



"TERMOPLAM" - Ltd
Test laboratory

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Republic of Bulgaria, Sofia,
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Sample Test Report

№ 146
04.02.2020 y.

I. NAME AND SIGNATURE OF THE TESTED SAMPLE(S):

Heating boilers: "MAT" models: BW25A, BW35A, BW45A, BW55A;

II. NAME AND DESCRIPTION OF THE TESTED SAMPLE(S):

Heating boilers working with pressed wood material-wood pellets without binding agents, manufactured from steel through welding;

III. LEGAL DOCUMENT: EN 303-5:2012, EN 304:2017 and
EN ISO/IEC 17025:2018



Picture of the sample "MAT"

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IV. QUANTITY OF THE TESTED SAMPLES: 4 samples from regular production selected at random method.

V. CUSTOMER: MAT Ltd, Razgrad, 7200 Garova promischlena zona;

VI. PURPOSE AND OBJECT OF THE TEST:

Heating boilers thermal test for defining of:

- 6.1. Boilers thermal capacity.
- 6.1.1. Capacity at rated load.
- 6.1.2. Test at minimum load.
- 6.2. Test for determining heating boilers efficiency.
- 6.3. Determining emissions from the heating boilers.
- 6.4. Pressure test of the boilers plumbing parts.
- 6.5. Determination of the waterside resistance.

VII. TECHNICAL FEATURES:

Model(s): „MAT“	BW25A nom/min	BW35A nom/min	BW45A nom/min	BW55A nom/min
7.1. Heat input: Q_B kW (according p.3.14 of EN 303-5)	28,2 kW	38,8 kW	49,7 kW	60,4 kW
7.2. Heat output: Q kW (according p.3.6 of EN 303-5).	25,4 kW	35,2 kW	45,2 kW	55,3 kW
7.3. Efficiency: η_k % acc.p.3.11 and 5.10.3.1 of EN 303-5.	90,1 %	90,7 %	90,9 %	91,5 %
7.4. Weight kg – dry/with water:	320/415 kg	350/450 kg	390/495 kg	420/537 kg

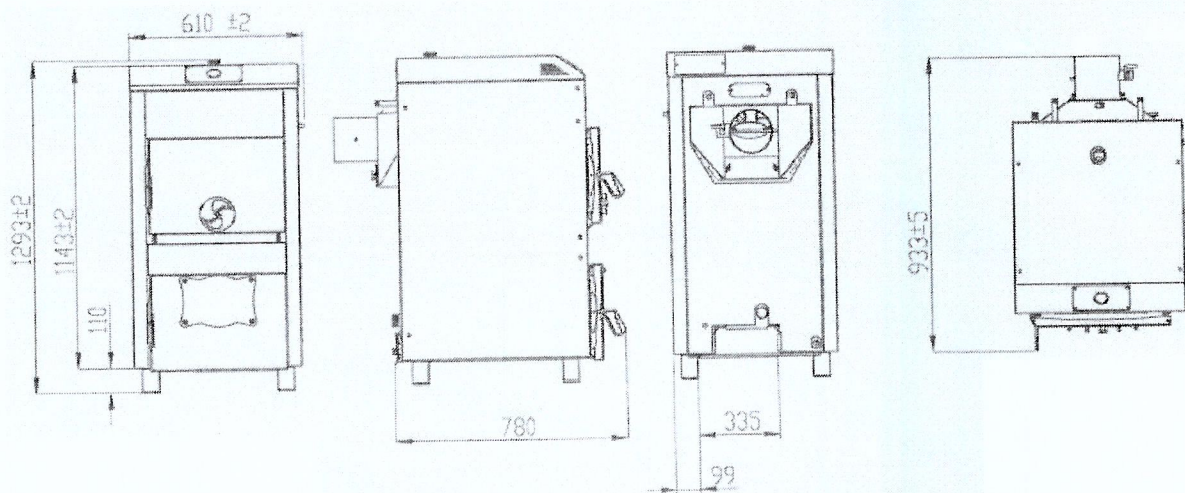
VIII. TEST CONDITIONS:

