

**Report No. K11612013T1**  
**Residential space heating appliances**  
**Initial type testing**  
**DIN EN 14785**

Type: **AP008S\_0\_08; AP008S\_0\_09; AP008S\_0\_10; AP008S\_0\_11; AP008S\_0\_12**

Company: **Palazzetti Lelio S.p.A.**



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**Publication of page 2 is permitted.**

**The test results presented in this report refer solely to the test object stated.**



**Initial type testing**

**Residential space heating appliances fired by wood pellets**

**- Pellet stove -**

**DIN EN 14785: September 2006**

**DIN EN 14785 Correction 1: October 2007**

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

Type designation: **AP008S\_0\_08, AP008S\_0\_09, AP008S\_0\_10,  
AP008S\_0\_11, AP008S\_0\_12**

Type of appliances: Residential room heating appliance fired by wood pellets with water heat exchanger, with fan assisted flue discharge and with internal fuel hopper

Total heat input: **AP008S\_0\_08: 2,55 kW – 8,81 kW  
AP008S\_0\_09: 2,55 kW – 9,97 kW  
AP008S\_0\_10: 2,55 kW – 10,94 kW  
AP008S\_0\_11: 2,55 kW – 12,35 kW  
AP008S\_0\_12: 2,55 kW – 13,60 kW**

Water heat output: -

Space heat output: **AP008S\_0\_08: 2,39 kW – 8,03 kW  
AP008S\_0\_09: 2,39 kW – 9,00 kW  
AP008S\_0\_10: 2,39 kW – 9,81 kW  
AP008S\_0\_11: 2,39 kW – 11,00 kW  
AP008S\_0\_12: 2,39 kW – 12,04 kW**

Max. water pressure: -

Max. water temperature: -

Fuels: Wood pellet

**Remarks:** All the stoves are identical and have the same reduced load; only the nominal load parameters are different. Data's of AP008S\_0\_09; AP008S\_0\_10; AP008S\_0\_11 are linear interpolated.

All the data's are related to the version with star loading system, 1 ambient ventilation fan and with Magnofix (vermiculite).

**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 could only be confirmed by full compliance with Annex ZA.

Dated in Cologne, 24.06.2014  
432/mc

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

Inspector

Dep. Head of Test Centre

  
Dipl.-Ing. M. Ciccarelli

  
Dipl.-Ing. R. Verbert

Residential space heating appliances fired by wood pellets, Initial Type Test in accordance with the directive 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 **AP008S\_0\_08; AP008S\_0\_09; AP008S\_0\_10; AP008S\_0\_11; AP008S\_0\_12** for the operation with wood pellets according 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 28<sup>th</sup>, 29<sup>th</sup>, 30<sup>th</sup> and 31<sup>th</sup> of October 2013.

The (FPC) Factory Production Control was not performed.

## **2. Description of the appliances**

### **Construction**

Residential sealed room 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 and an ambient motor which can blow the air in the installation room or in the canalization pipe by moving an internal flap. All the stoves are identical and have the same reduced load; only the nominal load parameters are different. Data's of AP008S\_0\_09; AP008S\_0\_10; AP008S\_0\_11 are linear interpolated.

### **Combustion air**

The combustion air is to be taken from ambient.

**2.1 General technical data of the pellet stove**

Type:	<b>AP008S_0_08; AP008S_0_09; AP008S_0_10; AP008S_0_11; AP008S_0_12</b>
Nominal power	AP008S_0_08: <b>8,03 kW</b> AP008S_0_09: <b>9,00 kW</b> AP008S_0_10: <b>9,81 kW</b> AP008S_0_11: <b>11,00 kW</b> AP008S_0_12: <b>12,04 kW</b>
Test fuel	Pellets Ø 6 mm, L <sub>max</sub> 30 mm, max. humidity 6,1%, Firestixx
Total dimension High x Width x Depths (mm)	1186 x 510 x 528
Diameter, exhaust gas stub	80 mm
Weight	180 kg
Distance of adjacent combustible materials	200 mm (backside) distance from test wall 200 mm (side) distance from test wall 800 mm (front) distance from test wall

For more information see appendix A04-A06-A008.1-A08.2-A21

**2.2 Leakage test according to EN 613:2000 and to DIBt regulation; AP00S\_0\_12**

Leakage test of combustion room before mechanical and thermal tests at 10/50 Pa	m <sup>3</sup> /h	0,45/ 0,80
Leakage test of combustion room after mechanical and thermal tests at 10/50 Pa	m <sup>3</sup> /h	0,45/ 0,79

### 3. Testing

The tests were carried out in October 2013 in the laboratory of TÜV Rheinland/CMC Centro Misura Compatibilità in Thiene.

#### 3.1 General requirements

- P (pass / Anforderungen erfüllt)
- N (not applicable / Anforderungen nicht zutreffend)
- F (fail / Anforderungen nicht erfüllt)

Requirement acc. EN 14785	Clause	Tested Acc.	Requirement Complies
Production documentation	4.1	-	P
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	-	N
Fire doors	4.7	-	P
Combustion air supply	4.8	-	P
-Primary air inlet control	4.8.1		
-Secondary air inlet control	4.8.2		
Internal flue gas diverter	4.9	-	N
Retort	4.10	-	P
Ash pan and ash removal	4.11	-	P
Integral boiler	4.12	A.4.9.2	N
- 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	-	N
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	-	N
Thermal discharge control	5.7	A.4.9.3	N
Strength and leak tightness of boiler shells	5.8	A.4.7 A.4.9.2	N
Electrical safety	5.9	EN 50165	Not tested

### 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 utilization	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	N
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	Requirement Complies
General	9.1	P
Type testing	9.2	P
-Initial type testing	9.2.1	
-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

Detailed test results see appendix A 04.1, 2, 3, 4, 5; A 06.1, 2, 3, 4, 5; A 07.2.

