

Report No. K 1793 2016 T1
Residential space heating appliances
Initial type testing
DIN EN 14785

Type:
AP004N_1_08
AP004N_1_07
AP004N_1_06

Company:
Palazzetti Lelio S.p.A.



Deutsche
Akkreditierungsstelle
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.

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)

Trademark: **Palazzetti**

Type designation:

Type of appliances: Residential room 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

Model designation: **AP004N_1_08 AP004N_1_07 AP004N_1_06**

Total heat input [kW]: 2,4 - 9,3 2,4 - 7,8 2,4 - 6,6

Water heat output [kW]: - - -

Space heat output [kW]: 2,2 - 8,2 2,2 - 7,0 2,2 - 6,0

Max. water pressure: Not applicable

Max. water temperature: Not applicable

Fuels: Wood pellets
 Ø 6 mm, Lmax 30 mm, max humidity 6,3%, Heizinos

Remarks: The model AP004N_1_07 is linear interpolated.**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.

Cologne, 07.04.2016

 Test Centre for Energy Appliances
 DIN- and DVGW-Test Centre
 Notified Body: 2456 (CPR)

Assessor

Report released after review


 Dipl.-Ing. M. Ciccarelli


 Dipl.-Ing. M. Reibold

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 **AP004N_1_08**, **AP004N_1_06** for the operation with wood pellets according 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 18 February 2016 until 25 February 2016.

The (FPC) Factory Production Control was not performed.

2 Description of the appliances

2.1 Construction

Residential space heating appliance fired by wood pellets without water heat exchanger for domestic central heating system. The flue discharge for pellet operation is fan assisted. The stove is equipped with an automatic ignition.

Combustion air

The combustion air is to be taken from inside

2.2 General technical data of the pellet stove

| | |
|--|--|
| Type: | AP004N_1_08 |
| Nominal power [kW]: | 8,2 |
| Test fuel: | Wood pellets Ø 6 mm, Lmax 30 mm, max humidity 6,3%, Heizinos |
| Total dimension High x Width x Depths [mm] | 1107 x 531 x 525 |
| Flue spigot [mm] | |
| Weight [kg] | 93 |
| Distance of adjacent combustible materials | 100 mm (Backside) distance from test wall 100 mm (Side) distance from test wall 800 mm (Front) distance from test wall |

| | |
|--|--|
| Type: | AP004N_1_07 |
| Nominal power [kW]: | 7,0 |
| Test fuel: | Wood pellets Ø 6 mm, Lmax 30 mm, max humidity 6,3%, Heizinos |
| Total dimension High x Width x Depths [mm] | 1107 x 531 x 525 |
| Flue spigot [mm] | |
| Weight [kg] | |
| Distance of adjacent combustible materials | 100 mm (Backside) distance from test wall 100 mm (Side) distance from test wall 800 mm (Front) distance from test wall |

| | |
|--|--|
| Type: | AP004N_1_06 |
| Nominal power [kW]: | 6,0 |
| Test fuel: | Wood pellets Ø 6 mm, Lmax 30 mm, max humidity 6,3%, Heizinos |
| Total dimension High x Width x Depths [mm] | 1107 x 531 x 525 |
| Flue spigot [mm] | |
| Weight [kg] | |
| Distance of adjacent combustible materials | 100 mm (Backside) distance from test wall 100 mm (Side) distance from test wall 800 mm (Front) distance from test wall |

For more information see appendix A02, A04, A06, A08.1, A08.2, A08.3

3 Testing

The tests were carried out on 18 February 2016 until 25 February 2016 in the laboratory of TÜV Rheinland/CMC Centro Misura Compatibilità in Thiene.

3.1 General requirements

- P (pass)
- N (not applicable)
- F (fail)

| 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 | - | |
| - Primary air inlet control | 4.8.1 | - | P |
| - Secondary air inlet control | 4.8.2 | - | N |
| Internal flue gas diverter | 4.9 | - | N |
| 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 | - | 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 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 | 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 | 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

| AP004N_1_08 | | Nominal | Partial | Requirement |
|---|-------------------|----------------|----------------|---------------------------------|
| Mass of the test fuel fired hourly | kg/h | 1,917 | 0,497 | - |
| Flue gas mass flow | g/s | 5,1 | 3,1 | - |
| Flue gas temperature | °C | 224,5 | 82,9 | - |
| Flue draught | mbar | 0,12 | 0,12 | 0,12/0,10 +/-0,02 |
| CO ₂ -concentration | Vol.-% | 13,01 | 5,34 | - |
| O ₂ -concentration | Vol.-% | 7,34 | 15,39 | - |
| CO-concentration | ppm | 34,7 | 198,5 | - |
| CO-emission (at 13%-O ₂) | mg/m ³ | 25,5 | 353,7 | 500/750 |
| CO-emission | mg/kWh | 60,6 | 841,7 | - |
| CO-emission | mg/MJ | 16,8 | 233,8 | 500 (Art. 15a) |
| NO _x -concentration | ppm | 111,4 | 41,2 | - |
| NO _x -emission (at 13%-O ₂) | mg/m ³ | 133,6 | 120,2 | - |
| NO _x -emission | mg/kWh | 317,9 | 286,1 | - |
| NO _x -emission | mg/MJ | 88,3 | 79,5 | 100 (Art. 15a) |
| CnHm-concentration measured acc. CEN/TS 15883 | ppm | 1,2 | 2,0 | - |
| CnHm-emission (at 13%-O ₂) | mg/m ³ | 1,1 | 4,7 | - |
| CnHm-emission | mg/kWh | 2,6 | 11,2 | - |
| CnHm-emission | mg/MJ | 0,7 | 3,1 | 30 (Art. 15a) |
| Dust concentration measured acc. CEN/TS 15883 and EN13284-1 | mg | 3,9 | 2,3 | - |
| Dust emission (at 13%-O ₂) | mg/m ³ | 8,4 | 11,7 | - |
| Dust emission | mg/kWh | 19,9 | 28,0 | - |
| Dust emission | mg/MJ | 5,5 | 7,8 | 25 (Art.15a) |
| Particulate emission acc. PrEN16510:2012 | mg/m ³ | 8,8 | 12,9 | - |
| Total heat output | kW | 8,2 | 2,2 | - |
| Water heat output | kW | 0,0 | 0,0 | - |
| Space heat output | kW | 8,2 | 2,2 | - |
| Efficiency | % | 87,7 | 91,3 | 75/70 (EN14785) - 80 (Art. 15a) |

