

Report No. K23402018T1
Residential space heating appliances
Type testing
DIN EN 14785

Types:
AP021B_0_06
AP021B_0_07
AP021B_0_08
AP021B_0_09
AP021B_0_10

Trademark:
PALAZZETTI

Company:
Palazzetti Lelio S.p.A.



Deutsche
Akkreditierungsstelle
D-PL-11120-04-00

This accreditation is valid only for the listed standards as stated in the accreditation annex of D-PL-11120-04-00

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Publication of page 2 is permitted.

The test results presented in this report refer solely to the test object stated as described on page 2. The report does not represent a general statement about the serial production of the test object and gives not an authorization for use of a TÜV Rheinland test- / certification mark.

Type testing
Residential space heating appliances fired by wood pellets
DIN EN 14785: September 2006
Correction 1 DIN EN 14785: 10/2007

Applicant/contractor: **Palazzetti Lelio S.p.A.**
Via Roveredo, 103
33080 Porcia (PN) - Italy

Trademark: **PALAZZETTI**

Type designation	AP021B_0_06	AP021B_0_07	AP021B_0_08	AP021B_0_09	AP021B_0_10
Total heat input [kW]	3,3 – 6,8	3,3 – 7,7	3,3 – 8,9	3,3 – 10,1	3,3 – 11,4
Nominal heat output [kW]	3,1 – 6,3	3,1 – 7,0	3,1 – 8,0	3,1 – 9,0	3,1 – 10,0

Type of appliances: Residential room sealed heating appliances fired by wood pellets without water heat exchanger, with fan assisted flue discharge and with internal fuel hopper.

Type of fuel charging: automatic load

Fuel: wood pellets
Ø: 6 mm, maximum length: 30 mm,
maximum humidity: 5,5%, Firestixx

Remarks:

All the Types share the same basic construction of the tested one (the stove **AP021B_0_10**) regarding the combustion air inlet, the tightness, the dimensions and the shape of the combustion chamber, the flueways. The only difference between each Type is on the software settings at nominal heat output.

Furthermore, the data of **AP021B_0_07**, **AP021B_0_08** and **AP021B_0_09** have been achieved by linear interpolation between the results of **AP021B_0_06** and **AP021B_0_10**.

Test results:

The technical requirements cl. 4-8 of the above mentioned standard are fulfilled. The local applicable installation conditions are to be observed.

The electrical safety cl. 5.9. of the standard was not a part of this initial type testing.

The presumption of conformity with the relevant European Directives respectively Regulations could only be confirmed by full compliance with Annex ZA.

Dated in Cologne, 2018-06-14
432 / jd

TÜV Rheinland Energy GmbH
Test Centre according to Construction
Product Regulation 305/2011(CPR)
Notified Body: 2456

Assessor:

Report released after review:



B. Sc. J. Duschanek



Dipl.-Ing. A. Pomp

Residential space heating appliances fired by wood pellets, Initial Type Test in accordance with the regulation 305/2011 conformity certification system no. 3

1 Task

The Test Centre for Energy Appliances was instructed to execute the initial type testing on the appliances **AP021B_0_06** and **AP021B_0_10** for the operation with wood pellets according to DIN EN 14785:2006, cl. 4-8.

The electrical safety cl. 5.9. of the standard was not a part of this initial type testing.

The practical tests were carried out in the laboratory in Thiene dated on the 13th until 18th April 2018.

The (FPC) Factory Production Control was not performed.

2 Description of the appliances

2.1 Construction

Residential room sealed heating appliances fired by wood pellets without water heat exchanger for domestic central heating system. The flue discharge for pellet operation is fan assisted. The stoves are equipped with an automatic ignition.

All the appliances can be fitted with an optional firebox lining (refractory material), positioned only on the backside of the combustion room (see Annex A 26). The practical tests were carried out with refractory material.

An additional comparison measurement, without refractory material in the combustion room, was carried out: no relevant differences between the two versions were found.

Combustion air

The combustion air is to be taken from outside.

2.2 General technical data of the pellet stoves

Type:	AP021B_0_06	AP021B_0_07	AP021B_0_08	AP021B_0_09	AP021B_0_10
Nominal heat output:	6,3 kW	7,0 kW	8,0 kW	9,0 kW	10,0 kW
Test fuel:	wood pellets Ø 6 mm, L _{max} 30 mm, max humidity 5,5%, Firestixx				
Total dimension [mm] High x Width x Depth	1131 x 885 x 322				
Flue spigot:	80 mm				
Weight:	140 kg				
Distance of adjacent combustible materials	20 mm (Backside) distance from test wall 200 mm (Side) distance from test wall 1000 mm (Front) distance from test wall				

For more information see appendix A04-A06-A07-A08.2-A22.

3 Testing

The tests were carried out on the 13th until 18th April 2018 in the laboratory of TÜV Rheinland Energy GmbH / CMC Centro Misura Compatibilità in Thiene.

3.1 General requirements

- P (pass)
- NA (not applicable)
- NT (not tested)
- F (fail)

Requirement acc. EN 14785	Clause	Tested Acc.	Requirement Complies
Production documentation	4.1	-	
General construction requirements	4.2	A.4.7	P
Flue spigot or socket	4.3	-	P
Combustion control device	4.4	-	P
Flue ways	4.5	-	P
Cleaning tools	4.6	-	NA
Fire doors	4.7	-	P
Combustion air supply	4.8	-	
- Primary air inlet control	4.8.1	-	P
- Secondary air inlet control	4.8.2	-	NA
Internal flue gas diverter	4.9	-	NA
Retort	4.10	-	P
Ash pan and ash removal	4.11	-	P
Integral boiler	4.12		
- General construction material	4.12.1		
- Nominal minimum wall thickness (steel)	4.12.2		
- Welding seams and welding fillers	4.12.3		
- Minimum wall thicknesses (cast iron)	4.12.4		
- Cast iron parts subject to water pressure	4.12.5		
- Venting of water sections	4.12.6		
- Water tightness	4.12.7		
- Water side connections	4.12.8		
- Boiler internal waterways	4.12.9		
- Design of all water boilers	4.12.9.1		
- Boiler waterways used with indirect water systems	4.12.9.2		
- Boiler waterways used with direct water systems	4.12.9.3		
Control of flue gas	4.13	-	NA
Cleaning of heating surfaces	4.14	-	P

3.2 Safety

Requirement acc. EN 14785	Clause	Tested Acc.	Requirement Complies
Temperatures of adjacent combustible materials	5.1	A.4.7 A.4.9	P
Operating tools	5.2	A.4.7	P*
Safety test for spillage of combustion gas and discharge of embers	5.3	A.4.7 A.4.9	P
Temperature in the fuel hopper	5.4	A.4.9.1	P
Safety against back burning through the fuel conveyor system	5.5	A.4.9.1	P
Safety against overheating the boiler system	5.6	-	NA
Thermal discharge control	5.7	A.4.9.3	NA
Strength and leak tightness of boiler shells	5.8	A.4.7 A.4.9.2	NA
Electrical safety	5.9	EN 50165	NT

*) Detachable handle available for firedoor.

