



Report No. K 487 2010 T1
Residential space heating appliances
Initial type testing
DIN EN 14785
Type: *AP003N_0_10*
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

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

Type designation: **AP003N_0_10**
Type of appliances: Residential space heating appliance fired by wood pellets without water heat exchanger with fan assisted flue discharge with internal fuel hopper

Total heat input: 3,7-11,1 kW

Water heat output: Not applicable

Space heat output: 3,4-10,0 kW

Max. water pressure: Not applicable

Max. water temperature: Not applicable

Fuels: Wood pellets

Remarks: -

Test results:

The technical requirements cl. 4-9 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.

Cologne, 2010-11-12
432/pom

Expert



Dipl.-Ing. A. Pomp

Test Laboratory for
Energy Appliances
DIN- und DVGW-Laboratory
Head of Test Laboratory



Dipl.-Ing. F. Rick

1. Task

The Test Laboratory for Energy Appliances was instructed to execute the initial type testing on the appliance AP003N_0_10 for the operation with wood pellets according EN 14785:2006, cl. 4-8.

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

The practical tests were carried in the laboratory in Thiene on February and June 2010.

The (FPC) Factory Production Control was performed in Porcia on 31 August 2009.

2. Description of the appliances

Construction

Residential space 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 stove is equipped with an automatic ignition.

Combustion air

The combustion air is to be taken from ambient.

2.1 General technical data of the pellet stoves

Type:	AP003N_0_10
Nominal power	3,4 – 10,0 kW
Fuel	Pellets Ø 6 mm, L _{max} 30 mm, max. humidity 6,5-8,5%, FireStixx
Total dimension High x Width x Depths (mm)	1170 x 600 x 565
Diameter, exhaust gas stub	80 mm
Weight	120 kg
Distance of adjacent combustible materials	200 side/200 mm back

For more information see appendix B1

3. Testing

The tests were carried out in February and June 2010 in the laboratory of CMC/TÜV Rheinland in Thiene.

3.1 General requirements

Requirement acc. EN 14785	Clause	Tested Acc.	Requirement Complies
Production documentation	4.1		Yes
General construction requirements	4.2		Yes
Flue spigot or socket	4.3		Yes
Combustion control device	4.4		Not applicable
Flue ways	4.5		Yes
Cleaning tools	4.6		Yes
Fire doors	4.7		Yes
Combustion air supply	4.8		
-Primary air inlet control	4.8.1		Yes
-Secondary air inlet control	4.8.2		Not applicable
Internal flue gas diverter	4.9		Not applicable
Retort	4.10		Yes
Ash pan and ash removal	4.11		Yes
Integral boiler	4.12		Not applicable
-General construction, material	4.12.1	A 4.9.5	Not applicable
-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		Not applicable
Cleaning of heating surfaces	4.14		Yes

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	Yes
Operating tools	5.2		Yes
Safety test for spillage of combustion gas and discharge of embers	5.3	A.4.7- A.4.9	Yes
Temperature in the fuel hopper	5.4	A.4.7- A.4.9	Yes
Safety against back burning through the fuel conveyor system	5.5	A.4.9.2	Yes
Safety against overheating the boiler system	5.6	-	Not applicable
Thermal discharge control	5.7	A.4.9.6	Not applicable
Strength and leak tightness of boiler shells	5.8	A.4.9.5 A.4.7	Not applicable
Electrical safety	5.9	EN 50165	Tested by CMC

3.3 Performance

Requirement acc. EN 14785	Clause	Tested Acc.	Requirement Complies
Flue draught	6.1		Yes
Flue gas temperature	6.2	A.4.7- A.4.8	Yes
Carbon monoxide emissions for pellet stoves	6.3	A.4.7- A.4.8	Yes
Efficient energy utilization	6.4		
-General	6.4.1	A.4.7-	Yes
-Efficiency at nominal heat output and at reduced heat output	6.4.2	A.4.8	Yes
Nominal heat output	6.5	A.4.7	Yes
Reduced heat output	6.6	A.4.8	Yes
Water heating output	6.7	A.4.7	Not applicable
Space heating output	6.8	A.4.7	Yes
Capacity of fuel storage	6.9	A.4.8	Yes
User operations	6.10		Yes