Type designation		AP008S_0_08		
		Full load	Partial load	Requirement
Test fuel		Pellets		
Mass of the test fuel fired hourly	kg/h	1,808	0,523	-
Flue gas mass flow	g/s	5,4	2,8	-
Flue gas temperature	°C	157,7	80,0	-
Flue draught	mbar	0,12	10	0,12/0,10 +/-0,02
CO <sub>2</sub> -concentration	Vol.-%	11,52	6,26	-
O <sub>2</sub> -concentration	Vol.-%	9,04	14,50	-
CO-concentration	ppm	21,3	326,4	-
CO-emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	17,8	502,4	500/750
CO-emission	mg/kWh	41,4	1168,5	-
CO-emission	mg/MJ	11,5	324,6	500/750 (Art. 15a)
NO <sub>x</sub> -concentration	ppm	110,3	39,1	-
NO <sub>x</sub> -emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	151,3	98,8	-
NO <sub>x</sub> -emission	mg/kWh	351,8	229,7	-
NO <sub>x</sub> -emission	mg/MJ	97,7	63,8	100**/- (Art. 15a)
C <sub>n</sub> H <sub>m</sub> -concentration measured acc. CEN/TS 15883	mg/m <sup>3</sup>	2,5	9,6	-
C <sub>n</sub> H <sub>m</sub> -emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	1,7	11,9	-
C <sub>n</sub> H <sub>m</sub> -emission	mg/kWh	3,9	27,6	-
C <sub>n</sub> H <sub>m</sub> -emission	mg/MJ	1,1	7,7	30/30 (Art. 15a)
Dust concentration measured acc. CEN/TS 15883 and EN13284-1	mg	7,2	6,3	-
Dust emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	7,1	11,6	-
Dust emission	mg/kWh	11,0	27,0	-
Dust emission	mg/MJ	3,1	7,5	25**/- (Art.15a)
Particulate emission acc. PrEN16510:2012	mg/m <sup>3</sup>	7,8	16,8	-
Total heat output	kW	8,03	2,39	-
Water heat output	kW	-	-	-
Space heat output	kW	8,03	2,39	-
Efficiency	%	91,16	93,53	75/70 (EN14785) 80** (Art. 15a)

\*\*) valid values from 01.01.2015



Type designation		AP008S_0_09*		Requirement
		Full load	Partial load	
<b>Test fuel</b>		Pellets		
Mass of the test fuel fired hourly	kg/h	2,05	0,523	-
Flue gas mass flow	g/s	5,8	2,8	-
Flue gas temperature	°C	174,1	80,0	-
Flue draught	mbar	0,12	10	0,12/0,10 +/-0,02
CO <sub>2</sub> -concentration	Vol.-%	12,01	6,26	-
O <sub>2</sub> -concentration	Vol.-%	8,52	14,50	-
CO-concentration	ppm	46,4	326,4	-
CO-emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	34,9	502,4	500/750
CO-emission	mg/kWh	81,1	1168,5	-
CO-emission	mg/MJ	22,5	324,6	500/750 (Art. 15a)
NO <sub>x</sub> -concentration	ppm	114,2	39,1	-
NO <sub>x</sub> -emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	150,4	98,8	-
NO <sub>x</sub> -emission	mg/kWh	349,6	229,7	-
NO <sub>x</sub> -emission	mg/MJ	97,1	63,8	100**/- (Art. 15a)
C <sub>n</sub> H <sub>m</sub> -concentration measured acc. CEN/TS 15883	mg/m <sup>3</sup>	3,0	9,6	-
C <sub>n</sub> H <sub>m</sub> -emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	1,9	11,9	-
C <sub>n</sub> H <sub>m</sub> -emission	mg/kWh	4,4	27,6	-
C <sub>n</sub> H <sub>m</sub> -emission	mg/MJ	1,2	7,7	30/30 (Art. 15a)
Dust concentration measured acc. CEN/TS 15883 and EN13284-1	mg	8,7	6,3	-
Dust emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	8,1	11,6	-
Dust emission	mg/kWh	12,0	27,0	-
Dust emission	mg/MJ	3,4	7,5	25**/- (Art.15a)
Particulate emission acc. PrEN16510:2012	mg/m <sup>3</sup>	8,9	16,8	-
Total heat output	kW	9,0	2,39	-
Water heat output	kW	-	-	-
Space heat output	kW	9,0	2,39	-
Efficiency	%	90,52	93,53	75/70 (EN14785) 80** (Art. 15a)

