied by instructions in the language of the country in which it is to be operated, containing all important details regarding the operation for the concerned appliance. The operating instructions shall contain at least the following information: • A statement to the fact that “all local regulations, including those referring to national and European standards need to be complied with when installing the appliance” • A list of the recommended fuels including type and size in accordance with EN 15821 • Details of the method of refuelling and de-ashing the appliance and the maximum filling height in the firebox and typical refuelling intervals at nominal heat output for various recommended fuels • A description of the correct instructions for safe and efficient operation of the appliance including the ignition procedure • Advice against the use of the appliance as an incinerator and the use of unsuitable and non recommended fuels, including advice against the use of liquid fuels • The operation of all adjusting devices, dampers and controls • Ventilation requirements for simultaneous operation with other heating appliances (where applicable) • The correct operations for seasonal use and under adverse flue draught or adverse weather conditions • Advice on the need for regular maintenance by a competent engineer • A warning that the firebox and ashpit cover shall be kept closed except during ignition, refuelling and removal of residue material to prevent fume spillage, unless the appliance is intended to be operated with open firebox • The need for regular cleaning of the appliance, of the flue gas connector and the chimney flue and highlighting the need to check for blockage prior to re-lighting after a prolonged shut down period • Advice on the adequate provision of combustion and ventilation air and on keeping air intake grilles; supplying combustion air, free from blockage • Instructions on simple fault finding and the procedure for the safe shut down of the appliance in event of malfunction e.g. overheating • Warning that parts of the appliance, especially the external surfaces, will be hot to touch when in operation and due care will need to be taken; • The means of protection against risk of fire in and outside the heat radiation area • Warning against any unauthorised modification of the appliance • Use of only replacement parts recommended in the installation instructions • Advice about the actions to be taken in the event of a chimney fire • Whether the appliance is suitable for installation in a shared flue system • Warning that parts of the appliance, especially the external surfaces, will be hot to touch when in operation and due care will need to be taken • Advice on the adjustment of any air grilles, where fitted	7.3		1)	

¹⁾ The test of the documentation was not part of the test order. Requirements have to be fulfilled.



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on	Requirements	according EN 15821	Test according	Requirem. fulfilled
<u>Marking</u>	Each appliance shall be permanently and legibly marked in a place where it is accessible so that the information can be read when the appliance is in its final location If a label is used it shall be durable and abrasion proof. Under normal operating conditions, the label shall not discolour, thus making the information difficult to read. Self-adhesive labels shall not become detached as a result of moisture or temperature The marking shall contain minimum following information: • The manufacturer's name or registered trade mark • The type or the model • The nominal output in kW or W • The standard number EN 15821 • The measured CO concentration at 13 % oxygen content and the determined appliance efficiency at nominal heat output, as defined in 6.2 and 6.3 • The instruction "follow the user's instructions"; • The minimum clearance distances from combustible materials, in mm • Flue gas temperature at nominal heat output • Minimum dimensions of chimney • Whether or not the appliance can be used in a shared flue • The words "use only natural wood logs as a fuel"	9		1)

¹⁾ The test of the marking was not part of the test order. Requirements have to be fulfilled.

Test installation

Sauna test room	According to DIN EN 15821 A.2.2 Height of the sauna test room 2,1 m Volume and ventilation of the sauna test room see the following annex.
Chimney connection	Vertical spigot Ø 115 mm, vertical extension Ø 115 mm to 150 mm, vertical pipe Ø 150 mm (height 500 mm), elbow 90°, horizontal through the rear wall of the sauna test room.
Measurement section	According to DIN EN 15821, Ø 150 mm
Sauna stove type	Heat 18
Stone weight	122 kg Arrangement of the stones in such a way, that no direct heat radiation from the surface of the steel body to the surrounding. ¹⁾
Firedoor	Firedoor with glass inset
Distance from the side wall	23 cm
Distance from the rear wall	23 cm
Distance to the front	50 cm
Distance from top of stove to the ceiling	134 cm
Distance from top of the horizontal flue gas pipe to the underside of the ceiling	72 cm
Distance from bottom of the stove to floor	4,3 cm (height of feet)
Insulation of the floor (only for the protection of the test room floor)	8 cm thermal insulation from Company Silca GmbH, type Silca 250 KM (German Approval Z-43.14-117)

¹⁾ Arrangement of the stones has to be given in installation manual.