3.3 Performance

Requirement acc. EN 14785	Clause	Tested Acc.	Requirement Complies
Flue draught	6.1	-	P
Flue gas temperature	6.2	A.4.7 A.4.8	P
Carbon monoxide emissions for pellet stoves	6.3	A.4.7 A.4.8	P
Efficient energy utilisation	6.4		
- General	6.4.1	A.4.7	P
- Efficiency at nominal heat output and at reduced heat output	6.4.2	A.4.8	P
Nominal heat output	6.5	A.4.7	P
Reduced heat output	6.6	A.4.8	P
Water heating output	6.7	A.4.7	NA
Space heating output	6.8	A.4.7	P
Capacity of fuel storage	6.9	A.4.7 A.4.8	P
User operations	6.10	A.4.7	P

3.4 Appliance instructions and marking

Requirement acc. EN 14785	Clause	Tested Acc.	Requirement Complies
General	7.1	-	P
Installation instructions	7.2	-	P
User operating instructions	7.3	-	P
Marking	8.0	-	P

3.5 Evaluation of conformity

Requirement acc. EN 14785	Clause	Tested Acc.	Requirement Complies
General	9.1		P
Type testing	9.2		
- Initial type testing	9.2.1		P
- Further type testing	9.2.2		-
Factory production control (FPC)	9.3		
- General	9.3.1		
- Raw materials and components	9.3.2		
- Control of inspection, meas. And test equipment	9.3.3		
- Process control	9.3.4		
- Product inspection, testing and evaluation	9.3.5		
- Material of construction	9.3.5.1		
- Insulation material	9.3.5.2		
- Seals and sealant materials	9.3.5.3		
- Manufacturing checks	9.3.5.4		
- Construction and dimensions	9.3.5.4.1		
- Other checks	9.3.5.4.2		
- Non conforming products	9.3.6		
- Corrective and preventive action	9.3.7		
- Handling, storage, packaging, preservation and delivery	9.3.8		

3.6 Resume of test results

AP021B_0_06		Nominal	Partial	Requirement
Mass of the test fuel fired hourly	kg/h	1,37	0,66	-
Flue gas mass flow	g/s	4,8	3,0	-
Flue gas temperature	°C	122,6	87,7	-
Flue draught	mbar	0,12	0,10	0,12/0,10 +/-0,02
CO ₂ -concentration	Vol.-%	9,7	7,4	-
O ₂ -concentration	Vol.-%	10,8	13,3	-
CO-concentration	ppm	62	189	-
CO-emission (at 13%-O ₂)	mg/m ³	61	244	500/750
CO-emission	mg/kWh	140	565	-
CO-emission	mg/MJ	39	157	-
NO _x -concentration	ppm	91	69	-
NO _x -emission (at 13%-O ₂)	mg/m ³	147	146	-
NO _x -emission	mg/kWh	339	339	-
NO _x -emission	mg/MJ	94	94	-
CnHm-concentration measured acc. CEN/TS 15883	ppm	1	2	-
CnHm-emission (at 13%-O ₂)	mg/m ³	2	3	-
CnHm-emission	mg/kWh	4	7	-
CnHm-emission	mg/MJ	1	2	-
Dust concentration measured acc. CEN/TS 15883 and EN13284-1	mg	7	6	-
Dust emission (at 13%-O ₂)	mg/m ³	17	20	-
Dust emission	mg/kWh	40	46	-
Dust emission	mg/MJ	11	13	-
Total heat output	kW	6,3	3,1	-
Water heat output	kW	-	-	-
Space heat output	kW	6,3	3,1	-
Efficiency	%	92,5	93,6	75/70 (EN14785)

AP021B_0_07		Nominal*	Partial	Requirement
Mass of the test fuel fired hourly	kg/h	1,54	0,66	-
Flue gas mass flow	g/s	5,2	3,0	-
Flue gas temperature	°C	136,3	87,7	-
CO ₂ -concentration	Vol.-%	9,9	7,4	-
O ₂ -concentration	Vol.-%	10,6	13,3	-
CO-concentration	ppm	59	189	-
CO-emission (at 13%-O ₂)	mg/m ³	57	244	500/750
CO-emission	mg/kWh	131	565	-
CO-emission	mg/MJ	36	157	-
NO _x -concentration	ppm	93	69	-
NO _x -emission (at 13%-O ₂)	mg/m ³	147	146	-
NO _x -emission	mg/kWh	339	339	-
NO _x -emission	mg/MJ	94	94	-
CnHm-concentration measured acc. CEN/TS 15883	ppm	1	2	-
CnHm-emission (at 13%-O ₂)	mg/m ³	2	3	-
CnHm-emission	mg/kWh	5	7	-
CnHm-emission	mg/MJ	1	2	-
Dust concentration measured acc. CEN/TS 15883 and EN13284-1	mg	7	6	-
Dust emission (at 13%-O ₂)	mg/m ³	17	20	-
Dust emission	mg/kWh	41	46	-
Dust emission	mg/MJ	11	13	-
Total heat output	kW	7,0	3,1	-
Water heat output	kW	-	-	-
Space heat output	kW	7,0	3,1	-
Efficiency	%	91,7	93,6	75/70 (EN14785)

* The results of **AP021B_0_07** are achieved by linear interpolation between the results of **AP021B_0_06** and **AP021B_0_10**.

AP021B_0_08		Nominal**	Partial	Requirement
Mass of the test fuel fired hourly	kg/h	1,79	0,66	-
Flue gas mass flow	g/s	5,9	3,0	-
Flue gas temperature	°C	156,5	87,7	-
CO ₂ -concentration	Vol.-%	10,3	7,4	-
O ₂ -concentration	Vol.-%	10,2	13,3	-
CO-concentration	ppm	54	189	-
CO-emission (at 13%-O ₂)	mg/m ³	51	244	500/750
CO-emission	mg/kWh	118	565	-
CO-emission	mg/MJ	33	157	-
NO _x -concentration	ppm	96	69	-
NO _x -emission (at 13%-O ₂)	mg/m ³	147	146	-
NO _x -emission	mg/kWh	340	339	-
NO _x -emission	mg/MJ	94	94	-
CnHm-concentration measured acc. CEN/TS 15883	ppm	2	2	-
CnHm-emission (at 13%-O ₂)	mg/m ³	3	3	-
CnHm-emission	mg/kWh	6	7	-
CnHm-emission	mg/MJ	1	2	-
Dust concentration measured acc. CEN/TS 15883 and EN13284-1	mg	7	6	-
Dust emission (at 13%-O ₂)	mg/m ³	18	20	-
Dust emission	mg/kWh	42	46	-
Dust emission	mg/MJ	11	13	-
Total heat output	kW	8,0	3,1	-
Water heat output	kW	-	-	-
Space heat output	kW	8,0	3,1	-
Efficiency	%	90,4	93,6	75/70 (EN14785)

** The results of **AP021B_0_08** are achieved by linear interpolation between the results of **AP021B_0_06** and **AP021B_0_10**.

