

Notified Body 1880 – Directive 89/106/CEE

TEST REPORT n. 1880-CPR-015-20

Initial Test Typing

Heating boilers for solid fuels, manually and automatically stoked,
nominal heat output of up to 500 kW
EN 303-5:2012

Manufacturer: AGE STUFE S.R.L
VIA DON GIUSEPPE DELLA TOMBA 5
37047 SAN BONIFACIO (VR)
ITALY

Type designation: CA 28 (tested appliance)
THERA 28 - THERA 30 - CA 30 - THERA CL 28 - THERA CL 30 -CA 30
CL - T-FIRE28 - T-FIRE30 - T-FIRE CL 28 - T-FIRE CL 30

Trademark: AGE STUFE

Type designation: CM 28 / CM 30 / CM 28A / CM 30A
Trademark: MHAUSER

Receipt date: February 19, 2020

Start test date: February 25, 2020

End test date: March 5, 2020

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

Issue date: May 28, 2020

Head of Test Laboratory
Dr.ssa Claudia Marcuzzi

The results of the tests relate only to the tested appliance.
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The appliance was returned to the manufacturer after the end of tests.

All data is stored for 10 years

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Task

ACTECO SRL was instructed to execute initial type testing to establish compliance according to the:

- EN 305-5:2012 Heating boiler for solid fuels, nominal heat output of up to 500kW
- 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 February 19, 2020.

Key data of appliance

		Nominal	Minimum
Water heat output	kW	25,0	5,7
Refuel period	min	360	360
Efficiency	%	91,3	84,3
CO to 10% O ₂	mg/Nm ³	109	175
CO ₂	%	13,9	7,8
O ₂	%	7,4	14,0
Flue gas mass flow	g/s	12,8	5,7
Fuel consumption hourly	kg/h	5,55	1,4
NO _x to 10% O ₂ (as NO ₂)	mg/Nm ³	175	197
OGC to 10% O ₂	mg/Nm ³	4	<1
Dust emission to 10% O ₂	mg/Nm ³	21	11
Flue gas temperature	°C	139,8	66,4
Minimum chimney draught	Pa	12,7	10,5
Maximum operative pressure	bar	2,5	2,5
Minimum combustible materials distance			
Side	mm	0	0
Back	mm	0	0
Front	mm	0	0
Up	mm	0	0