- 8.1. Weather conditions:
 - 8.1.1. Ambient temperature $t_L = 19,3^\circ\text{C}$ ($15^\circ\text{C} \div 30^\circ\text{C}$ acc. p.5.7.1 - EN 303-5).
- 8.2. Starting date: 30.01.2020 y. Date of completion: 04.02.2020 y.
- 8.3. Weight of the test fuel:
 - 8.3.1. $B = 5,69 \div 12,2$ kg/h (wood pellets at rated heating output for 6 h continuous combustion according section 5.7.4.2 and p.5.3 of EN 303-5).
- 8.4. Draught (low pressure in the flue pipe) $\leq 0,25$ mBar p. 4.4.4 of EN 303-5.
- 8.5. Type of fuel:
 - 8.5.1. Wood pellets with humidity $w = 6,78 \pm 0,14$ % $\leq 12\%$. acc. p.5.3 and table 7. Protocol № 7154/01.02.2018 of EUROTTEST-CONTROL Ltd;
- 8.6. Temperature of outgoing water from $86,5^\circ \div 89,7^\circ\text{C}$
(from $70^\circ\text{C} \div 90^\circ\text{C}$ p. 5.8.2 of EN 303-5).
- 8.7. The manufacturer's safety measures have been complied with, EN303-5 and EN304.

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Assembly drawing of MAT boilers

8.6. Used equipment:

8.6.1. Measuring tools:

8.6.1.1. TESTO 405-V1 air speed measuring device.

8.6.1.2. MS8127 digital thermometer with receiver - DS18B20 for the ambient temperature, water temperatures and test area walls;

8.6.1.3. Vacuum Tester 512;

8.6.1.4. Electronic stopwatch Casio FA109;

8.6.1.5. Thermohygrometer HAMA;

8.6.1.6. Gas analyzers: Testo 350XL;

8.6.1.7. Scales up to 510 kg - for measuring the weight of the test device;

8.6.1.8. Scale from 5 g to 40 kg - for measuring the weight of the fuel;

8.6.1.9. Measuring tape;

8.6.1.10 Caliper;

8.6.1.11. Pressure gauge;

8.6.1.12. Flowmeter Gardena, Type: 203.B;

8.6.1.13. FIMET analog thermometers for water temperature;

8.6.1.14. Infrared Thermometer - SKF TMTL 1400K

8.6.1.15. Dust concentration measuring device (Dr. Födisch AG controller)-PFM02

8.6.2. Recorders

8.6.3. Accessories: PC with application package.

IX. RESULTS FROM THE TEST:

9. Parametres.

9.1. Average efficiency:

9.1.1. For pellets: η according p. 4.4.2. and p.5.10.3.1 of EN 303-5.

9.2. Nominal heat output of the boiler Q_N according p.3.7 of EN 303-5.

9.3. Heat output: Q from p. 3.6 of EN 303-5.

9.4. Heat input: Q_B see. p. 3.14 and p. 5.10.2 of EN 303-5.

9.5 Duration of the test at rated heating output:

9.5.1. For pellets: ≥ 6 h according p. 5.7.4.2 of EN 303-5.

9.6. Average CO emissions according p. 4.4.7 and table 6 of EN 303-5:

9.7. Average dust emissions according p. 4.4.7 and table 6 of EN 303-5.

9.8. Average OGC emissions according p. 4.4.7 and table 6 of EN 303-5;

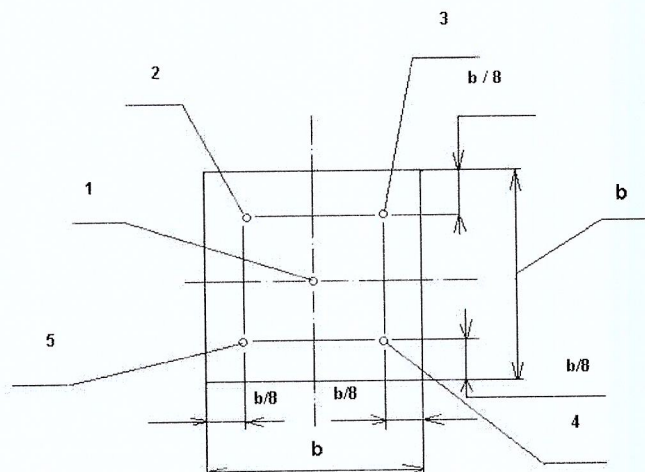
9.9. Flue gas flow (by calculation method):

9.10. After the pressure parts have been tested

$p_{\text{test}} = 2 \times PS = 2 \times 3 = 6$ bar no leaks and visible deformations are observed according to the requirements of p. 5.4.1 of EN 303-5.

9.11. Flue gas temperature according p. 4.4.3 of EN 303-5;

9.12. Results are in table 1.



Точки за измерване на температурата на
повърхността на котела

Temperature measuring points on the boiler

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Table 1.