AP021B_0_09		Nominal***	Partial	Requirement
Mass of the test fuel fired hourly	kg/h	2,03	0,66	-
Flue gas mass flow	g/s	6,5	3,0	-
Flue gas temperature	°C	175,8	87,7	-
CO ₂ -concentration	Vol.-%	10,6	7,4	-
O ₂ -concentration	Vol.-%	9,9	13,3	-
CO-concentration	ppm	50	189	-
CO-emission (at 13%-O ₂)	mg/m ³	45	244	500/750
CO-emission	mg/kWh	105	565	-
CO-emission	mg/MJ	29	157	-
NO _x -concentration	ppm	100	69	-
NO _x -emission (at 13%-O ₂)	mg/m ³	148	146	-
NO _x -emission	mg/kWh	340	339	-
NO _x -emission	mg/MJ	95	94	-
CnHm-concentration measured acc. CEN/TS 15883	ppm	2	2	-
CnHm-emission (at 13%-O ₂)	mg/m ³	3	3	-
CnHm-emission	mg/kWh	7	7	-
CnHm-emission	mg/MJ	2	2	-
Dust concentration measured acc. CEN/TS 15883 and EN13284-1	mg	8	6	-
Dust emission (at 13%-O ₂)	mg/m ³	18	20	-
Dust emission	mg/kWh	43	46	-
Dust emission	mg/MJ	12	13	-
Total heat output	kW	9,0	3,1	-
Water heat output	kW	-	-	-
Space heat output	kW	9,0	3,1	-
Efficiency	%	89,3	93,6	75/70 (EN14785)

*** The results of **AP021B_0_09** are achieved by linear interpolation between the results of **AP021B_0_06** and **AP021B_0_10**.

AP021B_0_10		Nominal	Partial	Requirement
Mass of the test fuel fired hourly	kg/h	2,29	0,66	-
Flue gas mass flow	g/s	7,2	3,0	-
Flue gas temperature	°C	196,8	87,7	-
Flue draught	mbar	0,12	0,10	0,12/0,10 +/-0,02
CO ₂ -concentration	Vol.-%	11,0	7,4	-
O ₂ -concentration	Vol.-%	9,5	13,3	-
CO-concentration	ppm	45	189	-
CO-emission (at 13%-O ₂)	mg/m ³	39	244	500/750
CO-emission	mg/kWh	91	565	-
CO-emission	mg/MJ	25	157	-
NO _x -concentration	ppm	103	69	-
NO _x -emission (at 13%-O ₂)	mg/m ³	148	146	-
NO _x -emission	mg/kWh	341	339	-
NO _x -emission	mg/MJ	95	94	-
CnHm-concentration measured acc. CEN/TS 15883	ppm	3	2	-
CnHm-emission (at 13%-O ₂)	mg/m ³	4	3	-
CnHm-emission	mg/kWh	8	7	-
CnHm-emission	mg/MJ	2	2	-
Dust concentration measured acc. CEN/TS 15883 and EN13284-1	mg	8	6	-
Dust emission (at 13%-O ₂)	mg/m ³	19	20	-
Dust emission	mg/kWh	44	46	-
Dust emission	mg/MJ	12	13	-
Total heat output	kW	10,0	3,1	-
Water heat output	kW	-	-	-
Space heat output	kW	10,0	3,1	-
Efficiency	%	88,0	93,6	75/70 (EN14785)

3.7 Temperatures

AP021B_0_10			
Maximum temperatures at trihedron:			
- Right side	°C	53,4	65 K over t_{ambient}
- Back side	°C	49,3	65 K over t_{ambient}
- Front side 100 cm	°C	49,0	65 K over t_{ambient}
- Front side bottom	°C	46,7	65 K over t_{ambient}
Distances:			
- Backside-Pelletstove	mm	20	
- Side-Pelletstove	mm	200	
- Front-Pelletstove	mm	1000	
Ambient temperature	°C	23,4	
Max. temperature in fuel hopper	°C	68,1	65 K over t_{ambient}
Max. temperature of operating tools (handle of fuel hopper)	°C	53,4	35 K over t_{ambient}

Detachable handle for firedoor available.
For detailed test results see appendix A 02.

3.8 Leakage test

AP021B_0_06		Before mechanical and thermal tests	After mechanical tests	After mechanical and thermal tests	Limit
Leakage test of combustion room at 5 Pa	m³/h	0,39	0,4	0,42	-
Leakage test of combustion room at 10 Pa	m³/h	0,54	0,6	0,65	2,0
Leakage test of combustion room at 15 Pa	m³/h	0,7	0,83	0,85	-
Leakage test of combustion room at 50 Pa (acc. to EN613, cl. 6.2.2.2)	m³/h	1,46	-	-	1,7

AP021B_0_10		Before mechanical and thermal tests	After mechanical tests	After mechanical and thermal tests	Limit
Leakage test of combustion room at 5 Pa	m³/h	0,39	0,4	0,42	-
Leakage test of combustion room at 10 Pa	m³/h	0,54	0,6	0,65	2,0
Leakage test of combustion room at 15 Pa	m³/h	0,7	0,83	0,85	-
Leakage test of combustion room at 50 Pa (acc. EN613, cl. 6.2.2.2)	m³/h	1,46	-	-	2,9

Leakage test has been carried out without additional flue gas exhaust pipes / air inlet combustion pipes.

4 Statement of the test results

The appliances

AP021B_0_06
AP021B_0_07
AP021B_0_08
AP021B_0_09
AP021B_0_10

of the company

Palazzetti Lelio S.p.A.

comply for the operation with wood pellets with the requirements acc.
DIN EN 14785: September 2006, cl.4-8.

The technical requirements cl. 4-8 of the above mentioned standard are fulfilled. The local applicable installation conditions are to be observed.

The electrical safety cl. 5.9. of the standard was not a part of this initial type testing.

The presumption of conformity with the relevant European Directives respectively Regulations could only be confirmed by full compliance with Annex ZA.

The test results presented in this report refer solely to the test object stated as described on page 2. The report does not represent a general statement about the serial production of the test object and gives not an authorization for use of a TÜV Rheinland test- / certification mark.

5 Test documents

Appendix A 01 Fuel Data

Appendix A 02 Test results

Appendix A 03 Measurement Instruments

Appendix	Subject	Reference
A 04	Type labels	
A 05	EU Declaration of conformity	21/05/2018
A 06	Essential requirements declarations EN 14785	21/05/2018 22/05/2018
A 07	Declarations of Performances	
A 08.1	User and installation manual	004776830
A 08.2	Manual with cleaning instructions and technical data	004776820
A 08.3	Operating instructions manual	004776500
A 09	List of electrical components	22/05/2018
A 10	Combustion air motor datasheet and declaration of conformity	BLXMS00003 EU DoC – 16/12/2013
A 11	Ignition resistance datasheet and declaration of conformity	PSx-2-240-B EU DoC – 26/02/2014
A 12	Electrical wiring diagram with internal connections for control board	00 472 3681_06-2013 FUMIS ALPHA 65-230
A 13	Auger motor datasheet and declaration of conformity	GMFE 200D95 EU DoC – 16/12/2013
A 14	Fuel temperature limiter datasheet, certificate and declaration of conformity	710 V EU DoC – 11/05/2016 Certif. 129102
A 15	Air pressure switch datasheet, declaration of conformity and certificate	DDS 605 EU DoC – 20/04/2016 Certif. 12-0638-GEA
A 16	Convection air fan datasheet and declaration of conformity	R2E190-RA26-14 EU DoC – 03/11/2015
A 17	Firedoor safety microswitch - datasheet and declaration of conformity	MF 08-T2 EU DoC – 09/11/2007
A 18	Fuel hopper lid safety microswitch - datasheet and declaration of conformity	MKW12D10 EU DoC - 09/11/2007
A 19.1	Gasket datasheet	TESPE
A 19.2	Fuel hopper lid gasket	EMKA
A 20	Firedoor glass technical details	SCHOTT

