

CONFORMITY TO THE NORM EN 14785:2006

ACTECO srl has tested on May, 13 2014 the type of a residential space heating appliance fired by wood pellets

AIRPELLET 7kW

manufactured by Arca srl., Via Giovanni XXXIII, 105 - I – 26865 S. Rocco al Porto (LODI) according to the efficiency prescriptions of the norm EN 14785:2006, with the following results:

		Nominal	Minimum
Efficiency	%	86,2	91,6
CO	mg/MJ	99	265
CO (13% O ₂)	mg/Nm ³	148	398
CO (13% O ₂)	%	0,012	0,032
NO _x as NO ₂	mg/MJ	97	81
NO _x as NO ₂ (13% O ₂)	mg/Nm ³	145	121
OGC	mg/MJ	9	7
OGC (13% O ₂)	mg/Nm ³	13	11
Dust	mg/MJ	15	--
Dust (13% O ₂)	mg/Nm ³	22	--

The results of the tests relate only to the tested appliance.

This test report shall not be reproduced except in full, without written approval of the laboratory.

The appliance was returned to the manufacturer after the end of tests.

All data is stored for 10 years

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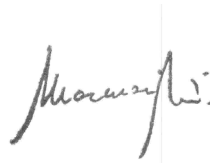
The appliance Airpellet 7 kW of Arca srl fulfils the requirements of:

- Austrian 15a B-VG 2015 limits
- Swiss LRV limits
- Flamme Verte limits

The results are listed in the test report Nr. 1880-CPR-011/001-14 dated July 03 2014 included in the Technical File of the product.

Cordenons, 03.04.2014

Head of Test Laboratory
dr. Mario Marcuzzi



Firmato digitalmente da Mario
Marcuzzi
ND: c=IT, o=NON PRESENTE,
sn=MARCUZZI, givenName=MARIO,
serialNumber=IT:MRCMRA37C27G8
88U, dnQualifier=20101115151152,
cn=Mario Marcuzzi
Data: 2014.07.04 16:53:47 +02'00'

Notified Body 1880 – REGULATION (EU) No 305/2011

TEST REPORT n. 1880-CPR-011/001-14

Compliance of dust load to European Regulations (Austrian 15a B-VG, German BImSchV, French Flamme Verte and Swiss LRV)

Residential space heating appliances fired by wood pellets
EN 14785:2006

Manufacturer: Arca SRL Unipersonale
Via 1° Maggio, 16
46030 San Giorgio (MN)
Italy

Type designation: Airpellet 7 kW

Type of appliance: Residential space heating appliances fired by wood pellets.

Receipt date: May 08 2014

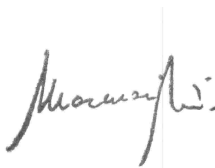
Start test date: May, 13 2014

End test date: May, 15 2014

Testing laboratory: ACTECO SRL
via Amman, 41
33084 Cordenons (PN)
Italy

Issue date: July, 03 2014

Head of Test Laboratory
Dr. Mario Marcuzzi



Firmato digitalmente da Mario
Marcuzzi
ND: c=IT, o=NON PRESENTE,
sn=MARCUZZI, givenName=MARIO,
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Basis of testing

- UNI EN 14785:2006 Residential space heating appliances fired by wood pellets
- UNI CEN/TS 15883:2009 Residential solid fuel burning appliances. Emission test methods
- Client's documents

The practical tests were performed in the laboratory in Cordenons (PN), via Amman, 41.

Sampling of the appliance

The sampling of the appliance was performed by the manufacturer and was received by the testing laboratory on.

Description of the appliance

Residential space heating appliances fired by wood pellets.

The combustion air is taken from the test room.