| AP004N_1_07* | | Nominal | Partial | Requirement |
|---|-------------------|----------------|----------------|--------------------------------|
| Mass of the test fuel fired hourly | kg/h | 1,615 | 0,500 | - |
| Flue gas mass flow | g/s | 4,6 | 3,1 | - |
| Flue gas temperature | °C | 193,7 | 82,9 | - |
| Flue draught | mbar | 0,12 | 0,12 | 0,12/0,10 +/-0,02 |
| CO ₂ -concentration | Vol.-% | 12,13 | 5,34 | - |
| O ₂ -concentration | Vol.-% | 8,26 | 15,39 | - |
| CO-concentration | ppm | 33,0 | 198,5 | - |
| CO-emission (at 13%-O ₂) | mg/m ³ | 25,9 | 353,7 | 500/750 |
| CO-emission | mg/kWh | 61,7 | 841,7 | - |
| CO-emission | mg/MJ | 17,1 | 233,8 | 500 (Art. 15a) |
| NO _x -concentration | ppm | 101,6 | 41,2 | - |
| NO _x -emission (at 13%-O ₂) | mg/m ³ | 130,6 | 120,2 | - |
| NO _x -emission | mg/kWh | 310,8 | 286,1 | - |
| NO _x -emission | mg/MJ | 86,3 | 79,5 | 100 (Art. 15a) |
| CnHm-concentration measured acc. CEN/TS 15883 | ppm | 1,1 | 2,0 | - |
| CnHm-emission (at 13%-O ₂) | mg/m ³ | 1,2 | 4,7 | - |
| CnHm-emission | mg/kWh | 2,8 | 11,2 | - |
| CnHm-emission | mg/MJ | 0,8 | 3,1 | 30 (Art. 15a) |
| Dust concentration measured acc. CEN/TS 15883 and EN13284-1 | mg | 4,0 | 2,3 | - |
| Dust emission (at 13%-O ₂) | mg/m ³ | 9,4 | 11,7 | - |
| Dust emission | mg/kWh | 22,3 | 28,0 | - |
| Dust emission | mg/MJ | 6,2 | 7,8 | 25 (Art.15a) |
| Particulate emission acc. PrEN16510:2012 | mg/m ³ | 9,8 | 12,9 | - |
| Total heat output | kW | 7,0 | 2,2 | - |
| Water heat output | kW | 0,0 | 0,0 | - |
| Space heat output | kW | 7,0 | 2,2 | - |
| Efficiency | % | 89,0 | 91,3 | 75/70 (EN14785) - 80(Art. 15a) |

*) Values are linear interpolated

| AP004N_1_06 | | Nominal | Partial | Requirement |
|---|-------------------|----------------|----------------|--------------------------------|
| Mass of the test fuel fired hourly | kg/h | 1,363 | 0,497 | - |
| Flue gas mass flow | g/s | 4,1 | 3,1 | - |
| Flue gas temperature | °C | 167,9 | 82,9 | - |
| Flue draught | mbar | 0,12 | 0,12 | 0,12/0,10 +/-0,02 |
| CO ₂ -concentration | Vol.-% | 11,40 | 5,34 | - |
| O ₂ -concentration | Vol.-% | 9,03 | 15,39 | - |
| CO-concentration | ppm | 31,5 | 198,5 | - |
| CO-emission (at 13%-O ₂) | mg/m ³ | 26,3 | 353,7 | 500/750 |
| CO-emission | mg/kWh | 62,6 | 841,7 | - |
| CO-emission | mg/MJ | 17,4 | 233,8 | 500 (Art. 15a) |
| NO _x -concentration | ppm | 93,5 | 41,2 | - |
| NO _x -emission (at 13%-O ₂) | mg/m ³ | 128,1 | 120,2 | - |
| NO _x -emission | mg/kWh | 304,9 | 286,1 | - |
| NO _x -emission | mg/MJ | 84,7 | 79,5 | 100 (Art. 15a) |
| CnHm-concentration measured acc. CEN/TS 15883 | ppm | 1,1 | 2,0 | - |
| CnHm-emission (at 13%-O ₂) | mg/m ³ | 1,2 | 4,7 | - |
| CnHm-emission | mg/kWh | 2,9 | 11,2 | - |
| CnHm-emission | mg/MJ | 0,8 | 3,1 | 30 (Art. 15a) |
| Dust concentration measured acc. CEN/TS 15883 and EN13284-1 | mg | 4,0 | 2,3 | - |
| Dust emission (at 13%-O ₂) | mg/m ³ | 10,2 | 11,7 | - |
| Dust emission | mg/kWh | 24,2 | 28,0 | - |
| Dust emission | mg/MJ | 6,7 | 7,8 | 25 (Art.15a) |
| Particulate emission acc. PrEN16510:2012 | mg/m ³ | 10,6 | 12,9 | - |
| Total heat output | kW | 6,0 | 2,2 | - |
| Water heat output | kW | 0,0 | 0,0 | - |
| Space heat output | kW | 6,0 | 2,2 | - |
| Efficiency | % | 90,0 | 91,3 | 75/70 (EN14785) - 80(Art. 15a) |

3.7 Temperatures

| AP004N_1_08 | | | |
|---|----|-------------------|--------------------|
| Maximum temperatures at trihedron: | | | |
| - Right side | °C | 48,1 | 65 K over tambient |
| - Back side | °C | 53,3 | 65 K over tambient |
| - Front side 80 cm | °C | 41,5 | 65 K over tambient |
| - Floor | °C | 45,1 | 65 K over tambient |
| Distances: | | | |
| - Backside-Pelletstove | mm | 100 | |
| - Side-Pelletstove | mm | 100 | |
| - Front-Pelletstove | mm | 800 | |
| Ambient temperature | °C | 23,44741 | |
| Max. temperature in fuel hopper | °C | 60,6 | 65 K over tambient |
| Max. temperature of operating tools (handle of firedoor) | °C | 167,600006103515* | 35 K over tambient |

| AP004N_1_06 | | | |
|---|----|-------------------|--------------------|
| Maximum temperatures at trihedron: | | | |
| - Right side | °C | 48,1 | 65K over tambient |
| - Back side | °C | 53,3 | 65K over tambient |
| - Front side 80 cm | °C | 41,5 | 65K over tambient |
| - Floor | °C | 45,1 | 65K over tambient |
| Distances: | | | |
| - Backside-Pelletstove | mm | 100 | |
| - Side-Pelletstove | mm | 100 | |
| - Front-Pelletstove | mm | 800 | |
| Ambient temperature | °C | 23,44741 | |
| Max. temperature in fuel hopper | °C | 60,6 | 65K over tambient |
| Max. temperature of operating tools (handle of firedoor) | °C | 167,600006103515* | 35 K over tambient |