3.4 Appliance instructions and marking

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

3.5 Evaluation of conformity

Requirement acc. EN 14785	Clause	Requirement Complies
General	9.1	Yes
Type testing	9.2	
-Initial type testing	9.2.1	Yes
-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	Yes

3.6 Resume of test results

Type designation	AP003N 0 10			
		Full load	Partial load	
Test fuel		Pellets		
Mass of the test fuel fired hourly	kg/h	2,305	0,773	
Flue gas mass flow	g/s	5,6	3,0	
Flue gas temperature	°C	201,5	96,6	
Flue draught	mbar	0,12	0,12	0,12/0,10 +/-0,02
CO ₂ -Content	Vol.-%	14,28	8,52	-
O ₂ -Content	Vol.-%	6,15	12,14	-
CO-emission	ppm	189,4	302,8	-
CO-emission (at 13%-O ₂)	mg/m ³	127,3	341,7	500/750
NOx-content	ppm	135,0	81,3	-
NOx-content (at 13%-O ₂)	mg/m ³	149,1	150,5	-
Dust content (at 13%-O ₂)	mg/m ³	15,0	8,4	-
Total heat output	kW	10,01	3,45	-
Water heat output	kW	-	-	-
Space heat output	kW	10,01	3,45	-
Efficiency	%	90,27	92,97	75/70
Maximum temperatures at trihedron:				
- Right side	°C	68,2		65K over t _{ambient}
- Back side	°C	37,2		65K over t _{ambient}
- Bottom side	°C	49,8		65K over t _{ambient}
- Front side at 80 cm		69,9		65K over t _{ambient}
Distances:				
- Backside-Pelletstove	mm	200		
- Side-Pelletstove	mm	200		
Ambient temperature	°C	32,4		
Temp. in fuel hopper	°C	80,2		65K over t _{ambient}
Temp. operating tools	°C	>35K*		35K over t _{ambient}

*) A suitable tool is a part of the appliance and will be provided by the producer.

Detailed test results see appendix A 2.

4 Statement of the test results

The appliance **AP003N_0_10**
of the company **Palazzetti Lelio S.p.A.**

comply for the operation with wood pellets with the requirements acc.
EN 14785: September 2006, cl.4-9.

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	
A 1	Fuel data	
A 2	Test results	
A 3	Measuring devices	
B1	Manual	004770762 09/2010
B2	Manufacture declaration	01/10/2010
B3	Type label	
B4	EC type examination pressure control	CE-0085AP0974
B5	Safety temperature limiter 710***	129102
B6	Technical data sheet gear motor	
B7	Technical data sheet ignition	
B8	Technical data sheet exhaust fan	
B9	Technical data sheet ambient fan	
C1	Drawing dimensions Marisa	805707900
C2	Drawing AP003	
C3	Drawing AP003N	1418222
C4	Drawing "burner"	165510150

Appendix A 1

Fuel data

Brennstoffanalyse vom 11.11.2009
 Brennstoff: wood pellets

Bestandteil im Brennstoff	Stoffanteil	Sauerstoffbedarf		Abgasbestandteile aus Brennstoff in Nm ³ /kg Brennstoff								
		in Nm ³ je kg Bestandteil	in Nm ³ je kg Brennstoff	CO ₂		SO ₂		H ₂ O		N ₂		
		Stoffanteil x	Sauerstoff- Bedarf	in Nm ³ je kg Bestandteil	in Nm ³ je kg Brennstoff	in Nm ³ je kg Bestandteil	in Nm ³ je kg Brennstoff	in Nm ³ je kg Bestandteil	in Nm ³ je kg Brennstoff	in Nm ³ je kg Bestandteil	in Nm ³ je kg Brennstoff	
	Gew. %											
c	47,000	1,860	0,874	1,850	0,8695	-	-	-	-	-	-	-
s	0,180	0,700	0,001	-	-	0,680	0,0012	-	-	-	-	-
h	5,680	5,550	0,315	-	-	-	-	11,100	0,6305	-	-	-
n	0,080	-	-	-	-	-	-	-	-	0,80	0,0006	-
o	39,630	-0,700	-0,277	-	-	-	-	-	-	-	-	-
wasser	7,200	-	-	-	-	-	-	1,240	0,0893	-	-	-
asche	0,250	-	-	-	-	-	-	-	-	-	-	-
summe	100,020	O min =	0,913	V CO ₂ =	0,8695	V SO ₂ =	0,0012	V W =	0,7198	V N ₂ =	0,0006	


