



ISTITUTO DI RICERCHE E COLLAUDI M. MASINI S.r.l.

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TEST REPORT No. 2413-2010 of 30/11/2010

- English translation of the original italian test report (issued on 28/03/2011) -

APPLICANT/MANUFACTURER: **EDILKAMIN S.p.A.**
Via Mascagni, 7 - 20020 LAINATE (MI)

PRODUCT: **Heating boilers for solid fuels, hand and
automatically stocked, nominal heat output
of up to 300 kW**

MODEL: **OTTAWA**

REF. STANDARD: **EN 303-5:1999**

GOODS RECEIVED ON: **27/10/2010 (NPA 1750/10)**

REF. DOCUMENTS: **delivery doc. no 60 of 27/10/10**

TESTING DATE: **04 + 10/11/2010**

This test report only refers to the appliance tested in the described conditions
and it can be reproduced only in full.

Laboratory Technician
p.l. Ezio Borghetti

General Manager
Dr. Ing. Vincenzo La Fragola



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TEST FUEL SPECIFICATIONS

Definition	Notation	Units	Test fuel	
			measured	EN requirement
Fuel			Wood pellets	
Essence				
Section		mm	6	
Average length		mm	20	
Humidity	W	%	7,05	
Carbon (as fired basis)	C	%	43,3	
Hydrogen (as fired basis)	H	%	5,1	
Sulfur (as fired basis)	S	%	0,03	
Oxygen (as fired basis)	O	%	42,0	
Azote (as fired basis)	N	%	0,29	
Ash (as fired basis)	Ash	%	0,45	
Low calorific value	Huw	kJ/kg	17419	



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REQUIREMENTS AND TEST METHOD

EN 303-5:1999

**Heating boilers - Heating boilers for solid fuels, hand
and automatically stocked, nominal heat output of up to 300 kW**

LEGENDA: C = Complying // NC = Not complying // NA = Not applicable

Structure related requirements (ref. clause 4 of the standard)	
<p>General requirements The manufacturer shall declare that the boiler is fire-resistant and can work safely, furthermore it must be built with fire-proof materials, resistant to deformation and be manufactured so that:</p> <ul style="list-style-type: none"> - It resists to tensions during the normal operation; - The thermo-vector fluid (water) does not overheat to hazardous levels - The device is safe and reliable so that hazardous fumes do not leak in the boiler room during the normal operation. - Accumulation of hazardous combustible gases is prevented in the combustion chamber and in the smokestacks 	<p>C</p> <p>C</p> <p>C</p> <p>C</p>
<p>Manufacturing documents In order to identify the device, the manufacturer must have the available documentation and or the building drawings, on a scale, representing the base project and the device structure. The documentation and/or the drawings, must include at least the following information:</p> <ul style="list-style-type: none"> - Specification of materials used to manufacture the device - The welding process used to produce the boiler shield <i>The symbol of the welding type used is sufficient</i> - Maximum allowed working temperature of water , in °C - Maximum working pressure allowed, in bar - Test pressure, in bar - The nominal useful thermal power in kW using fuels recommended by the manufacturer. 	<p>C</p>
Steel boiler with non ferrous materials	
<p>General structure The materials used must be fit for welding. The materials listed in annex 1 are fit and do not require further thermal treatments after welding.</p>	<p>C</p>
<p>Minimum nominal thickness of the wall (steels) The minimum nominal thickness of the wall of steel sheets and of tubes subject to hydraulic pressure must comply with prescriptions 3. Tolerances on nominal minimum thickness on carbon steels walls, as mentioned in table 1, must correspond to those specified in EN 10029:1991</p>	<p>C</p>
<p>Minimum nominal thickness of the wall (cast iron) The thickness of walls indicated in production drawings should not be lower than the minimum thicknesses indicated in prospect 5. Real minimum thicknesses, during the manufacturing of boilers components and of components subject to pressure must be 0.8 times greater than what indicated in drawings.</p>	<p>NA</p>
<p>Cast iron components subject to hydraulic pressure Minimum mechanical properties of the cast irons used for components subject to hydraulic pressure, must comply with the table requirements.</p>	<p>NA</p>
<p>Air drain from sections with water The boiler sections with water must be purged from air The boiler must be designed so that in normal working conditions, complying with the instructions of the manufacturer, no abnormal boiling occurs.</p>	<p>C</p>