A 21	Software settings	
A 22	Overview drawings with dimensions and minimum flueways dimension	
A 23	Drawings of loading system	1157RM14502 1157RM75517
A 24	Drawing of fuel hopper	1157RM15500
A 25	Drawing of burner	165510210
A 26	Drawing of optional backside internal wall of combustion room (vermiculite)	1157RM16527

Appendix A 01

Fuel data AP021B_0_06

Test at nominal load																																															
Verbrennungsrechnung aus der Elementaranalyse																																															
nach DIN EN 304 Teil 2, Ausgabe 01/2004																																															
nach DIN 4702 Teil 2, Ausgabe 3/1990																																															
Analysis from:			26/02/2018			Analysis No.			Fuel sampling date:																																						
Fuel:			wood pellets			1801775-001			19/02/18																																						
Bestandteil im Brennstoff	Stoffanteil	Sauerstoffbedarf		Abgasbestandteile aus Brennstoff in Nm³/kg Brennstoff																																											
		in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	CO₂		SO₂		H₂O		N₂																																					
	Gew. %		Stoffanteil x																																												
			Sauerstoff- Bedarf	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff																																				
c	47,400	1,860	0,882	1,850	0,8769	-	-	-	-	-	-																																				
s	0,001	0,700	0,000	-	-	0,680	0,0000	-	-	-	-																																				
h	5,980	5,550	0,332	-	-	-	-	11,100	0,6638	-	-																																				
n	0,090	-	-	-	-	-	-	-	-	0,80	0,0007																																				
o	40,900	-0,700	-0,286	-	-	-	-	-	-	-	-																																				
wasser	5,500	-	-	-	-	-	-	1,240	0,0682	-	-																																				
asche	0,129	-	-	-	-	-	-	-	-	-	-																																				
summe	100,000	O min=	0,927	V CO₂ =	0,8769	V SO₂ =	0,0000	V W =	0,7320	V N₂ =	0,0007																																				
<div><div>Luftbedarf</div><div>trockene stöchiometrische Abgasmenge</div><div>Max. Kohlenstoffdioxid-Anteil</div><div>Wasserdampfmenge</div></div> <div><div>L min =</div><div>V A tr min =</div><div>CO₂ max =</div><div>V w =</div><div>V A tr min/ L min =</div></div> <div><div>4,4154 Nm³/kg Brennstoff</div><div>4,3651 Nm³/kg Brennstoff</div><div>20,0890 Vol.-%</div><div>0,7320 Nm³/kg Brennstoff</div><div>0,9886</div></div> <tr><td colspan="12"><div>Heizwert, wf</div><div><div>Hu =</div><div>19014 kJ/kg</div><div>5,282 kWh/kg</div></div><tr><td colspan="12">Berechnungen zum Versuchszeitpunkt</td></tr><tr><td colspan="12"><div><div>wasser</div><div>zum Versuchszeitpunkt</div><div>Heizwert, roh zum Versuchszeitpunkt</div></div><div><div>w =</div><div>Hu</div><div>5,500 Gew. %</div><div>17834 kJ/kg</div></div></td></tr></td></tr>												<div>Heizwert, wf</div> <div><div>Hu =</div><div>19014 kJ/kg</div><div>5,282 kWh/kg</div></div> <tr><td colspan="12">Berechnungen zum Versuchszeitpunkt</td></tr> <tr><td colspan="12"><div><div>wasser</div><div>zum Versuchszeitpunkt</div><div>Heizwert, roh zum Versuchszeitpunkt</div></div><div><div>w =</div><div>Hu</div><div>5,500 Gew. %</div><div>17834 kJ/kg</div></div></td></tr>												Berechnungen zum Versuchszeitpunkt												<div><div>wasser</div><div>zum Versuchszeitpunkt</div><div>Heizwert, roh zum Versuchszeitpunkt</div></div> <div><div>w =</div><div>Hu</div><div>5,500 Gew. %</div><div>17834 kJ/kg</div></div>											
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Test at reduced load											
Verbrennungsrechnung aus der Elementaranalyse											
nach DIN EN 304 Teil 2, Ausgabe 01/2004											
nach DIN 4702 Teil 2, Ausgabe 3/1990											
Analysis from:				Analysis No.				Fuel sampling date:			
Fuel:				1801775-001				19/02/18			
26/02/2018				wood pellets							
Bestandteil im Brennstoff	Stoffanteil	Sauerstoffbedarf		Abgasbestandteile aus Brennstoff in Nm³/kg Brennstoff							
		in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	CO₂		SO₂		H₂O		N₂	
	Gew. %		Stoffanteil x	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff
c	47,400	1,860	0,882	1,850	0,8769	-	-	-	-	-	-
s	0,001	0,700	0,000	-	-	0,680	0,0000	-	-	-	-
h	5,980	5,550	0,332	-	-	-	-	11,100	0,6638	-	-
n	0,090	-	-	-	-	-	-	-	-	0,80	0,0007
o	40,900	-0,700	-0,286	-	-	-	-	-	-	-	-
wasser	5,500	-	-	-	-	-	-	1,240	0,0682	-	-
asche	0,129	-	-	-	-	-	-	-	-	-	-
summe	100,000	O min=	0,927	V CO₂ =	0,8769	V SO₂ =	0,0000	V W =	0,7320	V N₂ =	0,0007
Luftbedarf L min = 4,4154 Nm³/kg Brennstoff											
trockene stöchiometrische Abgasmenge V A tr min = 4,3651 Nm³/kg Brennstoff											
Max. Kohlenstoffdioxid-Anteil CO₂ max = 20,0890 Vol.-%											
Wasserdampfmenge V w = 0,7320 Nm³/kg Brennstoff											
V A tr min/ L min = 0,9886											
Heizwert, wf Hu = 19014 kJ/kg											
5,282 kWh/kg											
Berechnungen zum Versuchszeitpunkt											
wasser zum Versuchszeitpunkt w = 5,500 Gew. %											
Heizwert, roh zum Versuchszeitpunkt Hu 17834 kJ/kg											