Luftbedarf	L min =	4,3490 Nm ³ /kg Brennstoff
trockene stöchiometrische Abgasmenge	V A tr min =	4,3064 Nm ³ /kg Brennstoff
Max. Kohlenstoffdioxid-Anteil	CO ₂ max =	20,1907 Vol.-%
Wasserdampfmenge	V w =	0,7198 Nm ³ /kg Brennstoff
	V A tr min/ L min =	0,9902
Heizwert, wf	Hu =	18826 kJ/kg
		5,229 kWh/kg

Berechnungen zum Versuchszeitpunkt

wasser	zum Versuchszeitpunkt	w =	7,200 Gew. %
Heizwert, roh	zum Versuchszeitpunkt	Hu	17295 kJ/kg

Appendix A 2

Test results

Report- No. TÜV-order- No. Manufacture Type Model		K4872010T1 21215285 Palazzetti AP003N_0_10 Room heater for wood pellets with internal fuel hopper and flue gas fan without water parts combustion air is taken from the room		
Specifica		 TÜVRheinland® Precisely Right.		
Nominal heat output		10 KW		
Test place		Thiene		
Test date		14.06.2010		
Type of test		Test at nominal load acc. EN 14785		
		1. test	2. test	Average
Test date		14.06.2010	14.06.2010	
Time		11.30-14.30	14.35-17.35	
Ambient:				
Barometric pressure	mbar	1002	1002	1002
Temperature of combustion air	°C	31,2	32,4	31,8
Ambient rel. humidity	%	50	50	50
Ambient temperature (room)	°C	31,2	32,4	31,8
Fuel:				
Type of fuel		wood pellets	wood pellets	-
Number of fuel loadings		1	1	1
Total weight of appliance at start	kg	154,98	157,64	156,31
Weight of additional loads	kg	148,03	150,76	149,40
Total weight of appliance at end	kg	0,00	0,00	0,00
Fuel consumption, calculated of the difference	kg	6,95	6,88	6,91
Test duration	sec	10800	10800	10800
Fuel consumption "B"	kg/h	2,317	2,293	2,305
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 "C" 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 entrance temperature	°C	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	202,0	201,0	201,5
Flue gas draught	Pa	12,0	12,0	12,0
O ₂ - concentration, calculated	Vol-%	6,28	6,02	6,15
CO ₂ - concentration (measurement)	Vol-%	14,15	14,40	14,28
lambda value, λ	-	1,423	1,398	1,410
CO - concentration (measurement)	ppm	134,8	243,9	189,4
CO - concentration (measurement)	Vol-%	0,013	0,024	0,019
CO - concentration (measurement)	mg/m ³	168,8	304,9	238,8
CO - concentr. (at reference - O ₂)	Vol-%	0,007	0,013	0,01
CO - concentr. (at reference - O ₂)	mg/m ³	91,8	162,8	127,3
CO - concentration rel. to fuel input	mg/kWh	215,7	363,2	289,4
CO - concentration rel. to fuel input	mg/MJ	59,9	106,5	83,2
NOx - concentration (measurement)	ppm	133,5	139,5	135,0
NOx - concentration (measurement)	mg/m ³	273,8	279,7	276,7
NOx - concentr. (at reference - O ₂)	mg/m ³	148,7	149,4	149,1
NOx - concentration rel. to fuel input	mg/kWh	350,0	351,6	350,8
NOx - concentration rel. to fuel input	mg/MJ	97,2	97,7	97,4
CnHm - concentration (measurement)	mg/m ³	14,6	10,4	12,5
CnHm concentr. (at reference - O ₂)	mg/m ³	7,9	5,5	6,7
CnHm - concentration (total C) rel. to fuel input	mg/kWh	18,6	13,1	15,8
CnHm - concentration (total C) rel. to fuel input	mg/MJ	5,2	3,6	4,4
Dust (measurement*)	mg	18,8	0,0	18,8
Dust concentration (measurement*)	mg/m ³	27,8	0,0	27,8
Dust (at reference - O ₂)*	mg/m ³	15,0	0,0	15,0
Dust* rel. to fuel input	mg/kWh	35,3	0,0	35,3
Dust* rel. to fuel input	mg/MJ	9,8	0,0	9,8
Calculation				
"Qa" loss free heating flue gas	kJ/kg	1637,9	1592,3	1615,1
"qa" loss flue gas	%	9,47	9,21	9,34
"Qb" loss fix heating in flue gas	kJ/kg	10,5	18,7	14,8
"qb" loss fix heating in flue gas	%	0,08	0,11	0,08
"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	5,7	5,5	5,6
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m ³ K)	1,37	1,38	1,37
cpm-H ₂ O	kJ/(m ³ K)	1,52	1,52	1,52
"eta" Efficiency (direct), to consider only water heating output Pw	%	entfällt	entfällt	entfällt
"eta" Efficiency (indirect)	%	90,27	90,48	90,38
Heating input	kW	11,13	11,02	11,07
"P" heating output, total	kW	10,05	9,97	10,01
"Pw" water heating output	kW	0,00	0,00	0,00
Space heating output: P _{grk} = P - Pw	kW	10,05	9,97	10,01
Space heating output, relating to heat input	%	90,27	90,48	90,38
Water heating output, relating to heat input	%	0,00	0,00	0,00
Settings				
-	-	see sep. data sheet	0	-
-	-	0	0	-
-	-	0	0	-
-	-	0	0	-
Fire doors	open/closed	closed	closed	-

