

TESTING LABORATORY

“ITEM Consult” Ltd. — Testing Laboratory, Sofia 1220, 8 Istoria Slavianobulgarska Blvd

TEST REPORT

from testing the product type according to system 3

№ CPR 528A/04.02.2026

1. Manufacturer:

Company: “MAK ENDÜSTRİYEL ÜRETİM VE TİCARET A.Ş.”

Address: Mimar Sinan Mah. Ankara Yolu 5. Cadde No: 33 Çorum / TÜRKİYE

Appliance name: “SAPHIRE”

Type, serial number (type or prototype):

Year of manufacture: 2026

2. Applicant:

Application: № CPR 332A/20.01.2026

Company: “MAK ENDÜSTRİYEL ÜRETİM VE TİCARET A.Ş.”

Address: Mimar Sinan Mah. Ankara Yolu 5. Cadde No: 33 Çorum / TÜRKİYE

3. Test method:

Testing of a biofuel heating device according to:

“Residential solid fuel burning appliances – Part 2-1: Roomheaters”; BDS EN 16510-2-1:2023

“Residential solid fuel burning appliances – Part 1: General requirements and test methods”; BDS EN 16510-1:2023.

Performance tested according to the test method:

- Mechanical resistance and stability: load-bearing capacity – p. 4.1
- Fire safety: protection of combustible materials – p. 4.2
- Hygiene, health and environment: at nominal heat output – p. 4.3; p. 4.4; p. 4.5; p. 4.6; heat output at part load – p. 4.3; p. 4.4; p. 4.5; p. 4.6
- Safety and accessibility in use: chimney connection data at nominal heat output – p. 4.7.2; p. 4.7.4; p. 4.7.6; chimney connection data at partial heat output – p. 4.7.3; p. 4.7.5; p. 4.7.7; chimney connection data related to fire safety at safe heat output – p. 4.7.8
- Energy saving and heat retention: heat output and efficiency at nominal heat output – p. 4.8.1; p. 4.8.2; p. 4.8.3; heat output and efficiency at part load – p. 4.8.4; p. 4.8.5; p. 4.8.6; room heating efficiency – p. 4.8.7; p. 4.8.8; electrical consumption at nominal, part heat output and standby – p. 4.8.9; p. 4.8.10; p. 4.8.11

4. Date of receipt: 20.01.2026

5. Test date: 20.01.2026 – 04.02.2026

6. Place of testing:

“ITEM Consult” Ltd. – Testing Laboratory, Sofia 1220, 8 Istoria Slavianobulgarska Blvd

7. Description according to the technical documentation of the appliance:

Appliance Classification – Type “B”

Gravity-fed pellet stove with an oven for heating. It operates completely mechanically, without electricity. The pellets are fed into the combustion chamber automatically by gravity. Features mechanical side levers to adjust the burning intensity. The oven is located at the very top and is equipped with a thermometer for precise cooking.



8. Technical specifications provided by the manufacturer:

Nominal heating output:	10.0 kW
Efficiency:	89 %
Dimensions:	956 × 710 × 865 mm
Diameter of the chimney:	Ø130 mm
Weight:	135 kg

Distance from the walls of the stand to the appliance – specified by the manufacturer:

A. From left and right to the stand:	500 mm
B. Back to stand:	200 mm
C. Hearth on stand:	100 mm
D. Safety distance in front:	1000 mm

9. Fuels used:

9.1. Wooden pellets (EN 14961-2) A1 – Ø6 mm

Test report for the fuel № 10119/11.12.2025, Eurotest – Control EAD

– Net calorific value of the fuel:	4.79 kWh/kg
– Net calorific value of the fuel:	17.25 MJ/kg
– Upper calorific value of working fuel:	18.65 MJ/kg
– Moisture:	6.22 %
– Ash:	0.34 %
– Nitrogen:	0.31 %
– Hydrogen:	6.50 %
– Carbon:	50.75 %

10. Test conditions:

1. Installation of the device in a three-walled structure in accordance with the installation instructions – developed according to the requirements of BDS EN 16510-1:2023: p. A.2.2
2. Environment – according to the requirements of the standard
3. Operating modes set by the manufacturer:
 - A. Nominal: 10.0 kW
 - B. Thermal output at partial load: not applicable
4. Calculation of values: according to the formulas specified in A.6.2 of BDS EN 16510-1:2023
5. Measuring instruments used: listed in p. 21.