\*) Data's are interpolated

\*\*) valid values from 01.01.2015

Type designation		AP008S_0_10*		Requirement
		Full load	Partial load	
<b>Test fuel</b>		Pellets		
Mass of the test fuel fired hourly	kg/h	2,25	0,523	-
Flue gas mass flow	g/s	6,2	2,8	-
Flue gas temperature	°C	187,6	80,0	-
Flue draught	mbar	0,12	10	0,12/0,10 +/-0,02
CO <sub>2</sub> -concentration	Vol.-%	12,42	6,26	-
O <sub>2</sub> -concentration	Vol.-%	8,10	14,50	-
CO-concentration	ppm	67,1	326,4	-
CO-emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	49,1	502,4	500/750
CO-emission	mg/kWh	114,0	1168,5	-
CO-emission	mg/MJ	31,7	324,6	500/750 (Art. 15a)
NO <sub>x</sub> -concentration	ppm	117,5	39,1	-
NO <sub>x</sub> -emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	149,6	98,8	-
NO <sub>x</sub> -emission	mg/kWh	347,8	229,7	-
NO <sub>x</sub> -emission	mg/MJ	96,6	63,8	100**/- (Art. 15a)
C <sub>n</sub> H <sub>m</sub> -concentration measured acc. CEN/TS 15883	mg/m <sup>3</sup>	3,5	9,6	-
C <sub>n</sub> H <sub>m</sub> -emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	2,1	11,9	-
C <sub>n</sub> H <sub>m</sub> -emission	mg/kWh	4,9	27,6	-
C <sub>n</sub> H <sub>m</sub> -emission	mg/MJ	1,4	7,7	30/30 (Art. 15a)
Dust concentration measured acc. CEN/TS 15883 and EN13284-1	mg	9,9	6,3	-
Dust emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	9,0	11,6	-
Dust emission	mg/kWh	12,8	27,0	-
Dust emission	mg/MJ	3,6	7,5	25**/- (Art.15a)
Particulate emission acc. PrEN16510:2012	mg/m <sup>3</sup>	9,8	16,8	-
Total heat output	kW	9,81	2,39	-
Water heat output	kW	-	-	-
Space heat output	kW	9,81	2,39	-
Efficiency	%	90,0	93,53	75/70 (EN14785) 80** (Art. 15a)

\*) Data's are interpolated

\*\*) valid values from 01.01.2015

Type designation		AP008S_0_11*		Requirement
		Full load	Partial load	
<b>Test fuel</b>		Pellets		
Mass of the test fuel fired hourly	kg/h	2,54	0,523	-
Flue gas mass flow	g/s	6,7	2,8	-
Flue gas temperature	°C	207,5	80,0	-
Flue draught	mbar	0,12	10	0,12/0,10 +/-0,02
CO <sub>2</sub> -concentration	Vol.-%	13,02	6,26	-
O <sub>2</sub> -concentration	Vol.-%	7,47	14,50	-
CO-concentration	ppm	97,5	326,4	-
CO-emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	69,8	502,4	500/750
CO-emission	mg/kWh	162,2	1168,5	-
CO-emission	mg/MJ	45,1	324,6	500/750 (Art. 15a)
NO <sub>x</sub> -concentration	ppm	122,2	39,1	-
NO <sub>x</sub> -emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	148,4	98,8	-
NO <sub>x</sub> -emission	mg/kWh	345,1	229,7	-
NO <sub>x</sub> -emission	mg/MJ	95,9	63,8	100**/- (Art. 15a)
C <sub>n</sub> H <sub>m</sub> -concentration measured acc. CEN/TS 15883	mg/m <sup>3</sup>	4,1	9,6	-
C <sub>n</sub> H <sub>m</sub> -emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	2,4	11,9	-
C <sub>n</sub> H <sub>m</sub> -emission	mg/kWh	5,5	27,6	-
C <sub>n</sub> H <sub>m</sub> -emission	mg/MJ	1,5	7,7	30/30 (Art. 15a)
Dust concentration measured acc. CEN/TS 15883 and EN13284-1	mg	11,6	6,3	-
Dust emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	10,2	11,6	-
Dust emission	mg/kWh	14,0	27,0	-
Dust emission	mg/MJ	3,9	7,5	25**/- (Art.15a)
Particulate emission acc. PrEN16510:2012	mg/m <sup>3</sup>	11,2	16,8	-
Total heat output	kW	11,0	2,39	-
Water heat output	kW	-		-
Space heat output	kW	11,0	2,39	-
Efficiency	%	89,22	93,53	75/70 (EN14785) 80** (Art. 15a)