Test fuel

Test fuel specifications according EN 15821, Annex B								
Test fuel	contents [%]							lower calorific value [MJ/kg]
	W	C	H	N	O	S	A	
wood logs beech	12,1	42,7	5,5	0,2	38,6	< 0,1	0,9	15,4



Performance test at nominal heat output according DIN EN 15821, A 4.6					
	re- quire- ment to	test results		average value	Requ. fulfilled
		1	2		

Test conditions

date		02.09.2020			
Volume of sauna room	m ³	18,0			
Ventilation of sauna room	1/h	A.2.2	6		
test fuel	B.2	wood logs beech			
Test load	kg	6.5	2,2	2,2	2,4
Number of logs			2	2	
Number of batch charge	6.5	1	1		

Adjustment combustion air controls for

- Secondary air (not closable)		75 % open			
- Primary air inlet		ash drawer 2 mm open			

Results:

minimum refuelling interval	Min.		30	30	30	
refuelling interval per test period	Min.	6.5	44	48	46	yes
fuel mass flow	kg/h		3,0	2,8	2,9	
heat input	kW		12,9	12,0	12,4	
average flue draught	Pa	6.4	11	12	12	yes
average room temperature outside sauna room	°C	5.2	23	22	23	yes
temperature sauna test room (> 90°) after test period	°C	6.5	100	103	101	yes
average flue gas temperature in the measuring section	°C		231	236	234	
average flue gas temperature behind the spigot	°C		503	495	499	
average CO ₂ -content	%		9,7	8,8	9,2	
average CO-content	ppm		1310	943	1127	
average CO-content (13 % O ₂)	Vol. %	6.2	0,104	0,083	0,093	yes
average CO-content (13 % O ₂)	mg/m ³		1296	1032	1164	
average CO-content	mg/MJ		857	684	771	
average NO _x -content	ppm		60	60	60	
average NO _x -content (13 % O ₂)	mg/m ³		98	108	103	
average NO _x -content	mg/MJ		65	72	69	
average OGC-content	ppm		--	--	--	
average OGC-content (13 % O ₂)	mg/m ³		--	--	--	
average OGC-content	mg/MJ		--	--	--	
average dust-content	mg/m ³		66	37	51	
average dust-content (13 % O ₂)	mg/m ³		43	27	35	
average dust-content	mg/MJ		28	18	23	

Performance test at nominal heat output according DIN EN 15821, A 4.6						
		re- quire- ment to	test results		average value	Requ. fulfilled
			1	2		
losses through specific heat in the flue gases	%		16,4	18,5	17,5	
losses through latent heat in the flue gases	%		0,9	0,7	0,8	
losses through combustible constituents in the residues	%		0,5	0,5	0,5	
efficiency	%	6.3	82,2	80,3	81,3	yes
space heat output (calculated)	kW	6.6	10,6	9,6	10,1	
space heat output (quoted by the manufacturer)	kW	6.6				1)
difference	%	A.5	<10%	<10%		yes
flue gas mass flow	g/s		8,9	9,2	9,1	

1) The calculated heat output is taken into account in the documentation of the manufacturer.
The heat output declared by the manufacturer shall be not higher than the average value calculated.

Test of the temperature of adjacent combustible materials and operating components according DIN EN 15821, A 4.7				
		require- ment to	test results	Requirement fulfilled
max. room temperature outside sauna room (tr)	°C	5.2	23	yes
max. temperature sauna test room after test		6.5	104	yes
max. temperature operating components	°C	5.1	> 100	1)
operating component			--	
max. temp. rear wall (<115 K + tr)	°C	5.2	126	yes
max. temp. side wall (<115 K + tr)	°C	5.2	130	yes
max. temp. floor under the stove (≤ 65 K + tr)	°C	5.2	72	yes
max. temp. ceiling (<115 K + tr)	°C	5.2	118	yes
max. temp. front (<115 K + tr)	°C	5.2	117	yes
max. temp. fuel storage (≤ 65 K + tr)	°C	5.2	--	

1) Temperature of the steel door handle and steel slider for the primary combustion air. The need to use an operating tool and a suitable glove shall be supplied with the appliance and the use be indicated in the instructions.