11. Recording environmental conditions – (03.02.2026)

Point from BDS EN 16510-1:2022	Indicator	Unit of measuremen t	Measured or calculated value	Limits	Conformity
A.1.1	Ambient temperature in the room	°C	21.8		Yes
A.1.2	Cross-draught	m/s	0.02	< 0.5	Yes

Point from BDS EN 16510-1:2022	Indicator	Unit of measurement	Measured or calculated value	Limits	Conformity
A.1.3	External sources	–	Missing		Yes
–	Barometric pressure	hPa	962		Yes

12. Performance test at nominal heat output, p. A.4.7 of BDS EN 16510-2-1:2023

Conditions for conducting the test	Name	Unit of measurement	Test 1	Test 2	Test 3	Average value
Combustion process						
Calculating the fuel to be refueled, f. A.2	<i>Ma</i>	<i>kg</i>	3.41	3.41	3.41	3.41
Test time		<i>min</i>	40	40	40	40
Fuel consumption	<i>Mh</i>	<i>kg</i>	2.28	2.28	2.28	2.28
Average flue draught		<i>Pa</i>	12	13	13	13
Measured values						
Measured O ₂ concentration	<i>O₂</i>	%	11.69	11.52	10.81	11.34
Measured CO ₂ concentration	<i>CO₂</i>	%	9.24	9.34	10.04	9.54
Measured CO concentration	<i>CO</i>	<i>mg/m³</i>	139	155	170	155
Ambient temperature	<i>Ta</i>	°C	20.9	21.7	22.7	21.8
Average flue gas temperature	<i>Tfg</i>	°C	130	132	139	133
Heat output of water – if applicable						
Outlet water temperature	<i>T1</i>	°C	–	–	–	–
Inlet water temperature	<i>T2</i>	°C	–	–	–	–
Temperature difference	<i>ΔTw</i>	°C	–	–	–	–
Water flow rate	<i>Φw</i>	<i>kg/h</i>	–	–	–	–
Measuring wall temperatures						
Maximum left wall temperature		°C	71.3	71.6	71.7	71.5
Maximum rear wall temperature		°C	71.1	71.2	71.7	71.3
Maximum floor temperature of the measuring angle		°C	69.9	70.0	70.4	70.1
Maximum temperature in front of the appliance		°C	52.1	52.2	52.4	52.2
Measurement of surface temperatures						
Maximum handle temperature 1		°C	48.7	48.9	49.0	48.9
Maximum handle temperature 2		°C	46.9	47.2	47.4	47.2
Maximum handle temperature 3		°C	–	–	–	–
Maximum fuel tank temperature		°C	32.3	32.4	32.9	32.5
Electricity consumption – if applicable						
Electricity consumption at nominal	<i>elmax</i>	<i>kW</i>	–	–	–	–