\*) Data's are interpolated

\*\*) valid values from 01.01.2015

Type designation		AP008S_0_12		
		Full load	Partial load	Requirement
Test fuel		Pellets		
Mass of the test fuel fired hourly	kg/h	2,791	0,523	-
Flue gas mass flow	g/s	7,1	2,8	-
Flue gas temperature	°C	225,0	80,0	-
Flue draught	mbar	0,12	10	0,12/0,10 +/-0,02
CO <sub>2</sub> -concentration	Vol.-%	13,55	6,26	-
O <sub>2</sub> -concentration	Vol.-%	6,92	14,50	-
CO-concentration	ppm	124,4	326,4	-
CO-emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	88,1	502,4	500/750
CO-emission	mg/kWh	204,8	1168,5	-
CO-emission	mg/MJ	56,9	324,6	500/750 (Art. 15a)
NO <sub>x</sub> -concentration	ppm	126,4	39,1	-
NO <sub>x</sub> -emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	147,4	98,8	-
NO <sub>x</sub> -emission	mg/kWh	342,8	229,7	-
NO <sub>x</sub> -emission	mg/MJ	95,2	63,8	100**/- (Art. 15a)
C <sub>n</sub> H <sub>m</sub> -concentration measured acc. CEN/TS 15883	mg/m <sup>3</sup>	4,7	9,6	-
C <sub>n</sub> H <sub>m</sub> -emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	2,6	11,9	-
C <sub>n</sub> H <sub>m</sub> -emission	mg/kWh	6,1	27,6	-
C <sub>n</sub> H <sub>m</sub> -emission	mg/MJ	1,7	7,7	30/30 (Art. 15a)
Dust concentration measured acc. CEN/TS 15883 and EN13284-1	mg	13,2	6,3	-
Dust emission (at 13%-O <sub>2</sub> )	mg/m <sup>3</sup>	11,3	11,6	-
Dust emission	mg/kWh	15,1	27,0	-
Dust emission	mg/MJ	4,2	7,5	25**/- (Art.15a)
Particulate emission acc. PrEN16510:2012	mg/m <sup>3</sup>	12,4	16,8	-
Total heat output	kW	12,04	2,39	-
Water heat output	kW	-	-	-
Space heat output	kW	12,04	2,39	-
Efficiency	%	88,54	93,53	75/70 (EN14785) 80** (Art. 15a)
Maximum temperatures at trihedron:				
- Left side	°C	63,6		65K over ambient
- Back side	°C	41,5		65K over ambient
- Front side 80 cm	°C	59,4		65K over ambient
- Floor	°C	43,3		65K over ambient
Distances:				
- Backside-Pelletstove	mm	200		
- Side-Pelletstove	mm	200		
Ambient temperature	°C	29,2		
Temp. in fuel hopper	°C	86,5		65K over ambient
Temp. operating tools (handle of firedoor)	°C	193,9*		35K over ambient

\*) A suitable glove will be part of the appliance

\*\*) valid values from 01.01.2015

## **4 Statement of the test results**

The appliances

**AP008S\_0\_08**

**AP008S\_0\_09**

**AP008S\_0\_10**

**AP008S\_0\_11**

**AP008S\_0\_12**

of the company

Palazzetti Lelio S.p.A.

comply for the operation with wood pellets with the requirements acc.

EN 14785: September 2006, cl.4-8.

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

The test results presented in this report refer solely to the test object stated.

## 5 Test documents

Appendix	Subject	Reference
A 01	Fuel data	
A 02	Test results	
A 03	Measuring devices	
A 04.1	Type label AP008S_0_08	
A 04.2	Type label AP008S_0_09	
A 04.3	Type label AP008S_0_10	
A 04.4	Type label AP008S_0_11	
A 04.5	Type label AP008S_0_12	
A 05	CE Declaration of conformity and Essential requirements EN 14785	17/12/2013
A 06.1	Declaration of Performances AP008S_0_08	10/12/2013
A 06.2	Declaration of Performances AP008S_0_09	10/12/2013
A 06.3	Declaration of Performances AP008S_0_10	10/12/2013
A 06.4	Declaration of Performances AP008S_0_11	10/12/2013
A 06.5	Declaration of Performances AP008S_0_12	10/12/2013
A 07.1	Instruction and installation manual	
A 07.2	User manual	
A 08	List of electrical components	05/05/2014
A 09	EBM R2E190RA2605 technical datasheet ambient fan	
A 10	EBM R2E190RA2605 ambient fan declaration	14/10/2011
A 11	BLXMS00003 exhaust gas fan technical data	03/04/2013
A 12	BLXM000003 and BLXMS00003 exhaust gas fan declaration	16/12/2013
A 13	IPC Moon's RG2.0 D64 gear motor	
A 14	IPC Moon's RG2.0 D64 gear motor certificate	24/05/2011
A 15	Rotfil UTXS020330 350W ignition resistance datasheet	12/02/2013
A 16	Rotfil UTXS020330 350W ignition resistance declaration	2014
A 17.1	Rathgeber 20-S-227 710V temperature limiter datasheet	20-S-227
A 17.2	Rathgeber 20-S-228 710V temperature limiter datasheet	
A 18	Rathgeber 710V temperature limiter certificate	20-S-228
A 19	Huba 605 datasheet	
A 20	Huba 605 declaration	14/12/2010
A 21	Huba 605 certificate	01/07/2006
A 22	Schott Robax technical data glass	
A 23.1	Tespe technical data seals	
A 23.2	Tespe technical data seals	
A 24.1	Safety electrical circuit	
A 24.2	Safety electrical circuit	8415500
A 25.1	AP008S_0_08 Setup parameters	16/12/201
A 25.2	AP008S_0_12 Setup parameters	16/12/201
A 26.1	Overview drawing (with Magnofixx)	751822614
A 26.2	Overview drawing (without Magnofixx) and welding symbols	751822614
A 26.3	Overview drawing	18/02/2014
A 27	Drawing dimension, combustion room and flue ways	25/02/2014
A 28	Drawing retort	165510230
A 29.1	Drawing of pellet storage	13EZ9011
A 29.2	Drawing of pellet transport	140120006