*) tool provided by the manufacturer

Detailed test results see appendix A02, A04, A06, A08.1, A08.2, A08.3

4 Statement of the test results

The appliance

AP004N_1_08

AP004N_1_07

AP004N_1_06

of the company

Palazzetti Lelio S.p.A.

complies 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 1 Fuel Data

Appendix 2 Test results

Appendix 3 Measurement Instruments

| Appendix | Subject | Reference |
|----------|---|-----------------------|
| A 04 | Type labels | |
| A 05 | CE Declaration of conformity | 21.03.2016 |
| A 06 | Declaration of Performances | 21.03.2016 |
| A 07 | Essential requirements EN 14785 | 21.03.2016 |
| A 08.1 | Instruction and installation manual | 11/2015 |
| A 08.2 | User manual | 07/2015 |
| A 08.3 | Technical characteristics | 16.03.2016 |
| A 09 | List of electrical components | 21.03.2016 |
| A 10 | EBM R4S190 ambient fan datasheet | 09.04.2015 |
| A 11 | IPC BLXMS00003 exhaust gas fan datasheet and declaration | 03.04.2013 |
| A 12 | Mellor T3 SC9-075 DC3226 gear motor datasheet and declaration | 10.02.2015 |
| A 13 | FKK PSX 2 240 B ignition resistance datasheet and declaration | 10.06.2013 |
| A 14 | Rathgeber 20-S-228 710V temperature limiter datasheet and certificate | 10.05.2001 |
| A 15 | Huba 605 pressure switch datasheet and certificates | 24.04.2009 |
| A 16 | Schott Robax technical data glass | |
| A 17 | Tespe technical data seals | |
| A 18 | Fumis Alpha 65-230 safety electrical circuit | 03.05.2011 |
| A 19 | Setup parameters | 002_001012_46_60 1 |
| A 20 | Overview drawings | 13.01.2016 |
| A 21 | Flue ways | 24.02.2016 |
| A 22 | Drawing of combustion room | 28.12.2015 |
| A 23 | Drawing retort | 07.03.2011 |
| A 24 | Drawing of pellet storage and pellet transport | 28.12.2015 |

Appendix 1

Fuel data

| 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: | | | 19.01.2016 | | | Analysis No. 1600186-001 | | | Fuel sampling date: | | |
| Fuel: | | | Wood pellets | | | | | | 12.01.16 | | |
| Bestandteil im Brennstoff | Stoffanteil | Sauerstoffbedarf | | Abgasbestandteile aus Brennstoff in Nm³/kg Brennstoff | | | | | | | |
| | | in Nm³ je kg Bestandteil | in Nm³ je kg Brennstoff | | | | | | | | |
| | | | Stoffanteil x | CO₂ | | SO₂ | | H₂O | | N₂ | |
| | Gew. % | | 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 | 47,600 | 1,860 | 0,885 | 1,850 | 0,8806 | - | - | - | - | - | - |
| s | 0,003 | 0,700 | 0,000 | - | - | 0,680 | 0,0000 | - | - | - | - |
| h | 6,010 | 5,550 | 0,334 | - | - | - | - | 11,100 | 0,6671 | - | - |
| n | 0,090 | - | - | - | - | - | - | - | - | 0,80 | 0,0007 |
| o | 40,300 | -0,700 | -0,282 | - | - | - | - | - | - | - | - |
| wasser | 5,700 | - | - | - | - | - | - | 1,240 | 0,0707 | - | - |
| asche | 0,297 | - | - | - | - | - | - | - | - | - | - |
| summe | 100,000 | O min= | 0,937 | V CO₂ = | 0,8806 | V SO₂ = | 0,0000 | V W = | 0,7378 | V N₂ = | 0,0007 |
| Luftbedarf | | | | L min = 4,4611 Nm³/kg Brennstoff | | | | | | | |
| trockene stöchiometrische Abgasmenge | | | | V A tr min = 4,4049 Nm³/kg Brennstoff | | | | | | | |
| Max. Kohlenstoffdioxid-Anteil | | | | CO₂ max = 19,9913 Vol.-% | | | | | | | |
| Wasserdampfmenge | | | | V w = 0,7378 Nm³/kg Brennstoff | | | | | | | |
| | | | | V A tr min/ L min = 0,9874 | | | | | | | |
| Heizwert, wf | | | | Hu = 18698 kJ/kg | | | | | | | |
| | | | | 5,194 kWh/kg | | | | | | | |
| Berechnungen zum Versuchszeitpunkt | | | | | | | | | | | |
| wasser zum Versuchszeitpunkt | | | | w = | | 5,700 Gew. % | | | | | |
| Heizwert, roh zum Versuchszeitpunkt | | | | Hu | | 17493 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: | | | 19.01.2016 | | | Analysis No. 1600186-001 | | | Fuel sampling date: | | | | |
| Fuel: | | | Wood pellets | | | | | | 12.01.16 | | | | |
| Bestandteil im Brennstoff | Stoffanteil | Sauerstoffbedarf | | Abgasbestandteile aus Brennstoff in Nm³/kg Brennstoff | | | | | | | | | |
| | | in Nm³ je kg Bestandteil | in Nm³ je kg Brennstoff | Stoffanteil x | | CO₂ | | SO₂ | | H₂O | | N₂ | |
| | Gew. % | | 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 | 47,600 | 1,860 | 0,885 | 1,850 | 0,8806 | - | - | - | - | - | - | | |
| s | 0,003 | 0,700 | 0,000 | - | - | 0,680 | 0,0000 | - | - | - | - | | |
| h | 6,010 | 5,550 | 0,334 | - | - | - | - | 11,100 | 0,6671 | - | - | | |
| n | 0,090 | - | - | - | - | - | - | - | - | 0,80 | 0,0007 | | |
| o | 40,300 | -0,700 | -0,282 | - | - | - | - | - | - | - | - | | |
| wasser | 5,700 | - | - | - | - | - | - | 1,240 | 0,0707 | - | - | | |
| asche | 0,297 | - | - | - | - | - | - | - | - | - | - | | |
| summe | 100,000 | O min= | 0,937 | V CO₂ = | 0,8806 | V SO₂ = | 0,0000 | V W = | 0,7378 | V N₂ = | 0,0007 | | |
| Luftbedarf | | | | | | | | | | | | | |
| | | | | L min = | | 4,4611 Nm³/kg Brennstoff | | | | | | | |
| trockene stöchiometrische Abgasmenge | | | | V A tr min = | | 4,4049 Nm³/kg Brennstoff | | | | | | | |
| Max. Kohlenstoffdioxid-Anteil | | | | CO₂ max = | | 19,9913 Vol.-% | | | | | | | |
| Wasserdampfmenge | | | | V w = | | 0,7378 Nm³/kg Brennstoff | | | | | | | |
| | | | | V A tr min/ L min = | | 0,9874 | | | | | | | |
| Heizwert, wf | | | | Hu = | | 18698 kJ/kg | | | | | | | |
| | | | | | | 5,194 kWh/kg | | | | | | | |
| Berechnungen zum Versuchszeitpunkt | | | | | | | | | | | | | |
| wasser zum Versuchszeitpunkt | | | | w = | | 5,700 Gew. % | | | | | | | |
| Heizwert. roh zum Versuchszeitpunkt | | | | Hu | | 17493 kJ/kg | | | | | | | |