Key data of appliance

Appliance	AIRPELLET 7 KW	
Fuel		wood pellets
Fuel throughput	kg/h	1,60
Total heating output	kW	6,7
Space heating output	kW	6,7
CO emission based on 13% O ₂	mg/m ³	148
Efficiency	%	86,2
Flue gas temperature	°C	157
Necessary flue draught	Pa	12,8
Flue gas mass flow	g/s	7,0
Permissible maximum operating pressure	bar	3
Minimum clearance distances from exposed / combustibile materials	from rear wall from side walls	400 mm 400 mm

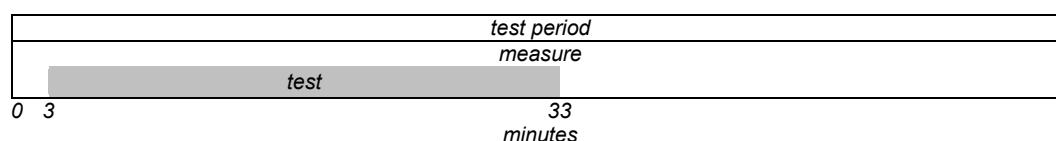
Description of the dust emission test

Measurement of particulate emissions is performed with UNI EN 13284-01:2003 (equivalent to VDI 2066:2006 part 1) parallel to CO-measurement during the initial type testing according to the nominal heat output test described in UNI EN 13240:2006 A.4.7.

A sample flow of the gas is extracted from the main gas flow at a representative sampling point for the sampling period with a controlled flow rate and the withdrawn volume is measured. The dust entrained in the gas sample is separated by a pre-weighted plain quartz fibre filter, which is dried and re-weighted. The increase of mass of the filter is attributed to the dust collected from the sampled gas.

The measurement position for particle measurement is arranged downstream of measurement positions of CO, CO₂, NO_x and OGC (Organic Gaseous Compounds). Measurement of particulate emissions and duration of measurements are described in the following scheme.

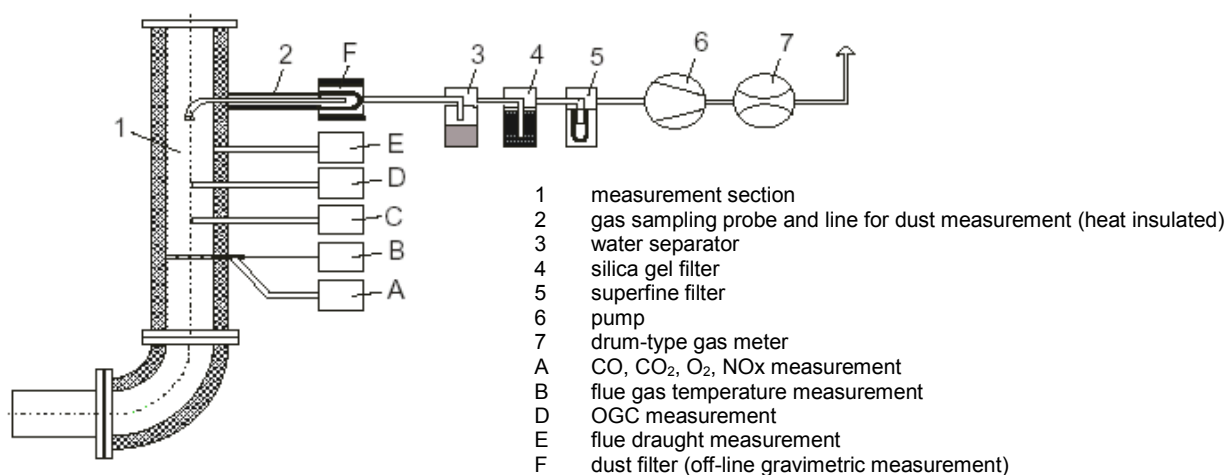
nominal heat output test:



The measuring arrangement is illustrated in the following figure. The sampling tube widens out to 9,74 mm at the specimen inlet. In a sampling period of 30 minutes a waste gas volume of $270 \pm 13,5$ l relative to normal conditions (273 K, 1013 hPa) is sampled, corresponding to a flow rate of $9,0 \pm 0,45$ l/min.