## Appendix A 01

### Fuel data

Verbrennungsrechnung aus der Elementaranalyse											
nach DIN EN 304 Teil 2, Ausgabe 01/2004											
nach DIN 4702 Teil 2, Ausgabe 3/1990											
Analysis from:		07.09.2012		Analysis No.		2011001334		Fuel sampling date:		13.07.12	
Fuel:		wood pellets									
Bestandteil		Sauerstoffbedarf									
im	Stoffanteil	in Nm³ je kg	in Nm³ je kg	Abgasbestandteile aus Brennstoff in Nm³/kg Brennstoff							
Brennstoff		Bestandteil	Brennstoff								
			Stoffanteil x	CO₂		SO₂		H₂O		N₂	
	Gew. %		Sauerstoff-Bedarf	in Nm³ je kg	in Nm³ je kg	in Nm³ je kg	in Nm³ je kg	in Nm³ je kg	in Nm³ je kg	in Nm³ je kg	in Nm³ je kg
				Bestandteil	Brennstoff	Bestandteil	Brennstoff	Bestandteil	Brennstoff	Bestandteil	Brennstoff
c	47,200	1,860	0,878	1,850	0,8732		-	-	-	-	-
s	0,009	0,700	0,000	-	-	0,680	0,0001	-	-	-	-
h	5,800	5,550	0,322	-	-	-	-	11,100	0,6438	-	-
n	0,300	-	-	-	-	-	-	-	-	0,80	0,0024
o	40,590	-0,700	-0,284	-	-	-	-	-	-	-	-
wasser	6,100	-	-	-	-	-	-	1,240	0,0756	-	-
asche	0,300	-	-	-	-	-	-	-	-	-	-
summe	100,299	O min=	0,916	V CO₂ =	0,8732	V SO₂ =	0,0001	V W =	0,7194	V N₂ =	0,0024
Luftbedarf				L min =		4,3607	Nm³/kg Brennstoff				
trockene stöchiometrische Abgasmenge				V A tr min =		4,3182	Nm³/kg Brennstoff				
Max. Kohlenstoffdioxid-Anteil				CO₂ max =		20,2212	Vol.-%				
Wasserdampfmenge				V w =		0,7194	Nm³/kg Brennstoff				
				V A tr min/ L min =		0,9903					
Heizwert, wf				Hu =		18843	kJ/kg				
						5,234	kWh/kg				