Appendix 2

Test results

| | | | | |
|--|--------|--|----------------|----------------|
| Report- No. | | K17932016T1 | | |
| TÜV- order- No. | | 21232454 | | |
| Manufacturer | | Palazzetti Lelio S.p.A. | | |
| Type of appliances | | Residential room heating appliances fired by wood pellets without water heat exchanger, with fan assisted flue discharge and with internal fuel hopper | | |
| Special properties | | room air dependent | | |
| Model name | | AP004N_1_08 | | |
| Trademark | | Palazzetti | | |
| Nominal heat input from manufacturer | kW | 9,30 | | |
| Nominal heat output from manufacturer | kW | 8,20 | | |
| Test place | | Thiene | | |
| Test date | | 18.02.2016 | | |
| Type of test | | Test at nominal load | | |
| | | DIN EN 14785:10:2006, Correction 1: 10:2007 | | |
| | | 1. test | 2. test | Average |
| Time | | 10:15-13:15 | 13:15-16:15 | |
| Ambient: | | | | |
| Barometric pressure | mbar | 1013 | 1013 | 1013 |
| Temperature of combustion air | °C | 22,32 | 23,45 | 22,89 |
| Ambient rel. humidity | % | 67,00 | 67,00 | 67,00 |
| Ambient temperature (room) | °C | 22,32 | 23,45 | 22,89 |
| Type of Fuel | | Wood pellets | | |
| Properties of Fuel | | Ø 6 mm, Lmax 30 mm, max humidity 6,3% Heizinos | | |
| Number of fuel loadings | | 1 | 1 | 1 |
| Total weight of appliance at start | kg | 133,3 | 127,6 | 130,4 |
| Weight of additional loads | kg | 127,6 | 121,8 | 124,7 |
| Total weight of appliance at end | kg | 0,00 | 0,00 | 0,00 |
| Fuel consumption, calculated of the difference | kg | 5,74 | 5,76 | 5,75 |
| Test duration | sec | 10800 | 10800 | 10800 |
| Fuel consumption "B" | kg/h | 1,91 | 1,92 | 1,92 |
| Combustible constituents in material passing through the grate "b", analyse | Gew. % | 0,000 | 0,000 | 0,000 |
| 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 | Gew. % | 0,104 | 0,104 | 0,104 |
| Water part (average values) | | | | |
| flow temperature | °C | 0,00 | 0,00 | 0,00 |
| return temperature | °C | 0,00 | 0,00 | 0,00 |
| delta-T | K | 0,00 | 0,00 | 0,00 |
| Cold water flow | kg/h | 0,00 | 0,00 | 0,00 |
| Additional energy of the pump | kW | 0,00 | 0,00 | 0,00 |
| Flue, average | | | | |
| Flue gas temperature | °C | 224,13 | 224,94 | 224,54 |
| Flue gas draught | Pa | 12,0 | 12,0 | 12,0 |
| O2 - concentration, calculated | Vol.-% | 7,76 | 6,91 | 7,34 |
| CO2 - concentration (measurement) | Vol.-% | 12,60 | 13,41 | 13,01 |
| lambda value, l | - | 1,58 | 1,48 | 1,53 |
| CO - concentration (measurement) | ppm | 37,97 | 31,37 | 34,67 |
| CO - concentration (measurement) | Vol.-% | 0,004 | 0,003 | 0,003 |
| CO - concentration (measurement) | mg/m³ | 47,47 | 39,21 | 43,34 |
| CO - concentr. (at reference - O2) | Vol.-% | 0,002 | 0,002 | 0,002 |
| CO - concentr. (at reference - O2) | mg/m³ | 28,69 | 22,27 | 25,48 |
| CO - concentration rel. to fuel input | mg/kWh | 68,27 | 52,98 | 60,62 |
| CO - concentration rel. to fuel input | mg/MJ | 18,96 | 14,72 | 16,84 |
| NOx - concentration (measurement) | ppm | 106,6 | 116,1 | 111,4 |
| NOx - concentration (measurement) | mg/m³ | 218,5 | 238,0 | 228,3 |
| NOx - concentr. (at reference - O2) | mg/m³ | 132,1 | 135,2 | 133,6 |
| NOx - concentration rel. to fuel input | mg/kWh | 314,2 | 321,6 | 317,9 |
| NOx - concentration rel. to fuel input | mg/MJ | 87,29 | 89,34 | 88,31 |