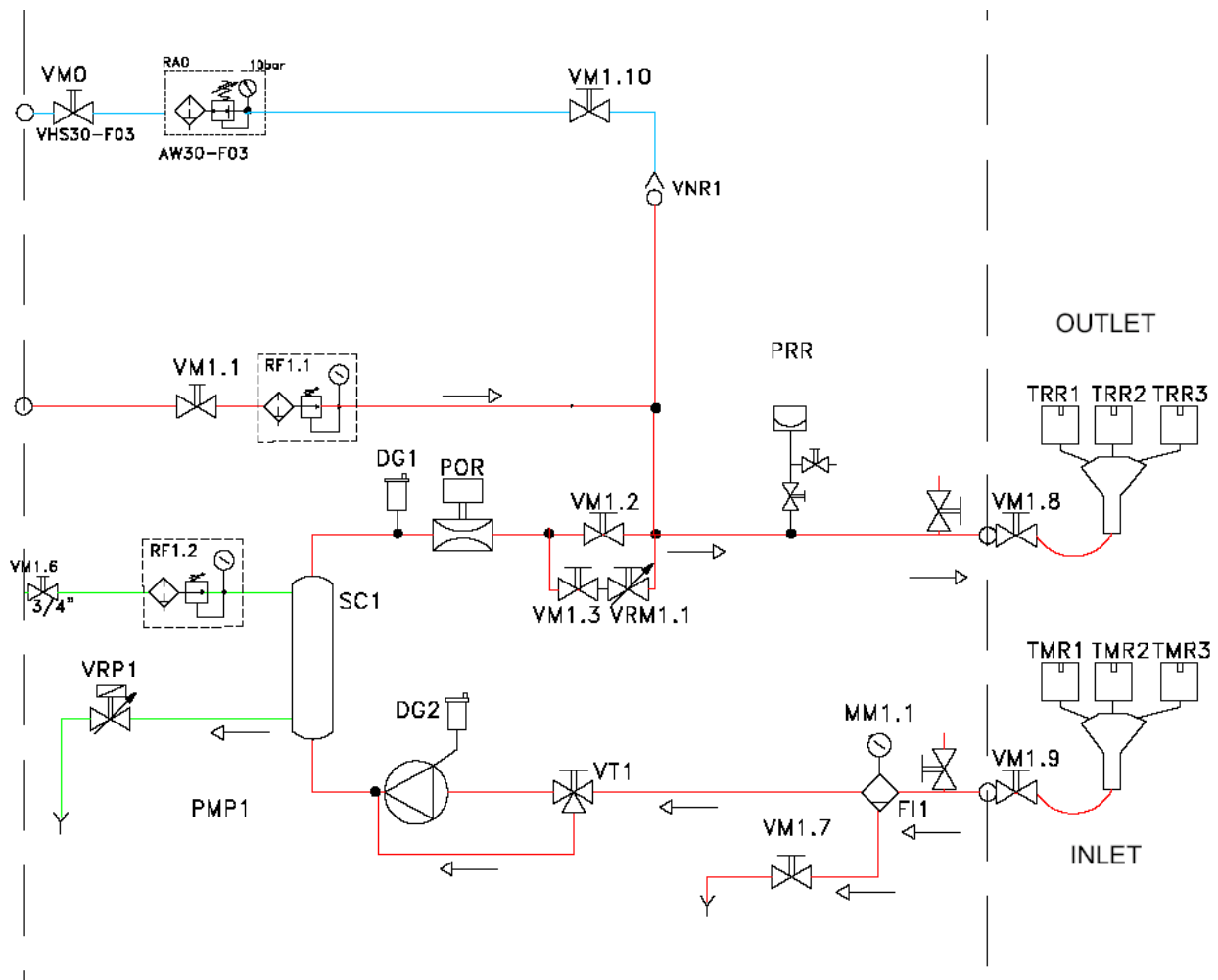
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Description of the water circuit used for the water heating output test

The water circuit used for the water heating output test was a closed circuit as shown in the figure below. During the test the mean value of flow temperature was set between 70 °C and 90 °C. During the test the mean temperature difference between flow and return was set between 10 K and 25 K. During the test period, inlet and outlet temperatures and the water flow were measured at 10 second intervals. At the end of the test period, the mean rise in water temperature between boiler inlet and outlet and the mean water flow were calculated.