## Appendix A 02

### Test results

Report- No.		K11612013T1		
TÜV- order- No.		21223475		
Manufacturer		Palazzetti		 <b>TÜVRheinland®</b> Precisely Right.
Type		AP008S_0_08		
Model		Room heater for wood pellets with internal fuel hopper and flue gas fan without water parts		
Specifics		combustion air is taken from the room Sealed stove with canalisation		
Nominal heat output		8,03 kW		
Test place		Thiene		
Test date		30.10.2013		
Type of test		Test at nominal load acc. EN 14785		
		1. test	2. test	Average
Test date		30/10/2013	30/10/2013	
Time		09:00-12:00	13:55-16:55	
Ambient:				
Barometric pressure	mbar	1003	1003	1003
Temperature of combustion air	°C	24,7	25,9	25,3
Ambient rel. humidity	%	45	45	45
Ambient temperature (room)	°C	24,7	25,9	25,3
Fuel:				
Type of fuel		wood pellets	wood pellets	-
Number of fuel loadings		1	1	1
Total weight of appliance at start	kg	197,43	198,32	197,87
Weight of additional loads	kg	191,94	192,96	192,45
Total weight of appliance at end	kg	0,00	0,00	0,00
Fuel consumption, calculated of the difference	kg	5,49	5,35	5,42
Test duration	sec	10800	10800	10800
Fuel consumption "B"	kg/h	1,830	1,785	1,808
Combustible constituents in material passing through the grate "b", analyse	Gew. %	0,0	0,0	0,0
Residue passing through the grate, measurement	kg	0,000	0,000	0,000
Residue passing through the grate "R"	Gew. %	0,00	0,00	0,0
Carbon content of the residue passing through the grate "Cr" depending of 1 kg fuel	Gew. %	0,10	0,10	0,10
Water part (average values)				
flow temperature	°C	0,0	0,0	0,0
return temperature	°C	0,0	0,0	0,0
delta-T	K	0,0	0,0	0,0
Cold water flow	kg/h	0,0	0,0	0,0
Additional energy of the pump	kW	0,000	0,000	0,000
Flue, average				
Flue gas temperature	°C	154,9	160,4	157,7
Flue gas draught	Pa	12,0	12,0	12,0
O <sub>2</sub> - concentration, calculated	Vol.-%	9,05	9,03	9,04
CO <sub>2</sub> - concentration (measurement)	Vol.-%	11,50	11,53	11,52
lambda value, λ	-	1,750	1,747	1,749
CO - concentration (measurement)	ppm	23,0	19,5	21,3
CO - concentration (measurement)	Vol.-%	0,002	0,002	0,002
CO - concentration (measurement)	mg/m³	28,8	24,4	26,6
CO - concentr. (at reference - O <sub>2</sub> )	Vol.-%	0,002	0,001	0,001
CO - concentr. (at reference - O <sub>2</sub> )	mg/m³	19,3	16,3	17,8
CO - concentration rel. to fuel input	mg/kWh	44,9	38,0	41,4
CO - concentration rel. to fuel input	mg/MJ	12,5	10,5	11,5
NO <sub>x</sub> - concentration (measurement)	ppm	108,9	111,7	110,3
NO <sub>x</sub> - concentration (measurement)	mg/m³	223,2	229,0	226,1
NO <sub>x</sub> - concentr. (at reference - O <sub>2</sub> )	mg/m³	149,5	153,1	151,3
NO <sub>x</sub> - concentration rel. to fuel input	mg/kWh	347,6	356,0	351,8
NO <sub>x</sub> - concentration rel. to fuel input	mg/MJ	96,6	98,9	97,7
CnHm - concentration (measurement)	mg/m³	2,6	2,4	2,5
CnHm concentr. (at reference - O <sub>2</sub> )	mg/m³	1,7	1,6	1,7
CnHm - concentration (total C) rel. to fuel input	mg/kWh	4,0	3,7	3,9
CnHm - concentration (total C) rel. to fuel input	mg/MJ	1,1	1,0	1,1
Dust (measurement*)	mg	7,2		7,2
Dust concentration*	mg/m³	10,7		10,7
Dust (at reference - O <sub>2</sub> )*	mg/m³	7,1		7,1
Dust* rel. to fuel input	mg/kWh	11,0		11,0
Dust* rel. to fuel input	mg/MJ	3,1		3,1
PME concentration (at reference - O <sub>2</sub> )*	mg/m³	7,8		7,8
Calculation				
"Qa" loss free heating flue gas	kJ/kg	1490,3	1537,5	1513,9
"qa" loss flue gas	%	8,49	8,76	8,63
"Qb" loss fix heating in flue gas	kJ/kg	2,2	1,9	2,1
"qb" loss fix heating in flue gas	%	0,01	0,01	0,01
"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	%	0,20	0,20	0,20
"m" flue gas mass flow	g/s	5,4	5,3	5,4
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m³K)	1,35	1,36	1,36
cpm-H <sub>2</sub> O	kJ/(m³K)	1,51	1,52	1,52
"eta" Efficiency (direct), to consider only water heating output Pw	%	entfällt	entfällt	entfällt
"eta" Efficiency (indirect)	%	91,29	91,03	91,16
Heating input	kW	8,92	8,70	8,81
"P" heating output, total	kW	8,14	7,92	8,03
"Pw" water heating output	kW	0,00	0,00	0,00
Space heating output: P <sub>STR</sub> = P - Pw	kW	8,14	7,92	8,03
Space heating output, relating to heat input	%	91,29	91,03	91,16
Water heating output, relating to heat input	%	0,00	0,00	0,00
Settings				
Air inlet delta	-	2322	2322	
Ambient motor	Volts	230		
Fuel motor	sec	ON 29; OFF 30	ON 29; OFF 30	
Cleaning time	sec	20 sec / 250 min	20 sec / 250 min	
Fire door	per/close	closed	closed	
canalization		OFF	ON	