| | | | | |
|--|--------------|----------------|----------------|----------|
| CnHm - concentration (measurement) | ppm | 1,21 | 1,10 | 1,15 |
| CnHm concentr. (at reference - O2) | mg/m³ | 1,19 | 1,02 | 1,10 |
| CnHm - concentration (total C) rel. to fuel input | mg/kWh | 2,83 | 2,43 | 2,63 |
| CnHm - concentration (total C) rel. to fuel input | mg/MJ | 0,79 | 0,67 | 0,73 |
| Dust (measurement*) | mg | 3,90 | | 3,90 |
| Dust concentration* | mg/m³ | 14,04 | | 14,04 |
| Dust (at reference - O2)* | mg/m³ | 8,38 | | 8,38 |
| Dust* rel. to fuel input | mg/kWh | 19,94 | | 19,94 |
| Dust* rel. to fuel input | mg/MJ | 5,54 | | 5,54 |
| PME concentration (at reference - O2)* | mg/m³ | 8,84 | | 8,84 |
| Electrical consumption | | | | |
| Elmax | W | | | 50,00 |
| Elmin | W | | | 40,00 |
| PSTB | W | | | 2,00 |
| Calculation | | | | |
| "Qa" loss free heating flue gas | kJ/kg | 2173,1 | 2057,8 | 2115,5 |
| "qa" loss flue gas | % | 12,42 | 11,76 | 12,09 |
| "Qb" loss fix heating in flue gas | kJ/kg | 3,38 | 2,62 | 3,00 |
| "qb" loss fix heating in flue gas | % | 0,019 | 0,015 | 0,017 |
| "Qr" losses due to combustible constituents in the residue passing through the | kJ/kg | 0,00 | 0,00 | 0,00 |
| "qr" losses due to combustible constituents in the residue passing through the | % | 0,200 | 0,200 | 0,200 |
| "m" flue gas mass flow | g/s | 5,27 | 4,99 | 5,13 |
| cpm, acc. DIN 4702-2, version 03.90 for dry flue gas | kJ/(m³K) | 1,37 | 1,37 | 1,37 |
| cpm-H₂O | kJ/(m³K) | 1,53 | 1,53 | 1,53 |
| "eta" Efficiency (direct), to consider only water heating output Pw | % | entfällt | entfällt | entfällt |
| "eta" Efficiency (indirect) | % | 87,36 | 88,02 | 87,69 |
| Heating input | kW | 9,3 | 9,3 | 9,3 |
| "P" heating output, total | kW | 8,1 | 8,2 | 8,2 |
| "Pw" water heating output | kW | 0,0 | 0,0 | 0,0 |
| Space heating output: P _{STR} = P - Pw | kW | 8,1 | 8,2 | 8,2 |
| Space heating output, relating to heat input | % | 87,36 | 88,02 | 87,69 |
| Water heating output, relating to heat input | % | 0,00 | 0,00 | 0,00 |
| Settings | | | | |
| Flue gas motor | rpm | 1750 | 1750 | |
| Ambient motor | Volt | 230 | 230 | |
| Fuel motor | sec | 3,2 ON 2,8 OFF | 3,2 ON 2,8 OFF | |
| Clenaing time | sec | off | off | |
| Fire door | Open / close | closed | closed | |

| | | |
|--|--------|--|
| Report- No. | | K17932016T1 |
| TÜV- order- No. | | 21232454 |
| Manufacturer | | Palazzetti Lelio S.p.A. |
| Type of appliances | | Residential room heating appliances fired by wood pellets without water heat exchanger, with fan assisted flue discharge and with internal fuel hopper |
| Special properties | | room air dependent |
| Model name | | AP004N_1_08 |
| Trademark | | Palazzetti |
| Reduced heat input from manufacturer | kW | 2,40 |
| Reduced heat output from manufacturer | kW | 2,20 |
| Test place | | Thiene |
| Test date | | 19.02.2016 |
| Type of test | | Test at reduced load |
| | | DIN EN 14785:10.2006, Correction 1: 10.2007 |
| | | 1. test |
| Time | | 9:20-15:20 |
| Ambient: | | |
| Barometric pressure | mbar | 1016 |
| Temperature of combustion air | °C | 19,82 |
| Ambient rel. humidity | % | 69,00 |
| Ambient temperature (room) | °C | 19,82 |
| Type of Fuel | | Wood pellets |
| Properties of Fuel | | Ø 6 mm, Lmax 30 mm, max humidity 6,3% Heizinos |
| Number of fuel loadings | | 1 |
| Total weight of appliance at start | kg | 144,2 |
| Weight of additional loads | kg | 141,2 |
| Total weight of appliance at end | kg | 0,00 |
| Fuel consumption, calculated of the difference | kg | 2,98 |
| Test duration | sec | 21600 |
| Fuel consumption "B" | kg/h | 0,50 |
| Combustible constituents in material passing through the grate "b", analyse | Gew. % | 0,000 |
| 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 part (average values) | | |
| flow temperature | °C | 0,00 |
| return temperature | °C | 0,00 |
| delta-T | K | 0,00 |
| Cold water flow | kg/h | 0,00 |
| Additional energy of the pump | kW | 0,00 |
| Flue, average | | |
| Flue gas temperature | °C | 82,91 |
| Flue gas draught | Pa | 12,0 |
| O2 - concentration, calculated | Vol.-% | 15,39 |
| CO2 - concentration (measurement) | Vol.-% | 5,34 |
| lambda value, l | - | 3,71 |
| CO - concentration (measurement) | ppm | 198,5 |
| CO - concentration (measurement) | Vol.-% | 0,020 |
| CO - concentration (measurement) | mg/m³ | 248,2 |
| CO - concentr. (at reference - O2) | Vol.-% | 0,028 |
| CO - concentr. (at reference - O2) | mg/m³ | 353,7 |
| CO - concentration rel. to fuel input | mg/kWh | 841,7 |
| CO - concentration rel. to fuel input | mg/MJ | 233,8 |
| NOx - concentration (measurement) | ppm | 41,15 |
| NOx - concentration (measurement) | mg/m³ | 84,36 |
| NOx - concentr. (at reference - O2) | mg/m³ | 120,2 |
| NOx - concentration rel. to fuel input | mg/kWh | 286,1 |
| NOx - concentration rel. to fuel input | mg/MJ | 79,48 |

| | | |
|--|--------------|-----------------|
| CnHm - concentration (measurement) | ppm | 2,02 |
| CnHm concentr. (at reference - O2) | mg/m³ | 4,69 |
| CnHm - concentration (total C) rel. to fuel input | mg/kWh | 11,17 |
| CnHm - concentration (total C) rel. to fuel input | mg/MJ | 3,10 |
| Dust (measurement*) | mg | 2,30 |
| Dust concentration* | mg/m³ | 8,19 |
| Dust (at reference - O2)* | mg/m³ | 11,75 |
| Dust* rel. to fuel input | mg/kWh | 27,95 |
| Dust* rel. to fuel input | mg/MJ | 7,76 |
| PME concentration (at reference - O2)* | mg/m³ | 12,91 |
| Electrical consumption | | |
| Elmax | W | 0,00 |
| Elmin | W | 0,00 |
| PSTB | W | 0,00 |
| Calculation | | |
| "Qa" loss free heating flue gas | kJ/kg | 1448,8 |
| "qa" loss flue gas | % | 8,28 |
| "Qb" loss fix heating in flue gas | kJ/kg | 41,48 |
| "qb" loss fix heating in flue gas | % | 0,237 |
| "Qr" losses due to combustible constituents in the residue passing through the grate | kJ/kg | 0,00 |
| "qr" losses due to combustible constituent in the residue passing through the grate | % | 0,200 |
| "m" flue gas mass flow | g/s | 3,07 |
| cpm, acc. DIN 4702-2, version 03.90 for dry flue gas | kJ/(m³K) | 1,32 |
| cpm-H ₂ O | kJ/(m³K) | 1,50 |
| "eta" Efficiency (direct), to consider only water heating output P _w | % | entfällt |
| "eta" Efficiency (indirect) | % | 91,28 |
| Heating input | kW | 2,4 |
| "P" heating output, total | kW | 2,2 |
| "P _w " water heating output | kW | 0,0 |
| Space heating output: P _{STR} = P - P _w | kW | 2,2 |
| Space heating output, relating to heat input | % | 91,28 |
| Water heating output, relating to heat input | % | 0,00 |
| Settings | | |
| Flue gas motor | rpm | 580 |
| Ambient motor | Volt | 230 |
| Fuel motor | sec | 0,8 ON; 4,2 OFF |
| Clenaing time | sec | off |
| Fire door | Open / close | closed |