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PERFORMANCE AT THE NOMINAL HEAT OUTPUT TEST

Combustion:		
test period	<i>min</i>	360
fuel load	<i>kg/h</i>	5,6
average flue draught	<i>Pa</i>	12,7
Ventilation circuit:		
average ambient room temperature	<i>°C</i>	23,9
Flue gas:		
carbon dioxide	<i>CO₂ %</i>	0,011
oxygen	<i>O₂ %</i>	7,4
average flue gas temperature	<i>°C</i>	139,8
flue gas mass flow	<i>g/s</i>	12,8
Results:		
boiler efficiency	<i>%</i>	91,3
carbon monoxide [at 10% O ₂]	<i>CO %</i>	0,009
carbon monoxide [at 10% O ₂]	<i>CO mg/m³</i>	109
carbon monoxide [at 0% O ₂]	<i>CO mg/MJ</i>	53
carbon monoxide [at 13% O ₂]	<i>CO %</i>	0,006
carbon monoxide [at 13% O ₂]	<i>CO mg/m³</i>	79
average boiler water output temperature	<i>°C</i>	78,4
average boiler water input temperature	<i>°C</i>	60,0
operating pressure	<i>bar</i>	2,0
water flow rate	<i>kg/h</i>	1143
heat input	<i>kW</i>	27,4
heat output	<i>kW</i>	25,0
Dust emission (at 10% O ₂): test A	<i>mg/m³</i>	12
Dust emission (at 10% O ₂): test B	<i>mg/m³</i>	24
Dust emission (at 10% O ₂): test C	<i>mg/m³</i>	25
Dust emission (at 10% O ₂): test D	<i>mg/m³</i>	21
Dust emission (at 10% O ₂): average	<i>mg/m³</i>	21
Dust emission (at 13% O ₂): average	<i>mg/m³</i>	15
Dust emission (at 0% O ₂): average	<i>mg/MJ</i>	10
NO _x	<i>ppm</i>	106
NO _x (as NO ₂ at 10% O ₂)	<i>mg/m³</i>	175
NO _x (as NO ₂ at 13% O ₂)	<i>mg/m³</i>	127
NO _x (as NO ₂ at 0% O ₂)	<i>mg/MJ</i>	85
THC (as propane)	<i>ppm</i>	3
OGC (as C at 10% O ₂)	<i>mg/m³</i>	4
OGC (as C at 13% O ₂)	<i>mg/m³</i>	3
OGC (as C at 0% O ₂)	<i>mg/MJ</i>	2
Maximal electrical consumption:		
stand-by	<i>W</i>	3
nominal heat output	<i>W</i>	48
ignition	<i>W</i>	392

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PERFORMANCE AT THE MINIMUM HEAT OUTPUT TEST

Combustion:		
test period	<i>min</i>	360
fuel load	<i>kg/h</i>	8,2
average flue draught	<i>Pa</i>	10,5
Ventilation circuit:		
average ambient room temperature	<i>°C</i>	22,3
Flue gas:		
carbon dioxide	<i>CO₂ %</i>	0,009
oxygen	<i>O₂ %</i>	14,0
average flue gas temperature	<i>°C</i>	66,4
flue gas mass flow	<i>g/s</i>	5,7
Results:		
boiler efficiency	<i>%</i>	84,3
carbon monoxide [at 10% O ₂]	<i>CO %</i>	0,014
carbon monoxide [at 10% O ₂]	<i>CO mg/m³</i>	175
carbon monoxide [at 0% O ₂]	<i>CO mg/MJ</i>	85
carbon monoxide [at 13% O ₂]	<i>CO %</i>	0,010
carbon monoxide [at 13% O ₂]	<i>CO mg/m³</i>	128
average boiler water output temperature	<i>°C</i>	70,8
average boiler water input temperature	<i>°C</i>	59,9
operating pressure	<i>bar</i>	2,0
water flow rate	<i>kg/h</i>	440
heat input	<i>kW</i>	6,7
heat output	<i>kW</i>	5,7
Dust emission (at 10% O ₂): test A	<i>mg/m³</i>	10
Dust emission (at 10% O ₂): test B	<i>mg/m³</i>	14
Dust emission (at 10% O ₂): test C	<i>mg/m³</i>	10
Dust emission (at 10% O ₂): test D	<i>mg/m³</i>	11
Dust emission (at 10% O ₂): average	<i>mg/m³</i>	11
Dust emission (at 13% O ₂): average	<i>mg/m³</i>	8
Dust emission (at 0% O ₂): average	<i>mg/MJ</i>	5
NO _x	<i>ppm</i>	61
NO _x (as NO ₂ at 10% O ₂)	<i>mg/m³</i>	197
NO _x (as NO ₂ at 13% O ₂)	<i>mg/m³</i>	143
NO _x (as NO ₂ at 0% O ₂)	<i>mg/MJ</i>	96
THC (as propane)	<i>ppm</i>	<1
OGC (as C at 10% O ₂)	<i>mg/m³</i>	<1
OGC (as C at 13% O ₂)	<i>mg/m³</i>	1
OGC (as C at 0% O ₂)	<i>mg/MJ</i>	<1
Maximal electrical consumption:		
stand-by	<i>W</i>	3
minimum heat output	<i>W</i>	35