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Water sealing Screw holes and the components used for the connection or removal of parts, should not be open along the water passage, or in spaces where water flows. <i>This requirement may not be applied to shafts in the measurement, control and safety devices.</i>	C
Safety and planning requirements The boiler and its components are designed so that they can be easily purged from air on the water side. The boiler has been designed so that in normal working conditions and complying with the instructions given it does not emit irritating noises caused by boiling, the combustion chamber and the fumes passage ducts have been conceived to prevent dangerous accumulation of flammable gases.	C
Exchange surfaces cleaning Exchange surfaces have enough openings for cleaning to inspect and clean them with chemical agents and brushes. If fit tools are required to clean and service the boiler, these must be supplied by the manufacturer.	C
Flame inspection The device is equipped with a system that allows seeing the flames or the embers bed.	C
Water sealing Screw holes or similar components used for removable parts do not enter in the areas where the water is flowing, apart from the shafts of measurement, adjustment or safety devices.	C
Removable parts Removable parts have been designed, manufactured and branded so that their mounting may be correctly performed according to the instructions of the manufacturer.	C
Water side connections The size of threaded connections has not to be lower than their minimum section indicated at point 4.1.5.6 and must comply with the requirements prescribed by ISO 7-1:1994, ISO 7-2:2000, ISO 228-1:2000 and ISO 228-2:1987. The size of flanges must comply with requirements prescribed by ISO 7005-1: ISO 7005-2 e ISO 7005-3. The design and position of the connection joints should facilitate mounting.	C
Connections for control devices, indication and safety thermostat. Every boiler must be equipped with, at least: <ul style="list-style-type: none">- Connection for an adjustment thermostat,- Connection for an overheat cut-off device,- Connection for one thermometer The minimum diameter shall correspond to G1/2	C
Thermal insulation The boilers are equipped with adequate thermal insulation in normal working conditions it does not emit fumes and it is made of non combustible material.	C



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Resistance on the water side of the boiler The load loss on the water side has been established according to par. 5.11 of EN 303-5:1999 for capacities corresponding to the nominal power, for the two temperature differences between delivery and flow: 10 K and 20 K. The results comply with the indications supplied by the manufacturer.	C
Temperature control and limitation device in open-cup systems Every boiler must be equipped with, at least: <ul style="list-style-type: none">- Adjustment thermostat- Cut-off thermostat with automatic restart	C
Temperature control and limitation device in open- and closed-cup systems The combustion system used can be rapidly stopped The boiler is equipped with the following devices: <ul style="list-style-type: none">- Adjustment thermostat- Cut-off thermostat with manual restart- A device to dissipate the maximum admitted power The control of the function for the adjustment thermostat, of the cut-off thermostat with manual restart has been performed in compliance with par 5.13 of EN 303-5:1999	C
Accumulation supply device The accumulation supply device has been designed so that the combustible can freely move and the combustion period is guaranteed.	C
Ash chamber The ash chamber is enough for a combustion period longer than 12 h, when using the recommended combustible, at nominal power, without chocking the air passage under the grid.	C
Supply devices	
Manual supply The boilers must be designed to prevent any damage for the operator during the opening of the loading door or of the combustion chamber.	NA
Automatic supply The automatic supply system is equipped with a safety device with manual reset to prevent the combustion in the supply device or in dosing device or a flash-back.	C



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Electrical safety Whenever the electric supply plant is part of the device, the device must comply with the electric safety requirement of EN 60335-1. It is necessary to check the documentation issued by the manufacturer to support these statements (insulation check, grounding conductor continuity, etc...)	C
Boiler capacity requirements	
Boiler output The boiler output at the nominal thermal power, shall not be lower than what indicated in figure 1 of standard EN 303-5:1999.	C
Fumes temperature Measure and record the average temperature of fumes during the check test of outputs at nominal thermal power and at reduced power.	C
Heating flue Measure the heating flue values using the test structures prescribed by the standard, following the mentioned test indications according to thermal power, prefixed heating flue values and to check the thermal power.	C
Combustion period The combustion period for boilers with manual loading must be: <ul style="list-style-type: none">- 2 hours for bio-combustible fuels- 4 hours for fossil-fuels The combustion period for boilers with manual loading must be 6 hours:	C
Minimum thermal power The minimum thermal power must not exceed 30% of the nominal thermal power	C
Emission limits The boiler, in working conditions at nominal thermal power and at minimum thermal power, in compliance with points 5.7, 5.9 and 5.10 must comply with the limits prescribed by prospect 7 of standard EN 303-5:1999 with a reference oxygen rate by 10%	C
Surfaces temperature The average temperature of the surface of the boiler doors and of the opening on the operator's side must not exceed 100 K of the environment temperature during the test at nominal thermal power. The temperature of the outer surface of the lower part of the boiler must not exceed 65 K of the environment temperature during the test at nominal thermal power. Check that an operation device has been supplied (e.g. heat prevention gloves) where it is necessary to touch surfaces having temperatures exceeding the environment temperature by the following values: <ul style="list-style-type: none">- 35 K for metal or similar materials;- 45 K for porcelain or similar;- 60 K for plastic or similar	C