Fuel data AP021B_0_10

Test at nominal load											
Verbrennungsrechnung aus der Elementaranalyse											
nach DIN EN 304 Teil 2, Ausgabe 01/2004											
nach DIN 4702 Teil 2, Ausgabe 3/1990											
Analysis from:			26/02/2018			Analysis No.			Fuel sampling date:		
Fuel:			wood pellets			1801775-001			19/02/18		
Bestandteil im Brennstoff	Stoffanteil	Sauerstoffbedarf		Abgasbestandteile aus Brennstoff in Nm³/kg Brennstoff							
		in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	CO₂		SO₂		H₂O		N₂	
	Gew. %		Stoffanteil x								
			Sauerstoff- Bedarf	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff
c		47,400	1,860	0,882	1,850	0,8769	-	-	-	-	-
s		0,001	0,700	0,000	-	-	0,680	0,0000	-	-	-
h		5,980	5,550	0,332	-	-	-	-	11,100	0,6638	-
n	0,090	-	-	-	-	-	-	-	-	0,80	0,0007
o	40,900	-0,700	-0,286	-	-	-	-	-	-	-	-
wasser	5,500	-	-	-	-	-	-	1,240	0,0682	-	-
asche	0,129	-	-	-	-	-	-	-	-	-	-
summe	100,000	O min=	0,927	V CO₂ =	0,8769	V SO₂ =	0,0000	V W =	0,7320	V N₂ =	0,0007
Luftbedarf				L min = 4,4154 Nm³/kg Brennstoff							
trockene stöchiometrische Abgasmenge				V A tr min = 4,3651 Nm³/kg Brennstoff							
Max. Kohlenstoffdioxid-Anteil				CO₂ max = 20,0890 Vol.-%							
Wasserdampfmenge				V w = 0,7320 Nm³/kg Brennstoff							
				V A tr min/ L min = 0,9886							
Heizwert, wf				Hu = 19014 kJ/kg							
				5,282 kWh/kg							
Berechnungen zum Versuchszeitpunkt											
wasser zum Versuchszeitpunkt				w = 5,500 Gew. %							
Heizwert, roh zum Versuchszeitpunkt				Hu 17834 kJ/kg							

Test at reduced load											
Verbrennungsrechnung aus der Elementaranalyse											
nach DIN EN 304 Teil 2, Ausgabe 01/2004											
nach DIN 4702 Teil 2, Ausgabe 3/1990											
Analysis from:				26/02/2018				Analysis No.			
Fuel:				wood pellets				1801775-001			
								Fuel sampling date:			
								19/02/18			
Bestandteil im Brennstoff	Stoffanteil	Sauerstoffbedarf		Abgasbestandteile aus Brennstoff in Nm³/kg Brennstoff							
		in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	CO₂		SO₂		H₂O		N₂	
	Gew. %		Stoffanteil x								
			Sauerstoff- Bedarf	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff	in Nm³ je kg Bestandteil	in Nm³ je kg Brennstoff
c	47,400	1,860	0,882	1,850	0,8769	-	-	-	-	-	-
s	0,001	0,700	0,000	-	-	0,680	0,0000	-	-	-	-
h	5,980	5,550	0,332	-	-	-	-	11,100	0,6638	-	-
n	0,090	-	-	-	-	-	-	-	-	0,80	0,0007
o	40,900	-0,700	-0,286	-	-	-	-	-	-	-	-
wasser	5,500	-	-	-	-	-	-	1,240	0,0682	-	-
asche	0,129	-	-	-	-	-	-	-	-	-	-
summe	100,000	O min=	0,927	V CO₂ =	0,8769	V SO₂ =	0,0000	V W =	0,7320	V N₂ =	0,0007
Luftbedarf L min = 4,4154 Nm³/kg Brennstoff											
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Max. Kohlenstoffdioxid-Anteil CO₂ max = 20,0890 Vol.-%											
Wasserdampfmenge V w = 0,7320 Nm³/kg Brennstoff											
V A tr min/ L min = 0,9886											
Heizwert, wf Hu = 19014 kJ/kg											
5,282 kWh/kg											
Berechnungen zum Versuchszeitpunkt											
wasser	zum Versuchszeitpunkt			w =	5,500 Gew. %						
Heizwert, roh	zum Versuchszeitpunkt			Hu	17834 kJ/kg						

Appendix 02

Test results

Report- No.		K23402018T1		
TÜV- order- No.		21243237		
Manufacturer		Palazzetti Lelio S.p.A.		
Construction type		Residential room sealed heating appliances fired by wood pellets without water heat exchanger, with fan assisted flue discharge and with internal fuel hopper		
max. working temperature	°C	Not applicable		
max. working pressure	bar	Not applicable		
Type of fuel charging		automatic load		
Special properties / Remarks		-		
Special properties		room sealed		
Type designation		AP021B_0_06		
Test place		Thiene		
Standard		DIN EN 14785:10.2006, Correction 1: 10.2007		
Type of test		Test at nominal load		
Heat input from manufacturer	kW	6,8		
Heat output from manufacturer	kW	6,3		
		1. test	2. test	Average
Test date		16/04/2018	16/04/2018	
Time		09:20-12:20	12:20-15:20	
Ambient:				
Barometric pressure	mbar	1010	1010	1010
Temperature of combustion air	°C	23,6	25,6	24,6
Ambient rel. humidity	%	54,0	54,0	54,0
Ambient temperature (room)	°C	23,6	25,6	24,6
Type of Fuel		wood pellets		
Properties of Fuel		Ø 6 mm, Lmax 30 mm, max humidity 5,5% Firestixx		
Number of fuel loadings		1	1	
Weight of the stove, start, measurement	kg	203,4	199,3	
Weight of the stove, end, measurement	kg	199,3	195,1	
Fuel consumption, calculated of the difference	kg	4,1	4,1	
Test duration	sec	10800	10800	
Fuel consumption "B"	kg/h	1,37	1,38	1,37
Calculation of losses in the ash (yes = 1, no = 0)	Gew . %	25,0	25,0	25,0
Residue passing through the grate, measurement	kg	0,00	0,00	0,00
Residue passing through the grate "R"	Gew . %	0,000	0,000	0,000
Carbon content of the residue passing through the grate "Cr" depending of 1kg fuel	Gew . %	0,104	0,104	0,104
Water side, measurement				
Flow , measurement	°C	0,0	0,0	0,0
Return, measurement	°C	0,0	0,0	0,0
Delta T	K	0,0	0,0	0,0
Cold water flow , measurement	kg/h	0,0	0,0	0,0
Additional energy of the pump	kW	0,00	0,00	0,00
Flue, average				
Flue gas temperature, measurement	°C	120,0	125,2	122,6
Flue draught, measurement	Pa	12,0	12,0	12,0
O2 - concentration, calculated	Vol.-%	10,8	10,9	10,8
CO2 - concentration, measurement	Vol.-%	9,8	9,7	9,7
lambda value, l	-	2,041	2,061	2,051