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EMISSION LIMITS

The boiler **CA 28** of **AGE STUFE srl** complies with

CLASS 5

of clause 4.4.2 of the European standard EN 303-5:2012

SURFACE TEMPERATURES OF HANDLES OR KNOBS, IN THE INTEGRAL FUEL HOPPER AND IN THE INTEGRAL FUEL STORAGE

Tested elements	Surface material	Temperature °C	ΔT °C	Tool necessary
Frontdoor handle	Plastic	32,3	8,4	NO
Display	Plastic	28,9	5,0	NO
Power cord supply	Plastic	30,5	6,6	NO

Ambient temperature at nominal heat output °C	23,9
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An operating tool shall be provided where it would otherwise be necessary to touch any surface having a temperature above ambient for more than the following values:

35 K for metals

45 K for porcelain, vitreous enamel or similar materials

60 K for plastics, rubber or wood

DETERMINATION OF WATERSIDE RESISTANCE

Temperature difference equivalent	Water flow m^3/h	Waterside resistance mbar
10 K	1,79	805
20 K	0,84	94

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SURFACE TEMPERATURES TESTS

Surfaces	Temperatures °C		Surfaces	Temperatures °C		Surfaces	Temperatures °C	
	T	ΔT		T	ΔT		T	ΔT
F1	26,5	2,6	R1	29,9	6,0	L1	29,4	5,5
F2	26,1	2,2	R2	32,9	9,0	L2	33,4	9,5
F3	21,7	-	R3	33,2	9,3	L3	32,4	8,5
F4	25,0	1,1	R4	33,6	9,7	L4	31,1	7,2
F5	24,4	0,5	R5	33,1	9,2	L5	24,5	0,6
Average	24,7	1,3	Average	32,5	8,6	Average	30,2	6,3
Surfaces	Temperatures °C		Surfaces	Temperatures °C				
	T	ΔT		T	ΔT			
T1	31,5	7,6	B1	34,1	10,2			
T2	32,0	8,1	B2	35,9	12,0			
T3	32,2	8,3	B3	34,2	10,3			
T4	33,3	9,4	B4	35,7	11,8			
T5	33,0	9,1	B5	34,6	10,7			
Average	32,4	8,5	Average	34,9	11,0			

Fx Front surface of boiler doors
 Rx Right surface of boiler
 Lx Left surface of boiler
 Tx Top surface of boiler
 Bx Back surface of the boiler
 With x identified of the thermocouple

Pass criterion is not to exceed the ambient temperature by more than 100 K for the temperature of boilers doors and cleaning port covers on the operator side and by more than 65 K for the temperature on the outside of the boiler bottom.

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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	MRU	0 – 21%	±0.1%	0 – 2,5 – 9,0 - - 21%
CO ₂	infra-red	MRU	0 – 20 %	±1%	0 – 9 – 18 %
CO	infra-red	MRU	0 – 2000 ppm	±2%	0 – 880 ppm
NO _x	infra-red	MRU	0 – 500 ppm	±2%	0 – 50 – 250 – 450 ppm
OGC	FID	Ratfish	0 -100 ppm	±2%	0 – 90 ppm propane
static pressure	--	MRU	0 – 25 Pa	±0,25 Pa	0 – 20 Pa
temperature: ambient room flue gas surface touchable areas	K thermocouple K thermocouple T 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 – 1500 kg 0 – 10 kg	±20 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 [%]	6,23
Lower calorific value [KJ/Kg]	17757
Carbon content [% on dry basis]	47,4
Sulphur content [% on dry basis]	0,005
Hydrogen [% on dry basis]	5,6
Size: length [mm] diameter [mm]	12 – 30 (at the origin) 6,0

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