Temperature safety test according DIN EN 15821, A 4.7				
		requirement to	results	Requ. fulfilled
Date			03.09.2020	
volume of sauna room	m ³		9,0	
Ventilation of sauna room	1/h	A.2.2	6	
Fuel		B.2	wood logs beech	yes
test load (first filling after ignition batch)	kg		9,1	
test load (refuelling)	kg		--	
maximum filling of the firebox				yes
number of refuelling intervals	-		0	
test time until sauna room temperature $\geq 110^{\circ}\text{C}$	h		0,3	
test time from 60 ° to steady state of the temperatures	h		1,1	
adjustment combustion air control:				
- secondary air			100% open	yes
- primary air inlet control			ash drawer 47 mm open	yes ¹⁾
average negative pressure	Pa	A.4.7.3	15	yes
max. room temperature outside sauna room (tr)	$^{\circ}\text{C}$		25	yes
start temperature sauna test room ($\geq 60^{\circ}\text{C}$)	$^{\circ}\text{C}$	A.4.7.3	60	yes
max. temperature sauna test room ($\geq 110^{\circ}\text{C}$)	$^{\circ}\text{C}$	A.4.7.3	127	yes
max. flue gas temperature in the measurement section	$^{\circ}\text{C}$		422	
max. flue gas temperature behind the spigot	$^{\circ}\text{C}$		830	
max. CO-content	%		5,8	
maximum surface temperature at 110°C sauna test room				
- rear wall ($\leq 140\text{ K+ tr}$) at 110°C	$^{\circ}\text{C}$	5.2	147	yes
distance appliance – rear wall	mm		230	
- side wall ($\leq 140\text{ K+ tr}$)	$^{\circ}\text{C}$	5.2	164	yes
distance appliance – side wall	mm		230	
- front stick (in the radiation area) ($\leq 140\text{ K+ tr}$)	$^{\circ}\text{C}$	5.2	159	yes
distance appliance – front (wooden rod)	mm		500	
- floor ($\leq 65\text{ K+ tr}$)	$^{\circ}\text{C}$	5.2	113	²⁾
distance bottom appliance – floor	mm		see Annex A9	
- ceiling ($\leq 140\text{ K+ tr}$)	$^{\circ}\text{C}$	5.2	142	yes
distance appliance – ceiling	mm		see Annex A9	
- fuel storage	$^{\circ}\text{C}$	5.2	--	--
Remarks:				
- No damage of the stove body through testing				
- The need to use an operating tool shall be indicated in the instructions. This tool shall be supplied with the appliance				
¹⁾ This corresponds to the maximum cross-section of the ash box opening at the front				
²⁾ The stove must be installed only on non combustible floor				



List of Measuring Device

QM-No.	Device	Type
QS-33-02M0052	data logger	Ahlborn MA 5690-1
QS-33-02M0122	scale	Sartorius MA 100
QS-33-02M0134	stop watch	Hanhart Prisma 200
QS-33-02M0221	CO/CO ₂ - analyzer	ABB uras 14 CO/CO ₂ -Gasanalysator
QS-33-02M0222	NO/NO _x analyzer	ECO Physics NO/NO _x -Gasanalysator
QS-33-02M0224	OGC analyzer	Testa FID CxHy-Gasanalysator
QS-33-02M0233	dust analyzer	Wöhler SM 96
QS-33-02M0303	pressure gauge, gas	MKS 127AAX-01000AS
QS-33-02M0429	temperature measuring device	Testo 925 mit Oberflächenfühler
QS-33-02M0552	scale	Sartorius Waage 34
QS-33-02M0553	scale	Sartorius Waage 32
QS-33-02M1072	thermocouple	Thermoelement Typ K
QS-33-02M1073	thermocouple	Thermoelement Typ K
QS-33-02M1074	thermocouple	Thermoelement Typ K
QS-33-02M1075	thermocouple	Thermoelement Typ K
QS-33-02M1076	thermocouple	Thermoelement Typ K
QS-33-02M1077	thermocouple	Thermoelement Typ K
QS-33-02M1078	thermocouple	Thermoelement Typ K
QS-33-02M1079	thermocouple	Thermoelement Typ K
QS-33-02M1080	thermocouple	Thermoelement Typ K
QS-33-02M1081	thermocouple	Thermoelement Typ K
QS-33-02M1082	thermocouple	Thermoelement Typ K
QS-33-02M1083	thermocouple	Thermoelement Typ K
QS-33-02M1084	thermocouple	Thermoelement Typ K
QS-33-02M1085	thermocouple	Thermoelement Typ K
QS-33-02M1086	thermocouple	Thermoelement Typ K
QS-33-02M1087	thermocouple	Thermoelement Typ K
QS-33-02M1088	thermocouple	Thermoelement Typ K
QS-33-02M1089	thermocouple	Thermoelement Typ K
QS-33-02M1090	thermocouple	Thermoelement Typ K
QS-33-02M1091	thermocouple	Thermoelement Typ K