Note: In the interests of simplifying the measuring method, individual measurement of the flow velocity and subsequent matching of the inlet cross-section are dispensed with. In order to carry out the measurement, the sampling probe is centred in the exhaust-gas cross-section..

The measuring filter is inserted in a filter holder at the end of the sampling probe and a controlled probe heating system is adopted to exclude the possibility of the sampled flue gas falling below the dew point in front of or in the filter sleeve.



PERFORMANCE AT THE NOMINAL HEAT OUTPUT TEST

test n°			1	2	average
Combustion:					
fuel load		kg	4,69	4,89	4,79
test period		min	180	180	180
fuel load	B	kg/h	1,56	1,63	1,60
average flue draught		Pa	12,4	13,2	12,8
Ventilation circuit:					
average ambient room temperature	tr	°C	22,4	23,7	23,1
Flue gas:					
carbon dioxide	CO ₂	%	7,1	7,7	7,4
oxygen	O ₂	%	13,8	13,1	13,5
carbon monoxide	CO	%	0,006	0,016	0,011
average flue gas temperature	ta	°C	155	158	157
maximum flue gas temperature		°C	160	163	161,5
flue gas mass flow	m	g/s	7,1	6,9	7,0
Maximum surface temperatures:					
internal fuel hopper		°C	65,0	67,3	66,2
pellet loading motor		°C	42,8	43,0	42,9
takeoff chute		°C	60,4	62,9	61,7
Maximum trihedron surface temperatures:					
hearth		°C	45,3	40,3	42,8
side wall		°C	44,0	46,3	45,2
back wall		°C	39,0	37,4	38,2

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test n°			1	2	average
Results:					
thermal losses in flue gas	q_a	%	13,9	13,2	13,6
thermal losses in flue gas	Q_a	kJ/kg	2405	2292	2349
chemical losses in flue gas	q_b	%	0,1	0,1	0,1
chemical losses in flue gas	Q_b	kJ/kg	10	24	17
heat losses due to combustible through the grate	q_r	%	0,2	0,2	0,2
efficiency	η	%	85,9	86,5	86,2
carbon monoxide [at 13% O ₂]		%	0,007	0,017	0,012
carbon monoxide [at 13% O ₂]		mg/m^3	88	208	148
space heat output	P_{SH}	kW	6,5	6,8	6,7
total heat output	P	kW	6,5	6,8	6,7
Dust emission: test A	mg/MJ		10	15	13
test B	mg/MJ		8	24	16
average	mg/MJ		9	20	15
Dust emission (at 13% O ₂): test A	mg/m^3		15	23	19
test B	mg/m^3		12	37	25
average	mg/m^3		14	30	22
NOx	ppm		67	67	67
NOx (as NO ₂)	mg/MJ		101	93	97
NOx (as NO ₂ at 13% O ₂)	mg/m^3		151	139	145
THC (as propane)	ppm		7	7	7
OGC (as C)	mg/MJ		9	8	9
OGC (as C at 13% O ₂)	mg/m^3		13	13	13

PERFORMANCE AT REDUCED HEAT OUTPUT TEST

test n°	1		
Combustion:			
fuel load		kg	2,51
test period		min	360
fuel load	B	kg/h	0,42
average flue draught		Pa	9,2
Ventilation circuit:			
average ambient room temperature	tr	°C	21,7
Flue gas:			
carbon dioxide	CO ₂	%	3,3
oxygen	O ₂	%	17,5
carbon monoxide	CO	%	0,014
average flue gas temperature	ta	°C	59,5
maximum flue gas temperature		°C	65,7
flue gas mass flow	m	g/s	4,2
Maximum surface temperatures:			
internal fuel hopper		°C	35,8
pellet loading motor		°C	30,0
takeoff chute		°C	36,8
Maximum trihedron surface temperatures:			
hearth		°C	27,7
side wall		°C	28,7
back wall		°C	29,5