Dimension	MAT BW25A nom/min	MAT BW35A nom/min	MAT BW45A nom/min	MAT BW55A nom/min	Limit
t_A °C	159/155	164/160	169/165	177/168	-
t_L °C	19,3	19,3	19,3	19,3	15÷30
H_w mbar	< 22	< 22	< 24	< 25	-
t_1 °C	53,6/47,3	54,1/48,8	57,8/48,9	59,9/51,0	$\leq 60+t_L^*=79,3$
t_2 °C	46,2/43,2	48,3/44,1	50,5/45,2	52,0/46,6	$\leq 60+t_L^*=79,3$
t_3 °C	47,5/42,6	48,9/44,3	50,3/44,8	55,1/47,5	$\leq 60+t_L^*=79,3$
t_4 °C	45,3/41,2	46,0/42,6	47,8/42,9	49,7/44,3	$\leq 60+t_L^*=79,3$
t_5 °C	50,6/45,3	52,5/46,6	54,1/47,2	55,0/49,0	$\leq 60+t_L^*=79,3$
$t_{\text{floor max}}$ °C	24,9/21,2	25,3/22,6	25,3/23,5	26,9/24,4	-
$t_{\text{upper handle}}$ °C	64,7/52,5	66,5/53,5	70,1/57,1	74,7/60,5	$\leq 60+t_L^*=79,3$
$t_{\text{lower handle}}$ °C	64,1/55,5	67,5/60,1	68,8/62,6	72,1/69,2	$\leq 60+t_L^*=79,3$
$p_{\text{test}}=2 \times p_1$ bar	6	6	6	6	$\leq 2 \times \text{PS}=6$ bar
W_1 m ³ /h	1420/410	1570/440	2600/650	2770/750	-
t_E °C	71,2/68,3	68,0/67,4	74,2/70,2	72,5/69,3	-
t_V °C	86,5/84,5	87,2/87,6	89,1/88,1	89,6/88,5	-
B kg/h	5,69/1,79	7,84/2,29	10,1/3,00	12,2/3,65	-
CO mg/Nm ³	423/406	451/428	465/435	486/465	≤ 500 mg/Nm ^{3**}
CO ₂ %	8,7/7,4	8,02/7,64	7,64/7,35	7,44/7,15	-
OGC mg/Nm ³	16,2/14,0	16,7/14,5	18,1/17,1	19,3/18,9	≤ 20 mg/Nm ^{3***}
Dust mg/Nm ³	25,1/22,4	27,6/24,3	36,1/34,8	37,7/36,5	≤ 40 mg/Nm ^{3****}
W % *****	6,78	6,78	6,78	6,78	≤ 10
O ₂ %	12,0/13,3	12,7/13,1	13,1/13,4	13,3/13,6	-
NO _x mg/Nm ³	156,6/ 146,9	165,7/ 153,9	175,6/ 171,3	190,6/ 182,1	

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9.13. Value of water resistance < 25 mbar according p.5.11 of EN 303-5 and A.10 of EN 304.

NOTES:

- * According p.4.3.6 of EN 303-5.
- ** Class 5 of rated power of the boiler according p.4.4.7 and table 6 of EN 303-5.
- *** Class 5 of the boiler for rated power according to item 4.4.7 and table. 6 of EN 303-5.
- **** Class 5 of the boiler for rated power according to item 4.4.7 and table. 6 of EN 303-5.
- ***** Fuel—according the requirements see. 5.3, table 7 on page 41 of EN303-5.

X. Annexes:

- 10.1. Annexes (from A to E) - 5;
- 10.2. Instructions for installation and operation of MAT boilers;

Head of Laboratory



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QUALITY ASSURANCE
DREBESDENJE KVALITETA

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This Annex is an integral part of Protocol №146/04.02.2020 y.of lab. "Termoplam"

QUALITY ASSURANCE
DOKLADJENJE KVALITETA

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ANNEX C

(Copy of Protocol No 7154 / 01.02.2018 of EUROTTEST-CONTROL Ltd)
This Annex is an integral part of Protocol №146/04.02.2020 y.of lab. "Termoplam"

7. Резултати от изпитването

№ на пробата, лабораторен №, обект: Проба № 1, лаб. № 1801234, взета от пелети собствено производство


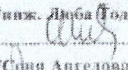
Стойност и допуск на характеристиката (норма, категория) съгласно: БДС EN ISO 17225 - 2:2014, табл. 1, клас А1