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

| | | |
|---|-----------------------|--|
| CnHm - concentration (measurement) | ppm | |
| CnHm concentr. (at reference - O ₂) | mg/m ³ | |
| CnHm - concentration (total C) rel. to fuel input | mg/kWh | |
| CnHm - concentration (total C) rel. to fuel input | mg/MJ | |
| Dust (measurement*) | mg | |
| Dust concentration* | mg/m ³ | |
| Dust (at reference - O ₂)* | mg/m ³ | |
| Dust* rel. to fuel input | mg/kWh | |
| Dust* rel. to fuel input | mg/MJ | |
| PME concentration (at reference - O ₂)* | mg/m ³ | |
| Electrical consumption | | |
| Elmax | W | |
| Elmin | W | |
| PSTB | W | |
| Calculation | | |
| "Qa" loss free heating flue gas | kJ/kg | |
| "qa" loss flue gas | % | |
| "Qb" loss fix heating in flue gas | kJ/kg | |
| "qb" loss fix heating in flue gas | % | |
| "Qr" losses due to combustible constituents in the residue passing through the | kJ/kg | |
| "qr" losses due to combustible constituents in the residue passing through the | % | |
| "m" flue gas mass flow | g/s | |
| cpm, acc. DIN 4702-2, version 03.90 for dry flue gas | kJ/(m ³ K) | |
| cpm-H ₂ O | kJ/(m ³ K) | |
| "eta" Efficiency (direct), to consider only water heating output P _w | % | |
| "eta" Efficiency (indirect) | % | |
| Heating input | kW | |
| "P" heating output, total | kW | |
| "P _w " water heating output | kW | |
| Space heating output: P _{STR} = P - P _w | kW | |
| Space heating output, relating to heat input | % | |
| Water heating output, relating to heat input | % | |
| Settings (you can change order) | | |
| Flue gas motor | rpm | |
| Ambient motor | Volt | |
| Fuel motor | sec | |
| Clenaing time | sec | |
| Fire door | Open / close | |

| | | | | |
|--|--------|--|----------------|----------------|
| Report- No. | | K17932016T1 | | |
| TÜV- order- No. | | 21232454 | | |
| Manufacturer | | Palazzetti Lelio S.p.A. | | |
| Type of appliances | | Residential room heating appliances fired by wood pellets without water heat exchanger, with fan assisted flue discharge and with internal fuel hopper | | |
| Special properties | | room air dependent | | |
| Model name | | AP004N_1_06 | | |
| Trademark | | Palazzetti | | |
| Nominal heat input from manufacturer | kW | 6,60 | | |
| Nominal heat output from manufacturer | kW | 6,00 | | |
| Test place | | Thiene | | |
| Test date | | 25.02.2016 | | |
| Type of test | | Test at nominal load | | |
| | | DIN EN 14785:10.2006, Correction 1: 10.2007 | | |
| | | 1. test | 2. test | Average |
| Time | | 9:20-12:20 | 12:20-15:20 | |
| Ambient: | | | | |
| Barometric pressure | mbar | 1010 | 1010 | 1010 |
| Temperature of combustion air | °C | 21,38 | 21,77 | 21,57 |
| Ambient rel. humidity | % | 72,0 | 72,0 | 72,0 |
| Ambient temperature (room) | °C | 21,38 | 21,77 | 21,57 |
| Type of Fuel | | Wood pellets | | |
| Type of fuel | | Ø 6 mm, Lmax 30 mm, max humidity 6,3% Heizinos | | |
| Number of fuel loadings | | 1 | 1 | 1 |
| Total weight of appliance at start | kg | 133,5 | 129,4 | 131,5 |
| Weight of additional loads | kg | 129,4 | 125,3 | 127,4 |
| Total weight of appliance at end | kg | 0,00 | 0,00 | 0,00 |
| Fuel consumption, calculated of the difference | kg | 4,09 | 4,09 | 4,09 |
| Test duration | sec | 10800 | 10800 | 10800 |
| Fuel consumption "B" | kg/h | 1,36 | 1,36 | 1,36 |
| Combustible constituents in material passing through the grate "b", analyse | Gew. % | 0,000 | 0,000 | 0,000 |
| 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 | Gew. % | 0,104 | 0,104 | 0,104 |
| Water part (average values) | | | | |
| flow temperature | °C | 0,00 | 0,00 | 0,00 |
| return temperature | °C | 0,00 | 0,00 | 0,00 |
| delta-T | K | 0,00 | 0,00 | 0,00 |
| Cold water flow | kg/h | 0,00 | 0,00 | 0,00 |
| Additional energy of the pump | kW | 0,00 | 0,00 | 0,00 |
| Flue, average | | | | |
| Flue gas temperature | °C | 167,29 | 168,60 | 167,94 |
| Flue gas draught | Pa | 12,00 | 12,00 | 12,00 |
| O ₂ - concentration, calculated | Vol.-% | 9,31 | 8,75 | 9,03 |
| CO ₂ - concentration (measurement) | Vol.-% | 11,13 | 11,67 | 11,40 |
| lambda value, λ | - | 1,79 | 1,70 | 1,75 |
| CO - concentration (measurement) | ppm | 29,45 | 33,59 | 31,52 |
| CO - concentration (measurement) | Vol.-% | 0,00 | 0,00 | 0,00 |
| CO - concentration (measurement) | mg/m³ | 36,81 | 41,99 | 39,40 |
| CO - concentr. (at reference - O ₂) | Vol.-% | 0,00 | 0,00 | 0,00 |
| CO - concentr. (at reference - O ₂) | mg/m³ | 25,19 | 27,41 | 26,30 |
| CO - concentration rel. to fuel input | mg/kWh | 59,95 | 65,22 | 62,59 |
| CO - concentration rel. to fuel input | mg/MJ | 16,65 | 18,12 | 17,39 |
| NO _x - concentration (measurement) | ppm | 90,59 | 96,51 | 93,55 |
| NO _x - concentration (measurement) | mg/m³ | 185,7 | 197,8 | 191,8 |
| NO _x - concentr. (at reference - O ₂) | mg/m³ | 127,1 | 129,1 | 128,1 |
| NO _x - concentration rel. to fuel input | mg/kWh | 302,5 | 307,3 | 304,9 |
| NO _x - concentration rel. to fuel input | mg/MJ | 84,02 | 85,37 | 84,69 |