Conditions for conducting the test	Name	Unit of measurement	Test 1	Test 2	Test 3	Average value
mode						
Calculated results – according to Art. A6 “Calculation methods”						
Heat loss and efficiency						
Efficiency	η	%	90	90	90	90
Carbon content of the residue, relative to the amount of test fuel burned	Cr	%	0.27	0.27	0.27	0.27
Heat loss in flue gases						
Heat loss in flue gases relative to the unit mass of the fuel under test	Qa	kJ/kg	1607.02	1613.67	1591.84	1604.18
Proportion of specific heat losses in flue gases	qa	%	9.03	9.07	8.94	9.01
Heat loss due to combustible ingredients in the residue						
Chemical heat loss in flue gases relative to the unit mass of the test fuel	Qb	kJ/kg	14.35	15.83	16.15	15.45
Proportion of latent heat losses in flue gases Qb	qb	%	0.08	0.09	0.09	0.09
Energy efficiency for seasonal space heating						
Energy efficiency for seasonal space heating	η_s	%	80	80	80	80
Energy Efficiency Index (EEI)						
Energy Efficiency Index	EEI	–	121	121	121	121 – Class A+
Total heat output						
Total heat output	P	kW	10.2	10.2	10.2	10.2
Heat output of water						
Heat output of water	P_w	kW	–	–	–	–
Space heat output						
Space heat output	P_{sh}	kW	10.2	10.2	10.2	10.2
Flue gas mass flow rate						
Flue gas mass flow rate	$\Phi_{f,g}$	g/s	9.0	8.9	8.3	8.7
Specific thermal value of combustion products						
Specific heat of dry flue gases under standard conditions	$C_{p,fg}$	$kJ/K \cdot m^3$	1.34	1.34	1.35	1.34
Specific heat of water vapor	$C_{p,fgw}$	$kJ/K \cdot m^3$	1.51	1.51	1.51	1.51
Nitrogen oxide (NOx) content in flue gases						
Nitric oxide	NO_x	mg/m^3	174	170	161	168
Organic gaseous carbon (OGC) content in flue gases						
Organic gaseous carbon	OGC	mg/m^3	4	4	5	5
Dust (PM) content in flue gases						

Conditions for conducting the test	Name	Unit of measurement	Test 1	Test 2	Test 3	Average value
Measured dust concentration	PM	mg/m ³	18	19	19	18

13. Part load test – not applicable

14. Slow burning and recovery test – not applicable

15. Safety tests

15.1 Load-bearing capacity test – Meets the requirement regarding the technical data sheet

15.2 Temperature safety test for wood-burning appliances – not applicable

16. Pressure testing for water heaters – not applicable

17. Test for the functioning of the heat unloading device and the safety heat exchanger – not applicable

18. Appliance leak tightness tests – not applicable

19. Checked characteristics

Point from BDS EN 16510-2-1:2023	Name of the characteristic	Standard requirements	Result of the inspection	Requirements met (Yes/No)
p. 4.3	Carbon monoxide emissions at nominal and partial heat output	Table 2 at 13 % O ₂	Verified during device testing	Yes – done
p. 4.4	Nitrogen oxide emissions at nominal and partial heat output	Table 3 at 13 % O ₂	Verified during device testing	Yes – done
p. 4.5	Emissions of organic gaseous compounds at nominal and partial heat output	Table 4 at 13 % O ₂	Verified during device testing	Yes – done
p. 4.6	Particulate matter emissions at nominal and partial heat output	Table 5 at 13 % O ₂	Verified during device testing	Yes – done
p. 5.3	<i>Materials and structural elements – production documentation provided:</i>			
	The specification of the materials used in the construction of the appliance:	Cert. №	Certificates submitted in electronic form, stored in the file	Yes – done
	Heat exchanger in contact with fuel combustion:	min 4 mm	Measured	Not applicable
–	Input materials:	Lack of harmful materials	Verified; no harmful material inserted	Yes – done
p. 5.3.3	<i>If the appliance is equipped with a boiler or water heat exchanger, the following additional data must be provided:</i>			
–	the welding process used in the manufacture of the boiler body;	Weld symbols indicated	Verified	Not applicable
–	the maximum permissible operating water temperature, in °C;	– °C	 °C during testing	Not applicable
–	the maximum permissible operating pressure, in bar;	– bar	 bar verified during testing	Not applicable
–	the standard test pressure, in bar;	2 × P(work)	– bar	Not applicable
–	the thermal power of the water, in kW.	–	Obtained during testing	Not applicable