*) Average of 3 samples, based on separate calculation

Report- No. TÜV-order- No. Manufacture Type Model	K4872010T1 21215285 Palazzetti AP003N_0_10 Room heater for wood pellets with internal fuel hopper and flue gas fan without water parts combustion air is taken from the room		
Specifics			
Nominal heat output	3,4 kW		
Test place Test date Type of test	Thiene 00.01.1900 Test at nominal load acc. EN 14785		
		1. test	Average
Test date Time		11.02.2010 8.05-15.05	
Ambient:			
Barometric pressure	mbar	987	987
Temperature of combustion air	°C	19,2	19,2
Ambient rel. humidity	%	40	40
Ambient temperature (room)	°C	19,2	19,2
Fuel:			
Type of fuel		wood pellets	-
Number of fuel loadings		1	1
Total weight of appliance at start	kg	172,40	172,40
Weight of additional loads	kg	167,76	167,76
Total weight of appliance at end	kg	0,00	0,00
Fuel consumption, calculated of the difference	kg	4,64	4,64
Test duration	sec	21600	21600
Fuel consumption "B"	kg/h	0,773	0,773
Combustible constituents in material passing through the grate "b", analyse	Gew. %	0,0	0,0
Residue passing through the grate, measurement	kg	0,000	0,000
Residue passing through the grate "R"	Gew. %	0,00	0,0
Carbon content of the residue passing through the grate "C" depending of 1 kg fuel	Gew. %	0,10	0,10
Water part (average values)			
flow temperature	°C	0,0	0,0
return temperature	°C	0,0	0,0
delta-T	K	0,0	0,0
Cold water entrance temperature	°C	0,0	0,0
Cold water flow	kg/h	0,0	0,0
Additional energy of the pump	kW	0,000	0,000
Flue, average			
Flue gas temperature	°C	96,8	96,8
Flue gas draught	Pa	12,0	12,0
O ₂ - concentration, calculated	Vol-%	12,14	12,14
CO ₂ - concentration (measurement)	Vol-%	8,52	8,52
lambda value, λ	-	2,356	2,356
CO - concentration (measurement)	ppm	302,8	302,8
CO - concentration (measurement)	Vol-%	0,030	0,030
CO - concentration (measurement)	mg/m ³	378,5	378,5
CO - concentr. (at reference - O ₂)	Vol-%	0,027	0,03
CO - concentr. (at reference - O ₂)	mg/m ³	341,7	341,7
CO - concentration rel. to fuel input	mg/kWh	804,0	804,0
CO - concentration rel. to fuel input	mg/MJ	223,3	223,3
NOx - concentration (measurement)	ppm	81,3	81,3
NOx - concentration (measurement)	mg/m ³	166,7	166,7
NOx - concentr. (at reference - O ₂)	mg/m ³	150,5	150,5
NOx - concentration rel. to fuel input	mg/kWh	354,0	354,0