CO - concentration, measurement	ppm	89	35	62
CO - concentration, measurement	Vol.-%	0,009	0,003	0,006
CO - concentration, measurement	mg/m³	111	43	77
CO - concentr. (at 13% - O2)	Vol.-%	0,007	0,003	0,005
CO - concentr. (at 13% - O2)	mg/m³	87	34	61
CO - concentration rel. to fuel input	mg/kWh	201	79	140
CO - concentration rel. to fuel input	mg/MJ	56	22	39
NOx - concentration, measurement	ppm	92	90	91
NOx - concentration, measurement	mg/m³	189	184	187
NOx - concentr. (at 13% - O2)	mg/m³	148	145	147
NOx - concentration rel. to fuel input	mg/kWh	343	336	339
NOx - concentration rel. to fuel input	mg/MJ	95	93	94
CnHm concentration, measurement	ppm	1	1	1
CnHm concentration, measurement	mg/m³	2	2	2
CnHm concentr. (at 13% - O2)	mg/m³	1	2	2
CnHm - concentration (total C) rel. to fuel input	mg/kWh	3	4	4
CnHm - concentration (total C) rel. to fuel input	mg/MJ	1	1	1
Dust, measurement*	mg	7		7
Dust, measurement*	mg/m³	22		22
Dust (at 13% - O2)*	mg/m³	17		17
Dust* rel. to fuel input	mg/kWh	40		40
Dust* rel. to fuel input	mg/MJ	11		11
PME concentration (at 13% - O2)*	mg/m³	18		18
Electrical consumption				
Rated electrical power (max)	W		320	
Electrical consumption (at nominal heat output) - acc. EN 15456	W		60	
Electrical consumption (at minimum heat output) - acc. EN 15456	W		30	
PSTBY (during stand-by) - acc. IEC 62301	W		1,6	
Calculation				
"Qa" loss free heating flue gas	kJ/kg	1274,5	1328,6	1301,6
"qa" loss flue gas	%	7,1	7,4	7,3
"Qb" loss fix heating in flue gas	kJ/kg	10,1	4,0	7,1
"qb" loss fix heating in flue gas	%	0,057	0,022	0,040
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	0,0	0,0	0,0
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,200	0,200	0,200
"m" flue gas mass flow	g/s	4,7	4,8	4,8
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m³K)	1,34	1,34	1,34
cpm-H2O	kJ/(m³K)	1,51	1,51	1,51
"eta" Efficiency (direct), to consider only water heating output Pw	%	not applicable	not applicable	not applicable
"eta" Efficiency (indirect)	%	92,6	92,3	92,5
Heating input	kW	6,8	6,8	6,8
"P" heating output, total	kW	6,3	6,3	6,3
"Pw" water heating output	kW	0,0	0,0	0,0
Space heating output: PSTR = P - Pw	kW	6,3	6,3	6,3
Space heating output, relating to heat input	%	92,6	92,3	92,5
Water heating output, relating to heat input	%	0,0	0,0	0,0
Adjustments				
Air inlet delta	Δp	280	280	
Convection air fan	Volts	230	230	
Fuel motor	s	2,5 ON/3,5 OFF	2,5 ON/3,5 OFF	
Cleaning time	s	-	-	

Report- No.		K23402018T1
TÜV- order- No.		21243237
Manufacturer		Palazzetti Lelio S.p.A.
Construction type		Residential room sealed heating appliances fired by wood pellets without water heat exchanger, with fan assisted flue discharge and with internal fuel hopper
max. working temperature	°C	Not applicable
max. working pressure	bar	Not applicable
Type of fuel charging		automatic load
Special properties / Remarks		-
Special properties		room sealed
Type designation		AP021B_0_06
Test place		Thiene
Standard		DIN EN 14785:10.2006, Correction 1: 10.2007
Type of test		Test at reduced load
Heat input from manufacturer	kW	3,3
Heat output from manufacturer	kW	3,1
		1. test
Test date		17/04/2018
Time		09:00-15:00
Ambient:		
Barometric pressure	mbar	1020
Temperature of combustion air	°C	24,3
Ambient rel. humidity	%	60,0
Ambient temperature (room)	°C	24,3
Type of Fuel		wood pellets
Properties of Fuel		Ø 6 mm, Lmax 30 mm, max humidity 5,5% Firestixx
Number of fuel loadings		1
Weight of the stove, start, measurement	kg	198,3
Weight of the stove, end, measurement	kg	194,3
Fuel consumption, calculated of the difference	kg	3,9
Test duration	sec	21600
Fuel consumption "B"	kg/h	0,66
Calculation of losses in the ash (yes = 1, no = 0)	Gew . %	25,0
Residue passing through the grate, measurement	kg	0,00
Residue passing through the grate "R"	Gew . %	0,000
Carbon content of the residue passing through the grate "Cr" depending of 1kg fuel	Gew . %	0,104
Water side, measurement		
Flow , measurement	°C	0,0
Return, measurement	°C	0,0
Delta T	K	0,0
Cold water flow , measurement	kg/h	0,0
Additional energy of the pump	kW	0,00
Flue, average		
Flue gas temperature, measurement	°C	87,7
Flue draught, measurement	Pa	10,0
O2 - concentration, calculated	Vol.-%	13,3
CO2 - concentration, measurement	Vol.-%	7,4
lambda value, l	-	2,697

CO - concentration, measurement	ppm	189
CO - concentration, measurement	Vol.-%	0,019
CO - concentration, measurement	mg/m³	236
CO - concentr. (at 13% - O2)	Vol.-%	0,020
CO - concentr. (at 13% - O2)	mg/m³	244
CO - concentration rel. to fuel input	mg/kWh	565
CO - concentration rel. to fuel input	mg/MJ	157
NOx - concentration, measurement	ppm	69
NOx - concentration, measurement	mg/m³	142
NOx - concentr. (at 13% - O2)	mg/m³	146
NOx - concentration rel. to fuel input	mg/kWh	339
NOx - concentration rel. to fuel input	mg/MJ	94
CnHm concentration, measurement	ppm	2
CnHm concentration, measurement	mg/m³	3
CnHm concentr. (at 13% - O2)	mg/m³	3
CnHm - concentration (total C) rel. to fuel input	mg/kWh	7
CnHm - concentration (total C) rel. to fuel input	mg/MJ	2
Dust, measurement*	mg	6
Dust, measurement*	mg/m³	19
Dust (at 13% - O2)*	mg/m³	20
Dust* rel. to fuel input	mg/kWh	46
Dust* rel. to fuel input	mg/MJ	13
PME concentration (at 13% - O2)*	mg/m³	21
Electrical consumption		
Rated electrical power (max)	W	320
Electrical consumption (at nominal heat output) - acc. EN 15456	W	60
Electrical consumption (at minimum heat output) - acc. EN 15456	W	30
PSTBY (during stand-by) - acc. IEC 62301	W	1,6
Calculation		
"Qa" loss free heating flue gas	kJ/kg	1073,6
"qa" loss flue gas	%	6,0
"Qb" loss fix heating in flue gas	kJ/kg	28,4
"qb" loss fix heating in flue gas	%	0,159
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	0,0
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,200
"m" flue gas mass flow	g/s	3,0
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m³K)	1,33
cpm-H2O	kJ/(m³K)	1,50
"eta" Efficiency (direct), to consider only water heating output Pw	%	not applicable
"eta" Efficiency (indirect)	%	93,6
Heating input	kW	3,3
"P" heating output, total	kW	3,1
"Pw" water heating output	kW	0,0
Space heating output: PSTR = P - Pw	kW	3,1
Space heating output, relating to heat input	%	93,6
Water heating output, relating to heat input	%	0,0
Adjustments		
Air inlet delta	Δp	112
Convection air fan	Volts	120
Fuel motor	s	1,1 ON/4,9 OFF
Cleaning time	s	-