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<p>Function test of the adjustment thermostat, of the cut-off thermostat (with automatic and/or manual restart) point 5.13</p> <p>When the adjustment thermostat works normally, the temperature displayed must not exceed 100°C and the cut-off thermostat and the heat-dispersion device do not switch on. When the adjustment thermostat does not work the cut-off thermostat of the heating system switches off, when it exceeds the temperature value indicated by the manufacturer (max 110°C)</p>	C
<p>Function test of the heat dissipation device – cl. 5.14</p> <p>In working conditions at maximum thermal power and with the adjustment thermostat off-duty, the cut-off thermostat must work.</p>	NA
<p>Boiler capacity requirements</p> <p>The boiler capacity test has been performed in compliance with par. 5.7.1 using measurement devices and methods complying with par. 5.2 of EN 303-5:1999. The test circuit complies with the indications at Annex A.6 of EN304 and the yield has been established with an efficiency tolerance by 3%. The fumes measurement section has been designed in compliance with EN 304:1992, figure 2. The definition of the thermal power and of the boiler yield has been performed in compliance with par. 5.8 prescribed by EN 303-5:1999. The annexed tables indicate the test conditions with the obtained results.</p>	C
<p>Instructions of the device</p> <p>Check that the manufacturer has supplied the instructions for installation of the use and that these instructions contain at least what required by the standard.</p>	C
<p>Marking</p> <p>Check that the marking indicated on the device or supplied as facsimile complies with the prescriptions of the standard.</p>	C



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PERFORMANCES ACCORDING TO STANDARD EN 303-5:1999 (Reference oxygen at 10%)

Efficiency at nominal heat output		
Heating boilers	model	OTTAWA
TESTING DATE	05/11/2010	10:30
TESTING PERIOD	min	240
ATMOSPHERE PRESSURE	mbar	1028
ROOM TEMPERATURE	°C	19,94
LOWER CALORIFIC VALUE	kWh/kg	4,839
MEASURED FUEL WEIGHT	kg	17,16
TIMING OF FLUE	s	10800
WEIGHT OF FUEL FLUE	kg/h	5,72
WATER TEMPERATURE BOILER FLOW	°C	80,25
WATER TEMPERATURE BOILER RETURN	°C	59,25
WATER TEMPERATURE EXCHANGER INLET	°C	14,33
WATER TEMPERATURE EXCHANGER OUTPUT	°C	51,42
WATER FLUE EXCHANGER	kg/h	563,00
SPECIFIC CALOR OF WATER	J(kg/k)	4172
PRESSURE UNDER FIRE	Pa	12
FLUE TEMPERATURE	°C	138,46
CARBON DIOXIDE - CO ₂	%	9,8
OXYGEN - O ₂	%	10,89
CARBON OXIDE - CO	ppm	245,1
CARBON OXIDE (O ₂ at 10%)- CO	mg/m ³	333,0
NITROGEN OXIDES - NO_x	ppm	204,63
NITROGEN OXIDES (O ₂ AT 10%) NO _x	mg/m ³	456,0
OGC (carbon with organic binding) as carbon	mg/m ³	4,02
OGC (at 10% of O₂)	mg/m ³	4,37
Dusts (at 10% of O₂)	mg/m ³	26,11
PLANT DISPERSION	kW	1,1
THERMAL CAPACITY	kW	27,679
NET THERMAL CAPACITY	kW	25,381
FLUE EFFICIENCY	%	91,17
DIRECT EFFICIENCY	%	91,70



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PERFORMANCES ACCORDING TO STANDARD EN 303-5:1999 (Reference oxygen at 10%)

Efficiency at minimum heat output		
Heating boilers	model	OTTAWA
TESTING DATE	09/11/2010	10:00
TESTING PERIOD	min	300
ATMOSPHERE PRESSURE	mbar	984
ROOM TEMPERATURE	°C	19,05
LOWER CALORIFIC VALUE	kWh/kg	4,839
MEASURED FUEL WEIGHT	kg	6,944
TIMING OF FLUE	s	14400
WEIGHT OF FUEL FLUE	kg/h	1,736
WATER TEMPERATURE BOILER FLOW	°C	80,46
WATER TEMPERATURE BOILER RETURN	°C	60,04
WATER TEMPERATURE EXCHANGER INLET	°C	13,68
WATER TEMPERATURE EXCHANGER OUTPUT	°C	39,36
WATER FLUE EXCHANGER	kg/h	249,00
SPECIFIC CALOR OF WATER	J(kg/k)	4172
PRESSURE UNDER FIRE	Pa	10
FLUE TEMPERATURE	°C	84,95
CARBON DIOXIDE - CO ₂	%	4,95
OXYGEN - O ₂	%	15,36
CARBON OXIDE - CO	ppm	398
CARBON OXIDE (O ₂ at 10%)- CO	mg/m ³	970,3
NITROGEN OXIDES - NO_x	ppm	85,33
NITROGEN OXIDES (O ₂ AT 10%) NO _x	mg/m ³	341,17
OGC (carbon with organic binding) as carbon	mg/m ³	3,88
OGC (at 10% of O₂)	mg/m ³	7,57
PLANT DISPERSION	kW	0,22
THERMAL CAPACITY	kW	8,401
NET THERMAL CAPACITY	kW	7,655
FLUE EFFICIENCY	%	90,28
DIRECT EFFICIENCY	%	91,13