\*) Average of 3 samples, based on separate calculation



Report- No.		K11612013T1		
TÜV- order- No.		21223475		
Manufacturer		Palazzetti		TÜVRheinland®
Type		AP008S_0-12		Precisely Right.
Model		Room heater for wood pellets with internal fuel hopper and flue gas fan without water parts		
		combustion air is taken from the room		
Specifics		Sealed stove with canalisation		
Nominal heat output		12,04 kW		
Test place		Thiene		
Test date		28.10.2013		
Type of test		Test at nominal load		
		acc. EN 14785		
		1. test	2. test	Average
Test date		28/10/2013	28/10/2013	
Time		10:50-13:50	13:55-16:55	
<b>Ambient:</b>				
Barometric pressure	mbar	1001	1001	1001
Temperature of combustion air	°C	28,4	29,2	28,8
Ambient rel. humidity	%	45	45	45
Ambient temperature (room)	°C	28,4	29,2	28,8
<b>Fuel:</b>				
Type of fuel		wood pellets	wood pellets	-
Number of fuel loadings		1	1	1
Total weight of appliance at start	kg	198,75	199,40	199,07
Weight of additional loads	kg	190,57	190,83	190,70
Total weight of appliance at end	kg	0,00	0,00	0,00
Fuel consumption, calculated of the difference	kg	8,18	8,57	8,37
Test duration	sec	10800	10800	10800
Fuel consumption "B"	kg/h	2,727	2,856	2,791
Combustible constituents in material passing through the grate "b", analyse	Gew. %	0,0	0,0	0,0
Residue passing through the grate, measurement	kg	0,000	0,000	0,000
Residue passing through the grate "R"	Gew. %	0,00	0,00	0,0
Carbon content of the residue passing through the grate "Cr" depending of 1 kg fuel	Gew. %	0,10	0,10	0,10
<b>Water part (average values)</b>				
flow temperature	°C	0,0	0,0	0,0
return temperature	°C	0,0	0,0	0,0
delta-T	K	0,0	0,0	0,0
Cold water flow	kg/h	0,0	0,0	0,0
Additional energy of the pump	kW	0,000	0,000	0,000
<b>Flue, average</b>				
Flue gas temperature	°C	219,4	230,6	225,0
Flue gas draught	Pa	12,0	12,0	12,0
O <sub>2</sub> - concentration, calculated	Vol.-%	7,56	6,28	6,92
CO <sub>2</sub> - concentration (measurement)	Vol.-%	12,94	14,17	13,55
lambda value, λ	-	1,557	1,423	1,490
CO - concentration (measurement)	ppm	109,8	139,0	124,4
CO - concentration (measurement)	Vol.-%	0,011	0,014	0,012
CO - concentration (measurement)	mg/m³	137,2	173,7	155,5
CO - concentr. (at reference - O <sub>2</sub> )	Vol.-%	0,007	0,008	0,007
CO - concentr. (at reference - O <sub>2</sub> )	mg/m³	81,7	94,4	88,1
CO - concentration rel. to fuel input	mg/kWh	190,0	219,7	204,8
CO - concentration rel. to fuel input	mg/MJ	52,8	61,0	56,9
NO <sub>x</sub> - concentration (measurement)	ppm	123,6	129,1	126,4
NO <sub>x</sub> - concentration (measurement)	mg/m³	253,4	264,7	259,1
NO <sub>x</sub> - concentr. (at reference - O <sub>2</sub> )	mg/m³	150,9	143,9	147,4
NO <sub>x</sub> - concentration rel. to fuel input	mg/kWh	351,0	334,6	342,8
NO <sub>x</sub> - concentration rel. to fuel input	mg/MJ	97,5	93,0	95,2
CnHm - concentration (measurement)	mg/m³	3,9	5,4	4,7
CnHm concentr. (at reference - O <sub>2</sub> )	mg/m³	2,3	2,9	2,6
CnHm - concentration (total C) rel. to fuel input	mg/kWh	5,5	6,8	6,1
CnHm - concentration (total C) rel. to fuel input	mg/MJ	1,5	1,9	1,7
Dust (measurement*)	mg	13,2		13,2
Dust concentration*	mg/m³	19,8		19,8
Dust (at reference - O <sub>2</sub> )*	mg/m³	11,3		11,3
Dust* rel. to fuel input	mg/kWh	15,1		15,1
Dust* rel. to fuel input	mg/MJ	4,2		4,2
PME concentration (at reference - O <sub>2</sub> )*	mg/m³	12,4		12,4
<b>Calculation</b>				
*Qa" loss free heating flue gas	kJ/kg	1988,2	1943,4	1965,8
*qa" loss flue gas	%	11,33	11,08	11,20
*Qb" loss fix heating in flue gas	kJ/kg	9,4	10,9	10,2
*qb" loss fix heating in flue gas	%	0,05	0,06	0,06
*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	%	0,20	0,20	0,20
*m" flue gas mass flow	g/s	7,3	7,0	7,1
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m³K)	1,37	1,38	1,37
cpm-H <sub>2</sub> O	kJ/(m³K)	1,53	1,53	1,53
*eta" Efficiency (direct), to consider only water heating output Pw	%	entfällt	entfällt	entfällt
*eta" Efficiency (indirect)	%	88,41	88,66	88,54
Heating input	kW	13,29	13,92	13,60
*P" heating output, total	kW	11,75	12,34	12,04
*Pw" water heating output	kW	0,00	0,00	0,00
Space heating output: P <sub>STR</sub> = P - Pw	kW	11,75	12,34	12,04
Space heating output, relating to heat input	%	88,41	88,66	88,54
Water heating output, relating to heat input	%	0,00	0,00	0,00
<b>Settings</b>				
Air inlet delta	-	4590	4590	
Ambient motor	Volts	230	230	
Fuel motor	sec	ON 46; OFF 14	ON 46; OFF 14	
Cleaning time	sec	OFF	OFF	
Fire door	pen/close	closed	closed	
canalization		OFF	ON	