№ по ред	Наименование на характеристиката	Единица на величината	Стандарт / валидиран метод	Резултати от изпитването (стойност, неопределеност)	Стойност и допуск на характеристиката	Условия на изпитването
1	2	3	4	5	6	7
1	Влага (обща)	%	БДС EN ISO 18134-2:2017	6.76 ± 0.14	M10 ±10	t (22±4) °C RH (30±60)%
2	Влага (аналитична)	%	БДС EN ISO 18134-3:2015	0.61 ± 0.02	не се нормира	t (22±4) °C RH (30±60)%
3	Пепел				-	t (22±4) °C RH (30±60)%
	Пепел (на сухо гориво, Ad)	%	БДС EN ISO 18122:2015	0.40 ± 0.02	A0.7 ±0.7	t (22±4) °C RH (30±60)%
4	Свра				-	t (22±4) °C RH (30±60)%
	Свра (на сухо гориво, Sd)	%	ETC 7.3-4:2014	< 0.02	S0.04 ±0.04	t (22±4) °C RH (30±60)%
5	Топлина на изгаряне				-	t (22±4) °C RH (30±60)%
	Топлина на изгаряне (долна на работно гориво, Qnet,v,ar)	kWh/kg	БДС EN ISO 18125:2017	4.96 ± 0.02	Q4.6±4.6	t (22±4) °C RH (30±60)%
	Топлина на изгаряне (долна на работно гориво, Qnet,v,ar)	MJ/kg	БДС EN ISO 18125:2017	17.61 ± 0.06	Q16.5 ±16.5	t (22±4) °C RH (30±60)%

Мнение относно резултатите от изпитване: Изпитваната проба № 1, лаб. № 1801234 по характеристики: Влага (обща); Пепел (на сухо гориво, Ad); Свра (на сухо гориво, Sd); Топлина на изгаряне (долна на работно гориво, Qnet,v,ar) съответства на изискванията на БДС EN ISO 17225 - 2:2014, табл. 1, клас А1.

ЗАБЕЛЕЖКИ: 1. ДИП не носи отговорност за коректността на пробовземане, сроковете на съхранение и условията на съхранение на пробата/ите за изпитване до постъпването ѝ/им в лабораторията.

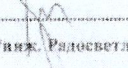
ПРОВЕЛ ИЗПИТВАНЕТО:


/инж. Добра Тодорова/

/Силвия Ангелова/

ДИРЕКТОР НА ДИРЕКЦИЯ
ИЗПИТВАТЕЛНА ЛАБОРАТОРИЯ:


/Юлиана Акрабова/

РЪКОВОДИТЕЛ НАПРАВЛЕНИЕ:


/инж. Радосветия Кръстева/



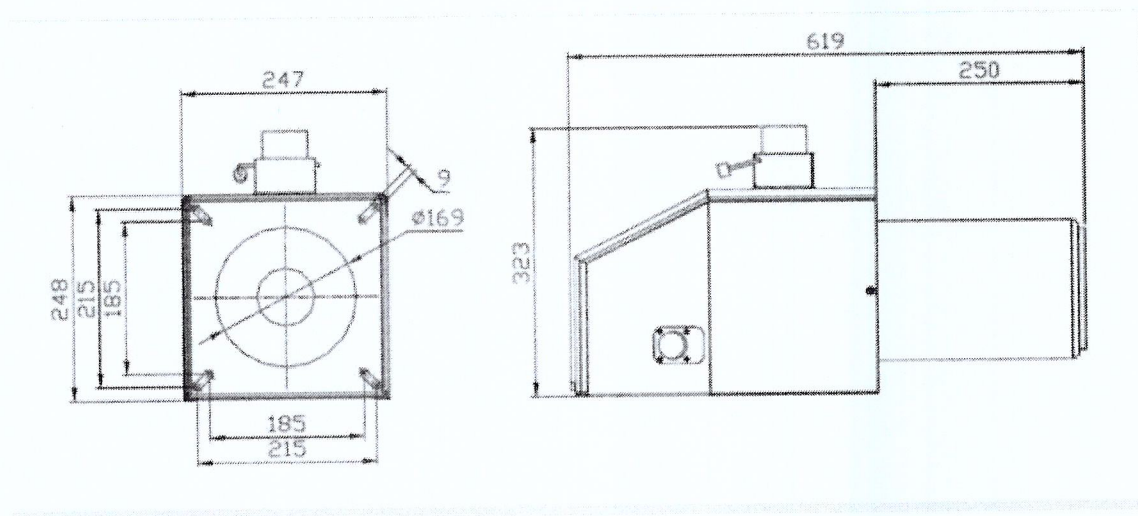
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ANNEX D

(Copy of a drawing assembled of MAT boilers with a Pellas X s-control burner)
This Annex is an integral part of Protocol №146/04.02.2020 y.of lab. "Termoplam"



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ANNEX E

(copy of the water jacket drawing with weld type)

This Annex is an integral part of Protocol №146/04.02.2020 y.of lab. "Termoplam"