The tests were carried out under the conditions of DIN EN 14785:2006

Report- No.		K23402018T1		
TÜV- order- No.		21243237		
Manufacturer		Palazzetti Lelio S.p.A.		
Construction type		Residential room sealed heating appliances fired by wood pellets without water heat exchanger, with fan assisted flue discharge and with internal fuel hopper		
max. working temperature	°C	Not applicable		
max. working pressure	bar	Not applicable		
Type of fuel charging		automatic load		
Special properties / Remarks		-		
Special properties		room sealed		
Type designation		AP021B_0_10		
Test place		Thiene		
Standard		DIN EN 14785:10.2006, Correction 1: 10.2007		
Type of test		Test at nominal load		
Heat input from manufacturer	kW	11,4		
Heat output from manufacturer	kW	10,0		
		1. test	2. test	Average
Test date		13/04/2018	13/04/2018	
Time		09:20-12:20	12:20-15:20	
Ambient:				
Barometric pressure	mbar	1012	1012	1012
Temperature of combustion air	°C	21,9	23,4	22,6
Ambient rel. humidity	%	60,0	60,0	60,0
Ambient temperature (room)	°C	21,9	23,4	22,6
Type of Fuel		wood pellets		
Properties of Fuel		Ø 6 mm, Lmax 30 mm, max humidity 5,5% Firestixx		
Number of fuel loadings		1	1	
Weight of the stove, start, measurement	kg	204,4	197,9	
Weight of the stove, end, measurement	kg	197,4	191,1	
Fuel consumption, calculated of the difference	kg	6,9	6,8	
Test duration	sec	10800	10800	
Fuel consumption "B"	kg/h	2,32	2,27	2,29
Calculation of losses in the ash (yes = 1, no = 0)	Gew . %	25,0	25,0	25,0
Residue passing through the grate, measurement	kg	0,00	0,00	0,00
Residue passing through the grate "R"	Gew . %	0,000	0,000	0,000
Carbon content of the residue passing through the grate "Cr" depending of 1 kg fuel	Gew . %	0,000	0,000	0,000
Water side, measurement				
Flow , measurement	°C	0,0	0,0	0,0
Return, measurement	°C	0,0	0,0	0,0
Delta T	K	0,0	0,0	0,0
Cold water flow , measurement	kg/h	0,0	0,0	0,0
Additional energy of the pump	kW	0,00	0,00	0,00
Flue, average				
Flue gas temperature, measurement	°C	197,2	196,5	196,8
Flue draught, measurement	Pa	12,0	12,0	12,0
O2 - concentration, calculated	Vol.-%	9,5	9,6	9,5
CO2 - concentration, measurement	Vol.-%	11,0	10,9	11,0
lambda value, l	-	1,817	1,830	1,824

CO - concentration, measurement	ppm	45	45	45
CO - concentration, measurement	Vol.-%	0,005	0,004	0,004
CO - concentration, measurement	mg/m³	56	56	56
CO - concentr. (at 13% - O2)	Vol.-%	0,003	0,003	0,003
CO - concentr. (at 13% - O2)	mg/m³	39	39	39
CO - concentration rel. to fuel input	mg/kWh	91	91	91
CO - concentration rel. to fuel input	mg/MJ	25	25	25
NOx - concentration, measurement	ppm	104	102	103
NOx - concentration, measurement	mg/m³	213	210	211
NOx - concentr. (at 13% - O2)	mg/m³	148	147	148
NOx - concentration rel. to fuel input	mg/kWh	342	340	341
NOx - concentration rel. to fuel input	mg/MJ	95	95	95
CnHm concentration, measurement	ppm	4	3	3
CnHm concentration, measurement	mg/m³	6	5	5
CnHm concentr. (at 13% - O2)	mg/m³	4	3	4
CnHm - concentration (total C) rel. to fuel input	mg/kWh	9	7	8
CnHm - concentration (total C) rel. to fuel input	mg/MJ	3	2	2
Dust, measurement*	mg	8		8
Dust, measurement*	mg/m³	27		27
Dust (at 13% - O2)*	mg/m³	19		19
Dust* rel. to fuel input	mg/kWh	44		44
Dust* rel. to fuel input	mg/MJ	12		12
PME concentration (at 13% - O2)*	mg/m³	21		21
Electrical consumption				
Rated electrical power (max)	W		320	
Electrical consumption (at nominal heat output)	W		68	
Electrical consumption (at minimum heat output)	W		30	
PSTBY (during stand-by)	W		1,6	
Calculation				
"Qa" loss free heating flue gas	kJ/kg	2111,8	2096,7	2104,3
"qa" loss flue gas	%	11,84	11,76	11,80
"Qb" loss fix heating in flue gas	kJ/kg	4,59	4,58	4,59
"qb" loss fix heating in flue gas	%	0,03	0,03	0,03
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	0,00	0,00	0,00
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,20	0,20	0,20
"m" flue gas mass flow	g/s	7,2	7,1	7,2
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m³K)	1,36	1,36	1,36
cpm-H2O	kJ/(m³K)	1,52	1,52	1,52
"eta" Efficiency (direct), to consider only water heating output Pw	%	not applicable	not applicable	not applicable
"eta" Efficiency (indirect)	%	87,9	88,0	88,0
Heating input	kW	11,5	11,2	11,4
"P" heating output, total	kW	10,1	9,9	10,0
"Pw" water heating output	kW	0,0	0,0	0,0
Space heating output: PSTR = P - Pw	kW	10,1	9,9	10,0
Space heating output, relating to heat input	%	87,9	88,0	88,0
Water heating output, relating to heat input	%	0,0	0,0	0,0
Adjustments				
Air inlet delta	Δp	596	595	
Convection air fan	Volts	230	230	
Fuel motor	s	4,2 ON/1,8 OFF	4,2 ON/1,8 OFF	
Cleaning time	s	-	-	

Report- No.		K23402018T1
TÜV- order- No.		21243237
Manufacturer		Palazzetti Lelio S.p.A.
Construction type		Residential room sealed heating appliances fired by wood pellets without water heat exchanger, with fan assisted flue discharge and with internal fuel hopper
max. working temperature	°C	Not applicable
max. working pressure	bar	Not applicable
Type of fuel charging		automatic load
Special properties / Remarks		-
Special properties		room sealed
Type designation		AP021B_0_10
Test place		Thiene
Standard		DIN EN 14785:10.2006, Correction 1: 10.2007
Type of test		Test at reduced load
Heat input from manufacturer	kW	3,3
Heat output from manufacturer	kW	3,1
		1. test
Test date		17/04/2018
Time		09:00-15:00
Ambient:		
Barometric pressure	mbar	1020
Temperature of combustion air	°C	24,3
Ambient rel. humidity	%	60,0
Ambient temperature (room)	°C	24,3
Type of Fuel		wood pellets
Properties of Fuel		Ø 6 mm, Lmax 30 mm, max humidity 5,5% Firestixx
Number of fuel loadings		1
Weight of the stove, start, measurement	kg	198,3
Weight of the stove, end, measurement	kg	194,3
Fuel consumption, calculated of the difference	kg	3,9
Test duration	sec	21600
Fuel consumption "B"	kg/h	0,66
Calculation of losses in the ash (yes = 1, no = 0)	Gew . %	25,0
Residue passing through the grate, measurement	kg	0,00
Residue passing through the grate "R"	Gew . %	0,000
Carbon content of the residue passing through the grate "Cr" depending of 1kg fuel	Gew . %	0,000
Water side, measurement		
Flow , measurement	°C	0,0
Return, measurement	°C	0,0
Delta T	K	0,0
Cold water flow , measurement	kg/h	0,0
Additional energy of the pump	kW	0,00
Flue, average		
Flue gas temperature, measurement	°C	87,7
Flue draught, measurement	Pa	10,0
O2 - concentration, calculated	Vol.-%	13,3
CO2 - concentration, measurement	Vol.-%	7,4
lambda value, l	-	2,697