\*) Average of 3 samples, based on separate calculation

Report- No.		K11612013T1
TÜV- order- No.		21223475
Manufacturer		Palazzetti
Type		AP008S_0_08; AP008S_0_12
Model		Room heater for wood pellets with internal fuel hopper and flue gas fan without water parts
Specifics		combustion air is taken from the room Sealed stove with canalisation
Reduced heat output		2,39 kW
Test place		Thiene
Test date		29.10.2013
Type of test		Test at reduced load acc. EN 14785
		<b>1. test</b>
Test date		29.10.2013
Time		09:10-15:10
<b>Ambient:</b>		
Barometric pressure	mbar	999
Temperature of combustion air	°C	26,9
Ambient rel. humidity	%	45
Ambient temperature (room)	°C	26,9
<b>Fuel:</b>		
Type of fuel		wood pellets
Number of fuel loadings		1
Total weight of appliance at start	kg	197,60
Weight of additional loads	kg	194,46
Total weight of appliance at end	kg	0,00
Fuel consumption, calculated of the difference	kg	3,14
Test duration	sec	21600
Fuel consumption "B"	kg/h	0,523
Combustible constituents in material passing through the grate "b", analyse	Gew. %	0,0
Residue passing through the grate, measurement	kg	0,000
Residue passing through the grate "R"	Gew. %	0,00
Carbon content of the residue passing through the grate "C" depending of 1 kg fuel	Gew. %	0,10
<b>Water part (average values)</b>		
flow temperature	°C	0,0
return temperature	°C	0,0
delta-T	K	0,0
Cold water flow	kg/h	0,0
Additional energy of the pump	kW	0,000
<b>Flue, average</b>		
Flue gas temperature	°C	80,0
Flue gas draught	Pa	10,0
O <sub>2</sub> - concentration, calculated	Vol.-%	14,50
CO <sub>2</sub> - concentration (measurement)	Vol.-%	6,26
lambda value, λ	-	3,211
CO - concentration (measurement)	ppm	326,4
CO - concentration (measurement)	Vol.-%	0,033
CO - concentration (measurement)	mg/m <sup>3</sup>	408,0
CO - concentr. (at reference - O <sub>2</sub> )	Vol.-%	0,040
CO - concentr. (at reference - O <sub>2</sub> )	mg/m <sup>3</sup>	502,4
CO - concentration rel. to fuel input	mg/kWh	1168,5
CO - concentration rel. to fuel input	mg/MJ	324,6
NO <sub>x</sub> - concentration (measurement)	ppm	39,1
NO <sub>x</sub> - concentration (measurement)	mg/m <sup>3</sup>	80,2
NO <sub>x</sub> - concentr. (at reference - O <sub>2</sub> )	mg/m <sup>3</sup>	98,8
NO <sub>x</sub> - concentration rel. to fuel input	mg/kWh	229,7
NO <sub>x</sub> - concentration rel. to fuel input	mg/MJ	63,8
CnHm - concentration (measurement)	mg/m <sup>3</sup>	9,6
CnHm concentr. (at reference - O <sub>2</sub> )	mg/m <sup>3</sup>	11,9
CnHm - concentration (total C) rel. to fuel input	mg/kWh	27,6
CnHm - concentration (total C) rel. to fuel input	mg/MJ	7,7
Dust (measurement*)	mg	6,3
Dust concentration (measurement*)	mg/m <sup>3</sup>	9,3
Dust (at reference - O <sub>2</sub> )*	mg/m <sup>3</sup>	11,6
Dust* rel. to fuel input	mg/kWh	27,0
Dust* rel. to fuel input	mg/MJ	7,5
PME concentration (at reference - O <sub>2</sub> )*	mg/m <sup>3</sup>	16,8
<b>Calculation</b>		
"Qa" loss free heating flue gas	kJ/kg	1041,9
"qa" loss flue gas	%	5,94
"Qb" loss fix heating in flue gas	kJ/kg	57,7
"qb" loss fix heating in flue gas	%	0,33
"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	%	0,20
"m" flue gas mass flow	g/s	2,8
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m <sup>3</sup> K)	1,33
cpm-H <sub>2</sub> O	kJ/(m <sup>3</sup> K)	1,50
"eta" Efficiency (direct), to consider only water heating output P <sub>w</sub>	%	entfällt
"eta" Efficiency (indirect)	%	93,53
Heating input	kW	2,55
"P" heating output, total	kW	2,39
"P <sub>w</sub> " water heating output	kW	0,00
Space heating output: P <sub>STR</sub> = P - P <sub>w</sub>	kW	2,39
Space heating output, relating to heat input	%	93,53
Water heating output, relating to heat input	%	0,00
<b>Settings</b>		
Air inlet delta	-	576
Ambient motor	Volt	130
Fuel motor	sec	8 ON, 52 OFF
Cleaning period	min	OFF
Canalisation		OFF
Fire door	open/closed	closed
*) Average of 3 samples, based on separate calculation		

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.

<i>Measure</i>	<i>Principle</i>	<i>Company</i>	<i>Range</i>	<i>Uncertainty</i>	<i>Calibration</i>
CO <sub>2</sub>	Infrared-absorption	Siemens Analyser Ultramat 6E	0 – 3 % 0 – 30 %	± 1% related to final value	Reference gas: 20,10 %
	Infrared-absorption	Siemens Ultramat 23	0 – 5 % 0 – 25 %	± 1% related to the range	
CO	Infrared-absorption	Siemens Analyser Ultramat 6E	0 – 300 ppm 0 – 3000 ppm	± 1% related to final value	Reference gas: 2030 ppm
	Infrared-absorption	Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	
	Infrared-absorption	Siemens Ultramat 23	0 – 1 % 0 – 5 %	± 1% related to the range	Reference gas: 1,00 %
NO <sub>x</sub>	Chemolumin- escenz	ECO Physics CLD 700 EL	0 – 10 ppm 0 – 10 ppm 0 – 100 ppm 0 – 1000 ppm 0 – 10000 ppm	± 1% related to final value	Reference gas: 495 ppm
NO	Infrared-absorption	Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	
OGC	FID	H&B Fidas 3E	0 – 50 mgC 0 – 100 mgC 0 – 500 mgC 0 – 1000 mgC	± 1% related to final value	Reference gas: 499 ppm propane
	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	
Dust content	Gravimetric	Sartorius CPA 224 S	0,1 mg – 220 g	± 0,1 mg	Reference load
Fuel consumption	Gravimetric	Dini Angeo DFWK	0 – 600 kg	± 10 g	Reference load
Water flow	Magnetic	ABB Copa-XE DE43FI	0 – 2000 kg/h	± 1% related to the range	Balance
Temperature	PT 100 K-type thermocouples	Agilent 34970 A	0 – 300 °C	Up to 0,5 °C	Reference thermometer: SIT certificate 6197.GT

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