NOx - concentration rel. to fuel input	mg/MJ	98,3	98,3
CnHm - concentration (measurement)	mg/m ³	5,2	5,2
CnHm concentr. (at reference - O ₂)	mg/m ³	4,7	4,7
CnHm - concentration (total C) rel. to fuel input	mg/kWh	11,0	11,0
CnHm - concentration (total C) rel. to fuel input	mg/MJ	3,1	3,1
Dust (measurement*)	mg	6,7	6,7
Dust concentration (measurement*)	mg/m ³	9,8	9,8
Dust (at reference - O ₂)*	mg/m ³	8,4	8,4
Dust* rel. to fuel input	mg/kWh	19,7	19,7
Dust* rel. to fuel input	mg/MJ	5,5	5,5
Calculation			
"Qa" loss free heating flue gas	kJ/kg	1142,3	1142,3
"qa" loss flue gas	%	8,80	8,80
"Qb" loss fix heating in flue gas	kJ/kg	39,2	39,2
"qb" loss fix heating in flue gas	%	0,23	0,23
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	0,0	0,0
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,20	0,20
"m" flue gas mass flow	g/s	3,0	3,0
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m ³ K)	1,34	1,34
cpm-H ₂ O	kJ/(m ³ K)	1,50	1,50
"eta" Efficiency (direct), to consider only water heating output Pw	%	entfällt	entfällt
"eta" Efficiency (indirect)	%	92,97	92,97
Heating input	kW	3,72	3,72
"P" heating output, total	kW	3,45	3,45
"Pw" water heating output	kW	0,00	0,00
Space heating output: P _{SPH} = P - Pw	kW	3,45	3,45
Space heating output, relating to heat input	%	92,97	92,97
Water heating output, relating to heat input	%	0,00	0,00
Settings			
-	-	0	-
-	-	0	-
-	-	0	-
-	-	0	-
Fire doors	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 3

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

Gas	Principle	Company	Range	Uncertainty	Calibration-gas
CO ₂	Infrared-absorption	Siemens Analyser Ultramat 6E	0 – 3 % 0 - 30 %	± 1% related to final value	8,07 %
CO	Infrared-absorption	Siemens Analyser Ultramat 6E	0 - 300 ppm 0 – 3000 ppm	± 1% related to final value	510 ppm
NO _x	Chemolumineszenz	ECO Physics CLD 700 ED	0 - 100 ppm 0 – 1000 ppm	± 1% related to final value	81,4 ppm
OGC	FID	H&B Fidas 3E	0 – 50 mgC 0-100 mgC 0-500 mgC 0-1000 mgC	± 1% related to final value	29,8 ppm propane
Dust content	gravimetric	Mettler	0,1 mg - 200 g	± 0,1 mg	-
Temperature	PT 100	Delta Ohm HD9215-TP93I	-50 bis 199°C	0,5°C	SIT certificate 6197.GT

The values were continuously recorded with data logger, Agilent 34970 A. The interval is 10s. All related certificates are stored.