Point from BDS EN 16510-2-1:2023	Name of the characteristic	Standard requirements	Result of the inspection	Requirements met (Yes/No)
p. 5.4	<i>Risk of burning fuel falling out</i>			
	When opening the loading door, it is not permissible to:	<i>Flue gas leakage; Falling out of embers</i>	<i>Verified when tested</i>	Yes – done
	Ember holding device:	<i>Mounted fire strips</i>	<i>Verified when tested</i>	Not applicable
p. 5.5	<i>Increasing the temperature in the fuel storage:</i>			
	does not exceed the ambient temperature in the room by more than 65 K	$t_{ok} + 65 = 86.8\text{ }^{\circ}\text{C}$	<i>Measured $t = 32.5\text{ }^{\circ}\text{C}$</i>	Not applicable
p. 5.6	<i>Temperature increase of operating components</i>			
	temperatures measured only in the areas that are touched must not exceed	<i>for metal (handle): $t_{ok} + 35 = 56.8\text{ }^{\circ}\text{C}$</i>	<i>Measured $t = 48.9\text{ }^{\circ}\text{C}$</i>	Yes – done
p. 5.8.1	Cleaning heating surfaces:	–	<i>Easy cleaning</i>	Yes – done
p. 5.8.3	Ashtray volume:	<i>0.3 dm³ per kW</i>	<i>Verified</i>	Yes – done
–	Manipulation with the ashtray	<i>Quick and easy</i>	<i>Verified when tested</i>	Yes – done
	Primary combustion air control device	<i>Register</i>	<i>Verified</i>	Yes – done
p. 4.4.19	<i>Oven door of cookers acc. to EN 16510-1:2023</i>			
	Opening angle:	$\geq 90^{\circ}$	<i>Measured —</i>	Not applicable

Declaration: IL declares that the verified essential characteristics with regard to:

- The requirements for materials, design and construction are fulfilled in accordance with the requirements of the standard and are supported by actual measured values and accompanying documentation (drawings and certificates);
- Definitions in the operating instructions for the loading interval at nominal heat output cover the requirement for combustion during the entire test period at nominal heat output;
- Thermal gloves are required for handling a heated ashtray during cleaning (specified in the instructions);
- The accompanying documentation (installation and operation instructions) meets the requirements of the standard;
- The safety requirements specified in point 5 are met and the appliance is not risky;
- The accompanying documentation (installation and operation instructions for protective equipment) meets point 7 of the standard.

20. Measurement equipment

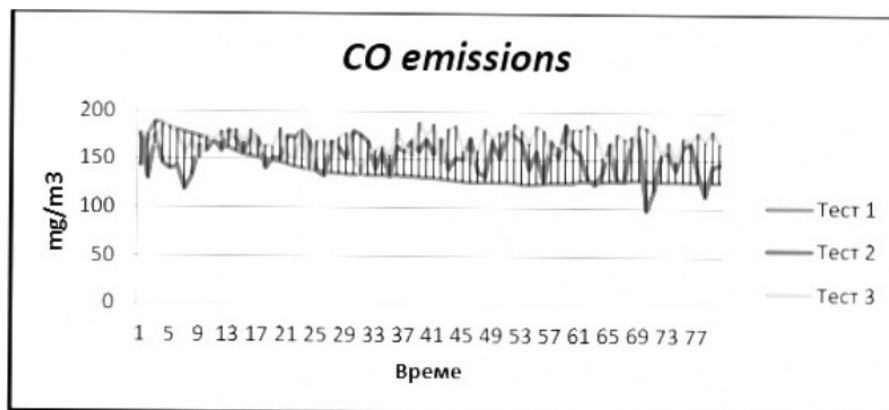
№	Name, type, manufacturer	Latest calibration certificate, № / date, issued by
1.	Electronic scale, type B600P	№ 02-M-550/13.10.2025, “Kalibra-Bulgaria”
2.	Electronic scale DE 60K1DL, KERN – Germany	№ 02-M-583/23.08.2024, “KALIBRA – BULGARIA” OOD
3.	Digital pressure gauge, type Testo 512, TESTO AG – Germany	№ 0670/24.04.2023, “UNISIST” OOD