| | | | | |
|--|--------------|-----------------|-----------------|----------|
| CnHm - concentration (measurement) | ppm | 1,13 | 1,07 | 1,10 |
| CnHm concentr. (at reference - O2) | mg/m³ | 1,27 | 1,14 | 1,20 |
| CnHm - concentration (total C) rel. to fuel input | mg/kWh | 3,01 | 2,71 | 2,86 |
| CnHm - concentration (total C) rel. to fuel input | mg/MJ | 0,84 | 0,75 | 0,79 |
| Dust (measurement*) | mg | 4,00 | | 4,00 |
| Dust concentration* | mg/m³ | 15,08 | | 15,08 |
| Dust (at reference - O2)* | mg/m³ | 10,19 | | 10,19 |
| Dust* rel. to fuel input | mg/kWh | 24,25 | | 24,25 |
| Dust* rel. to fuel input | mg/MJ | 6,74 | | 6,74 |
| PME concentration (at reference - O2)* | mg/m³ | 10,61 | | 10,61 |
| Electrical consumption | | | | |
| Elmax | W | | | 50,00 |
| Elmin | W | | | 40,00 |
| PSTB | W | | | 2,00 |
| Calculation | | | | |
| "Qa" loss free heating flue gas | kJ/kg | 1738,7 | 1679,3 | 1709,0 |
| "qa" loss flue gas | % | 9,94 | 9,60 | 9,77 |
| "Qb" loss fix heating in flue gas | kJ/kg | 2,96 | 3,22 | 3,09 |
| "qb" loss fix heating in flue gas | % | 0,02 | 0,02 | 0,02 |
| "Qr" losses due to combustible constituents in the residue passing through the | kJ/kg | 0,00 | 0,00 | 0,00 |
| "qr" losses due to combustible constituents in the residue passing through the | % | 0,20 | 0,20 | 0,20 |
| "m" flue gas mass flow | g/s | 4,21 | 4,03 | 4,12 |
| cpm, acc. DIN 4702-2, version 03.90 for dry flue gas | kJ/(m³K) | 1,36 | 1,36 | 1,36 |
| cpm-H ₂ O | kJ/(m³K) | 1,52 | 1,52 | 1,52 |
| "eta" Efficiency (direct), to consider only water heating output Pw | % | entfällt | entfällt | entfällt |
| "eta" Efficiency (indirect) | % | 89,84 | 90,18 | 90,01 |
| Heating input | kW | 6,6 | 6,6 | 6,6 |
| "P" heating output, total | kW | 6,0 | 6,0 | 6,0 |
| "Pw" water heating output | kW | 0,0 | 0,0 | 0,0 |
| Space heating output: P _{STR} = P - Pw | kW | 6,0 | 6,0 | 6,0 |
| Space heating output, relating to heat input | % | 89,84 | 90,18 | 90,01 |
| Water heating output, relating to heat input | % | 0,00 | 0,00 | 0,00 |
| Settings | | | | |
| Flue gas motor | rpm | 1200 | 1200 | |
| Ambient motor | Volt | 230 | 230 | |
| Fuel motor | sec | 2,3 ON; 3,7 OFF | 2,3 ON; 3,7 OFF | |
| Clenaing time | sec | off | off | |
| Fire door | Open / close | closed | closed | |

| | | |
|--|---------|--|
| Report- No. | | K17932016T1 |
| TÜV- order- No. | | 21232454 |
| Manufacturer | | Palazzetti Lelio S.p.A. |
| Type of appliances | | Residential room heating appliances fired by wood pellets without water heat exchanger, with fan assisted flue discharge and with internal fuel hopper |
| Special properties | | room air dependent |
| Model name | | AP004N_1_06 |
| Trademark | | Palazzetti |
| Reduced heat input from manufacturer | kW | 2,40 |
| Reduced heat output from manufacturer | kW | 2,20 |
| Test place | | Thiene |
| Test date | | 19.02.2016 |
| Type of test | | Test at reduced load |
| | | DIN EN 14785:10.2006, Correction 1: 10.2007 |
| | | 1. test |
| Time | | 9:20-15:20 |
| Ambient: | | |
| Barometric pressure | mbar | 1016 |
| Temperature of combustion air | °C | 19,82 |
| Ambient rel. humidity | % | 69,0 |
| Ambient temperature (room) | °C | 19,82 |
| Type of Fuel | | Wood pellets |
| Type of fuel | | Ø 6 mm, Lmax 30 mm, max humidity 6,3% Heizinos |
| Number of fuel loadings | | 1 |
| Total weight of appliance at start | kg | 144,2 |
| Weight of additional loads | kg | 141,2 |
| Total weight of appliance at end | kg | 0,00 |
| Fuel consumption, calculated of the difference | kg | 2,98 |
| Test duration | sec | 21600 |
| Fuel consumption "B" | kg/h | 0,50 |
| Combustible constituents in material passing through the grate "b", analyse | Gew . % | 0,000 |
| 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 1 kg | Gew . % | 0,104 |
| Water part (average values) | | |
| flow temperature | °C | 0,00 |
| return temperature | °C | 0,00 |
| delta-T | K | 0,00 |
| Cold water flow | kg/h | 0,00 |
| Additional energy of the pump | kW | 0,00 |
| Flue, average | | |
| Flue gas temperature | °C | 82,91 |
| Flue gas draught | Pa | 12,00 |
| O2 - concentration, calculated | Vol.-% | 15,39 |
| CO2 - concentration (measurement) | Vol.-% | 5,34 |
| lambda value, l | - | 3,71 |
| CO - concentration (measurement) | ppm | 198,5 |
| CO - concentration (measurement) | Vol.-% | 0,02 |
| CO - concentration (measurement) | mg/m³ | 248,2 |
| CO - concentr. (at reference - O2) | Vol.-% | 0,03 |
| CO - concentr. (at reference - O2) | mg/m³ | 353,7 |
| CO - concentration rel. to fuel input | mg/kWh | 841,7 |
| CO - concentration rel. to fuel input | mg/MJ | 233,8 |
| NOx - concentration (measurement) | ppm | 41,15 |
| NOx - concentration (measurement) | mg/m³ | 84,36 |
| NOx - concentr. (at reference - O2) | mg/m³ | 120,2 |
| NOx - concentration rel. to fuel input | mg/kWh | 286,1 |
| NOx - concentration rel. to fuel input | mg/MJ | 79,48 |