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test n°	1		
Results:			
thermal losses in flue gas	q_a	%	8,0
thermal losses in flue gas	Q_a	kJ/kg	1381
chemical losses in flue gas	q_b	%	0,3
chemical losses in flue gas	Q_b	kJ/kg	47
heat losses due to combustible through the grate	q_r	%	0,2
efficiency	η	%	91,6
carbon monoxide [at 13% O ₂]		%	0,032
carbon monoxide [at 13% O ₂]		mg/m^3	398
space heat output	P_{SH}	kW	1,9
total heat output	P	kW	1,9
NOx		ppm	26
NOx (as NO ₂)		mg/MJ	81
NOx (as NO ₂ at 13% O ₂)		mg/m^3	121
THC (as propane)		ppm	3
OGC (as C)		mg/MJ	7
OGC (as C at 13% O ₂)		mg/m^3	11

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STATEMENTS OF THE TEST RESULTS

The requirements for CO, NO_x, OGC and dust emissions and for efficiency of Austrian 15a B-VG, German BIMSChv, French Flamme Verte and Swiss LRV for appliances hand fired by wood are the following.

Austrian 15a B-VG

Nominal heat power		2015
	[mg/MJ]	[mg/MJ]
CO	500	500
NO _x	150	100
OGC	40	30
dust	60	50
efficiency	80	80

Reduced heat power		
	[mg/MJ]	[mg/MJ]
CO	750	750
OGC	40	30
efficiency	80	80

German BIMSChv limits (at 13% O₂)

2014		
CO [mg/m ³]	dust [mg/m ³]	efficiency [%]
400	30	90

German BAFA limits (at 13% O₂)

CO [mg/m ³]	dust [mg/m ³]	efficiency [%]
200	30	90

Swiss LRV limits (at 13% O₂)

2015	
CO [mg/m ³]	dust [mg/m ³]
500	40

French Flamme Verte limits (at 13% O₂)

CO [mg/m ³]	dust [mg/m ³]	efficiency [%]
500	100	85

The appliance Airpellet 7 kW of Arca srl fulfils the requirements of

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- Swiss LRV limits
- Flamme Verte limits

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MEASURING DEVICES

The requirements of the measuring instruments are fulfilled.

Before each qualified measuring analysers were calibrated with zero gas and calibration gas.

Parameter measured	principle	Company	range	uncertainty	Calibration gas
O ₂	paramagnetic	Horiba	0 – 21%	±0.1%	0 - 2.5 - 9.0 - 21%
CO ₂	infra-red	Horiba	0 – 20 %	±1%	0 – 9 – 18 %
CO	infra-red	Horiba	0 – 5000 ppm	±2%	0 – 450 – 2500 - 4500 ppm
NO _x	chemiluminescence	Horiba	0 – 500 ppm	±2%	0 – 50 – 250 – 450 ppm
OGC	FID	Ratfisch	0 -100 ppm	±2%	0 – 82 ppm propane
static pressure	--	Setra	0 – 25 Pa	±0.25 Pa	0 – 20 Pa
temperature: ambient room flue gas surface touchable areas	K thermocouple K thermocouple K thermocouple K thermocouple	National Instruments	10 – 50°C 20 – 1000°C 20 – 250°C 20 – 250 °C	±0.5°C ±2°C ±1°C ±1°C	-- -- -- --
cross-draught	heated thermistor	Schmidt Feintechnik	0 – 20 m/s	±0.1 m/s	--
mass: fuel consumption fuel load	balance balance	SBP SBP	0 – 800 kg 0 – 10 kg	±10 g ±0.5 g	-- --

All data were continuously recorded with data logger at intervals of 5 seconds. All raw data is stored for 10 years.

FUEL DATA

Specifications of the test fuel used:

	nominal heat output test
Fuel	wood pellet
Moisture content [%]	8.5
Lower calorific value [KJ/Kg]	17.345
Carbon content [% on dry basis]	50.5
Sulphur content [% on dry basis]	0.006
Hydrogen [% on dry basis]	6.0
Size:	
length [mm]	12 – 30 (at the origin)
diameter [mm]	6.0