№	Name, type, manufacturer	Latest calibration certificate, № / date, issued by
4.	Air speed meter Testo 405 V1	№ 19280/24.04.2023, "TOTAL TEST"
5.	Steel measuring tape, class II	№ 0194-D-02/22.02.2023, "Kalabsi" OOD, Sofia
6.	Digital thermometer Testo 922, Germany	№ 21113/23.01.2025, "Total Test" OOD
7.	Electronic stopwatch 696, Hong Kong	№ 027-IVCh/27.03.2025, BIM GD NCM
8.	Infrared thermometer	№ 21156/04.02.2025, "Total Test" OOD
9.	Gas analysis appliance "MRU AIR MC APRIME Q", serial № 064802, Germany, Type 400GD	Factory calibration certificate / 30.04.2024, "MRU GmbH, Fuchshalde"
10.	Dry sterilizer Ditem, № 0911/2016; Digital thermometer, type 4001, range 0 °C to 250 °C	№ 2021 of 21.10.2025, "UNISIST" OOD, Sofia
11.	Electronic analytical scale, 82 g, 0.1 mg, Type ABS 80-4N, № S.N. WB16AN0052	№ 0-2-M-549/13.10.2025, KALIBRA BULGARIA OOD, Sofia
12.	Digital thermohygrometer Testo-608 H1, № 30115603, Germany	№ 19646/10.08.2023, "Total Test" OOD, Sofia
13.	Digital barometer, type Testo 511 – ser. № 39112944601	№ 1291/30.06.2025, "UNISIST" OOD, Sofia
14.	Flowmeter for air with built-in aspirator, type LIFETEK55XP-P, № 55057	№ 1270/18.07.2025, "HIGITEST" OOD, Sofia

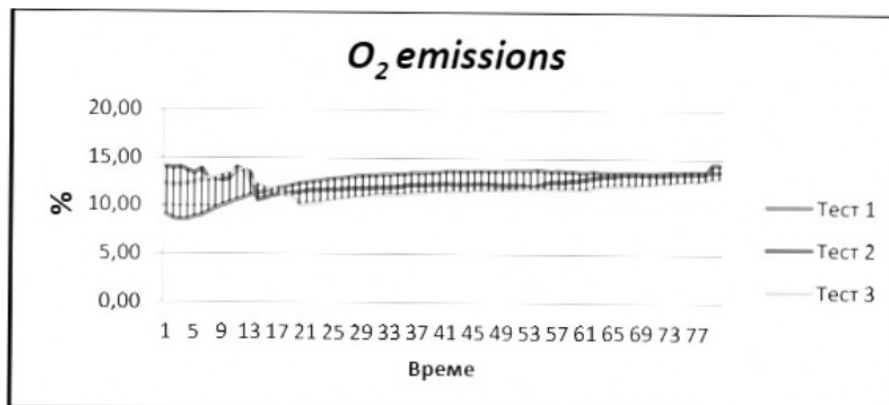
21. Graphical presentation of the results

21.1. Graphical representation of the test results at rated power

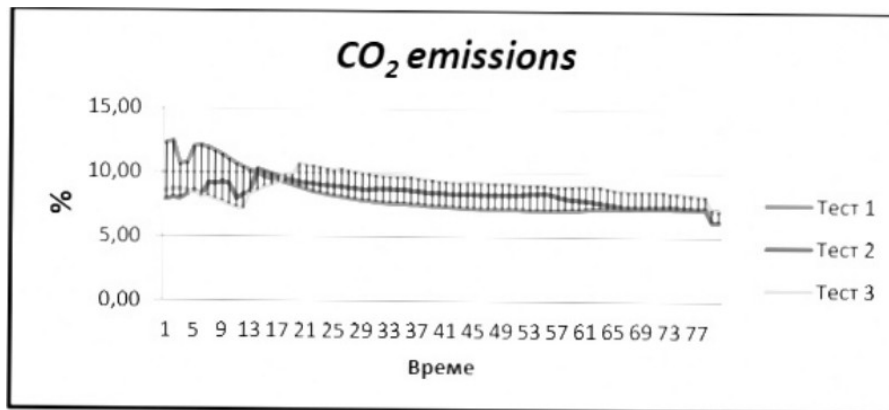
21.1.1. CO emissions:



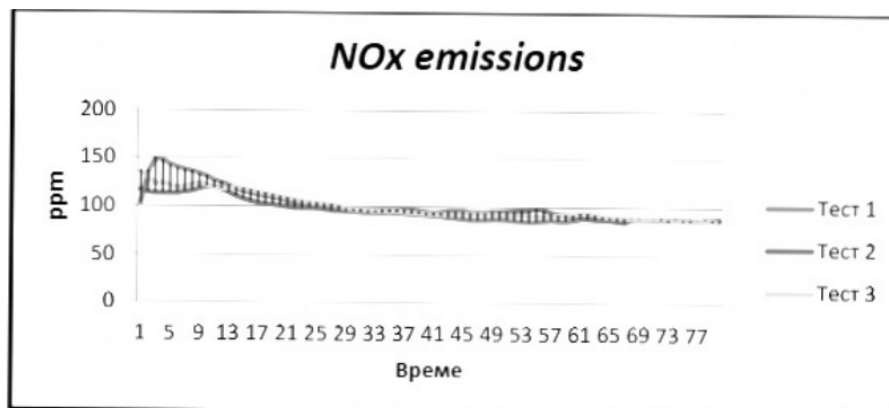
21.1.2. O₂ emissions:



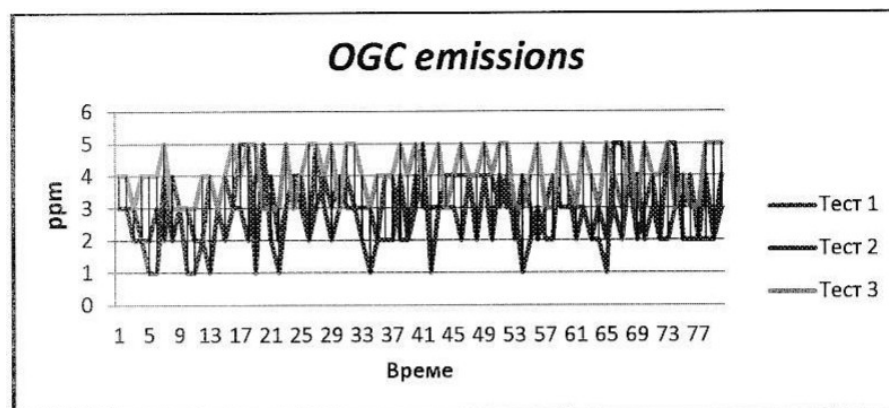
21.1.3. CO₂ emissions:



21.1.4. NO_x emissions:



21.1.5. OGC emissions:



CONCLUSION

HEATING APPLIANCE "SAPPHIRE" MEETS THE REQUIREMENTS OF BDS EN 16510-2-1:2023 for the tested/verified parameters.

Comments: 1. The test results refer only to the test specimen.

2. Extracts from the test report may not be prepared and distributed without the written consent of the testing laboratory.

Date: 04.02.2026

TESTED BY:

Dipl. eng. Tihomir Genov

VERIFIED BY:

Dipl. eng. Nayden Evtimov

HEAD OF THE LABORATORY:

Dipl. eng. Raycho Sahatchiev

(Signatures and laboratory stamp appear in the original bilingual report. Photograph and emission charts above are reproduced from the original scanned report.)