CO - concentration, measurement	ppm	189
CO - concentration, measurement	Vol.-%	0,019
CO - concentration, measurement	mg/m³	236
CO - concentr. (at 13% - O2)	Vol.-%	0,020
CO - concentr. (at 13% - O2)	mg/m³	244
CO - concentration rel. to fuel input	mg/kWh	565
CO - concentration rel. to fuel input	mg/MJ	157
NOx - concentration, measurement	ppm	69
NOx - concentration, measurement	mg/m³	142
NOx - concentr. (at 13% - O2)	mg/m³	146
NOx - concentration rel. to fuel input	mg/kWh	339
NOx - concentration rel. to fuel input	mg/MJ	94
CnHm concentration, measurement	ppm	2
CnHm concentration, measurement	mg/m³	3
CnHm concentr. (at 13% - O2)	mg/m³	3
CnHm - concentration (total C) rel. to fuel input	mg/kWh	7
CnHm - concentration (total C) rel. to fuel input	mg/MJ	2
Dust, measurement*	mg	6
Dust, measurement*	mg/m³	19
Dust (at 13% - O2)*	mg/m³	20
Dust* rel. to fuel input	mg/kWh	46
Dust* rel. to fuel input	mg/MJ	13
PME concentration (at 13% - O2)*	mg/m³	21
Electrical consumption		
Rated electrical power (max)	W	320
Electrical consumption (at nominal heat output)	W	68
Electrical consumption (at minimum heat output)	W	30
PSTBY (during stand-by)	W	1,6
Calculation		
"Qa" loss free heating flue gas	kJ/kg	1075,8
"qa" loss flue gas	%	6,03
"Qb" loss fix heating in flue gas	kJ/kg	28,48
"qb" loss fix heating in flue gas	%	0,16
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	0,00
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,20
"m" flue gas mass flow	g/s	3,0
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m³K)	1,33
cpm-H2O	kJ/(m³K)	1,50
"eta" Efficiency (direct), to consider only water heating output Pw	%	not applicable
"eta" Efficiency (indirect)	%	93,6
Heating input	kW	3,3
"P" heating output, total	kW	3,1
"Pw" water heating output	kW	0,0
Space heating output: PSTR = P - Pw	kW	3,1
Space heating output, relating to heat input	%	93,6
Water heating output, relating to heat input	%	0,0
Adjustments		
Air inlet delta	Δp	112
Convection air fan	Volts	120
Fuel motor	s	1,1 ON/4,9 OFF
Cleaning time	s	

The tests were carried out under the conditions of DIN EN 14785:2006

Appendix A 03

**The requirements of the measuring instruments are fulfilled.
Before each qualified measuring analysers were calibrated with zero gas and calibration gas.**

Index	Measure	Principle	Company	Range	Instrument specification	Reference
B030	Water pressure	Manometer	Cewal DN 150	0 – 25 bar	± 0,6%	Reference manometer
B062	Temperature	PT 100 K-type thermocouples	Agilent 34970 A	0 – 300 °C	Up to 0,5 °C	Reference thermometer
B066	Gas pressure	Manometer	Testo 510	0 – 100 hPa	± 3% related to final value	Reference manometer
B068	Temperature	IR emission	Fluke Ti20	-10 – 350 °C	---	---
B070	Fuel consumption	Gravimetric	Dini Angeo DFWK	0 – 600 kg	± 10 g	Reference load
B079	Water flow	Magnetic	ABB Copa-XE DE43FI	0 – 2000 kg/h	± 1% related to the range	Balance
B084	Temperature	PT 100 K-type thermocouples	Agilent 34970 A	0 – 300 °C	Up to 0,5 °C	Reference thermometer
B090	Dust content	Gravimetric	Sartorius CPA 224 S	0,1 mg – 220 g	± 0,1 mg	Reference load
B092	Fuel consumption	Gravimetric	Dini Angeo DFWK	0 – 1200 kg	± 10 g	Reference load
B094	CO ₂	Infrared-absorption	Siemens Ultramat 6E	0 – 3 % 0 – 30 %	± 1% related to the range	Reference gas: 19,99 %
	CO	Infrared-absorption	Siemens Ultramat 6E	0 – 300 ppm 0 – 3000 ppm	± 1% related to the range	Reference gas: 2002 ppm
B095	CO	Infrared-absorption	Siemens Ultramat 23	0 – 1 % 0 – 5 %	± 1% related to the range	Reference gas: 4,925 %
B096 + B123	CO ₂	Infrared-absorption	Siemens Ultramat 23	0 – 5 % 0 – 25 %	± 1% related to the range	Reference gas: 19,99 %
	CO	Infrared-absorption	Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	Reference gas: 2002 ppm
	NO _x	Infrared-absorption	Siemens Ultramat 23 + Bühler Bünox MV	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	Reference gas: 191,4 ppm
B097	OGC	FID	Siemens Fidamat 6	0 – 3,33 ppm C3 0 – 33,3 ppm C3 0 – 333 ppm C3 0 – 3333 ppm C3	± 1% related to the range	Reference gas: 29,82 ppm propane
B098	Temperature	K-type thermocouple	Testo 925	0 – 200 °C	± 2 °C	Reference thermometer
B116	Air flow	Mass flow measurement	Bronkhorst F-11AC-50K-AAD-33-V	0 – 50 l/min	± (0,5 % Rd + 0,1 % FS)	External calibration
B118	Gas volume	Diaphragm	CMC	0,016 – 2,5 m³/h	± 5 %	Air flow
B121	OGC	FID	Siemens Fidamat 6	0 – 3,33 ppm C3 0 – 33,3 ppm C3 0 – 333 ppm C3 0 – 3333 ppm C3	± 1% related to the range	Reference gas: 29,82 ppm propane
B122	CO ₂	Infrared-absorption	Siemens Ultramat 23	0 – 5 % 0 – 25 %	± 1% related to the range	Reference gas: 19,99 %
	CO	Infrared-absorption	Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	Reference gas: 2002 ppm
	NO	Infrared-absorption	Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	Reference gas: 191,4 ppm
B129	Water flow	Magnetic	ASA AF6-2600/1/B/1/AC	0 – 1500 kg/h	Accuracy: ± 0,5% r.v.	Balance

Index	Measure	Principle	Company	Range	Instrument specification	Reference
B140	Gas pressure	Inclined liquid column manometer	Kimo HP series	0 – 15 Pa	± 10% related to final value	Reference manometer
B141	Gas pressure	Inclined liquid column manometer	Kimo HP series	0 – 15 Pa	± 10% related to final value	Reference manometer
B149	Mass	Gravimetric	Kern FKB 15K0.5A	0 – 15 kg	± 0,5 g (reproducibility)	Reference load
B154	Gas volume	Diaphragm	Elster BK-G4M	---	Class 1,5	Air flow
B169	Electrical power	---	Yokogawa WT310E	0 – 2000 W	± 0,5 %	External calibration

The values are continuously recorded. The scan interval is 10s. All related certificates are stored.