| | | |
|--|--------------|-----------------|
| CnHm - concentration (measurement) | ppm | 2,02 |
| CnHm concentr. (at reference - O2) | mg/m³ | 4,69 |
| CnHm - concentration (total C) rel. to fuel input | mg/kWh | 11,17 |
| CnHm - concentration (total C) rel. to fuel input | mg/MJ | 3,10 |
| Dust (measurement*) | mg | 2,30 |
| Dust concentration* | mg/m³ | 8,19 |
| Dust (at reference - O2)* | mg/m³ | 11,75 |
| Dust* rel. to fuel input | mg/kWh | 27,95 |
| Dust* rel. to fuel input | mg/MJ | 7,76 |
| PME concentration (at reference - O2)* | mg/m³ | 12,91 |
| Electrical consumption | | |
| Elmax | W | 0,00 |
| Elmin | W | 0,00 |
| PSTB | W | 0,00 |
| Calculation | | |
| "Qa" loss free heating flue gas | kJ/kg | 1448,8 |
| "qa" loss flue gas | % | 8,28 |
| "Qb" loss fix heating in flue gas | kJ/kg | 41,48 |
| "qb" loss fix heating in flue gas | % | 0,24 |
| "Qr" losses due to combustible constituents in the residue passing through the | kJ/kg | 0,00 |
| "qr" losses due to combustible constituents in the residue passing through the | % | 0,20 |
| "m" flue gas mass flow | g/s | 3,07 |
| cpm, acc. DIN 4702-2, version 03.90 for dry flue gas | kJ/(m³K) | 1,32 |
| cpm-H ₂ O | kJ/(m³K) | 1,50 |
| "eta" Efficiency (direct), to consider only water heating output Pw | % | entfällt |
| "eta" Efficiency (indirect) | % | 91,28 |
| Heating input | kW | 2,4 |
| "P" heating output, total | kW | 2,2 |
| "Pw" water heating output | kW | 0,0 |
| Space heating output: P _{STR} = P - Pw | kW | 2,2 |
| Space heating output, relating to heat input | % | 91,28 |
| Water heating output, relating to heat input | % | 0,00 |
| Settings | | |
| Flue gas motor | rpm | 580 |
| Ambient motor | Volt | 230 |
| Fuel motor | sec | 0,8 ON; 4,2 OFF |
| Clenaing time | sec | off |
| Fire door | Open / close | closed |

The

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

Appendix 3

**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 | Uncertainty | Reference |
|---------------------|------------------|-----------------------------|---------------------------------------|-----------------------------------|-----------------------------|-------------------------------------|
| CMC B094 | CO ₂ | Infrared-absorption | Siemens Ultramat 6E | 0 – 3 % 0 – 30 % | ± 1% related to final value | Reference gas: 15,53 % |
| CMC B096 | | Infrared-absorption | Siemens Ultramat 23 | 0 – 5 % 0 – 25 % | ± 1% related to the range | |
| CMC B122 | | Infrared-absorption | Siemens Ultramat 23 | 0 – 5 % 0 – 25 % | ± 1% related to the range | |
| CMC B094 | CO | Infrared-absorption | Siemens Ultramat 6E | 0 – 300 ppm 0 – 3000 ppm | ± 1% related to final value | Reference gas: 495,3 ppm |
| CMC B096 | | Infrared-absorption | Siemens Ultramat 23 | 0 – 1000 ppm 0 – 5000 ppm | ± 1% related to the range | |
| CMC B122 | | Infrared-absorption | Siemens Ultramat 23 | 0 – 1000 ppm 0 – 5000 ppm | ± 1% related to the range | |
| CMC B095 | | Infrared-absorption | Siemens Ultramat 23 | 0 – 1 % 0 – 5 % | ± 1% related to the range | Reference gas: 4,929 % |
| CMC B077 | NO _x | Chemoluminescenz | ECO Physics CLD 700 EL | 0 – 100 ppm 0 – 1000 ppm | ± 1% related to final value | Reference gas: 198,3 ppm |
| CMC B122 + CMC B123 | | Infrared-absorption | Siemens Ultramat 23 + Bühler Bünox MV | 0 – 1000 ppm 0 – 5000 ppm | ± 1% related to the range | |
| CMC B096 | | Infrared-absorption | Siemens Ultramat 23 | 0 – 1000 ppm 0 – 5000 ppm | ± 1% related to the range | |
| CMC B097 | OGC | FID | Siemens Fidamat 6 | 0 – 33,3 ppm C3 0 – 333 ppm C3 | ± 1% related to the range | Reference gas: 29,96 ppm propane |
| CMC B121 | | FID | Siemens Fidamat 6 | 0 – 33,3 ppm C3 0 – 333 ppm C3 | ± 1% related to the range | |
| CMC B090 | Dust content | Gravimetric | Sartorius CPA 224 S | 0,1 mg – 220 g | ± 0,1 mg | Reference load |
| CMC B070 | Fuel consumption | Gravimetric | Dini Angeo DFWK | 0 – 1200 kg | ± 10 g | Reference load |
| CMC B092 | Fuel consumption | Gravimetric | Dini Angeo DFWK | 0 – 600 kg | ± 10 g | Reference load |
| CMC B079 | Water flow | Magnetic | ABB Copa-XE DE43FI | 0 – 2000 kg/h | ± 1% related to the range | Balance |
| CMC B129 | Water flow | Magnetic | ASA AF6-2600/1/B/1/AC | 0 – 1500 kg/h | Accuracy: ± 0,5% r.v. | Balance |
| CMC B062 | Temperature | PT 100 K-type thermocouples | Agilent 34970 A | 0 – 300 °C | Up to 0,5 °C | Reference thermometer |
| CMC B084 | | PT 100 K-type thermocouples | Agilent 34970 A | 0 – 300 °C | Up to 0,5 °C | |
| CMC B087 | Electrical power | --- | Yokogawa WT3000 | 0 – 600 W | ± 0,5 % | External calibration |
| CMC 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 |
| CMC B030 | Water pressure | Manometer | Cewal DN 150 | 0 – 25 bar | ± 0,6% | External calibration |

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