



Testing Laboratory 1045.1

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ČSN EN ISO/IEC 17025:2005

Strojírenský zkušební ústav, s.p. Testing Laboratory, Hudcova 424/56b, 621 00 Brno
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TEST REPORT

39-11540-T-7

Product: Wood stove

Type designation: OVAL Ecodesign

Customer: PANADERO DENIA, S.L.
Poligono Industrial Campollano
AVDA.5a, No 13-15, 02007 Albacete
Spain

Manufacturer: PANADERO DENIA, S.L.
Poligono Industrial Campollano
AVDA.5a, No 13-15, 02007 Albacete
Spain

Employee responsible: Milan Holomek

Report issue date: 2018-07-20

Distribution list: 1 copy to the Customer
1 copy to the Engineering Test Institute



The Engineering Test Institute, Public Enterprise, (hereinafter referred to as SZU in Brno) performed the activity based on these documents:

- Order B-62208 of 2018-06-07
- Contract : B-62208/39 of 2018-06-13
- Amendment No 1 to Contract B-62208/39 of 2018-07-26

I. Product description

The wood stoves OVAL Ecodesign (another acceptable version of OVAL 1 STONE Ecodesign, OVAL 3 STONE Ecodesign, EPSILON Ecodesign) are made of steel sheets. Wood is recommended as fuel. They are designed to heat living rooms in houses, cottages, country houses or cottages. The stoves are equipped with primary and secondary combustion air control, glazed door, cast iron grill, pit with ashtray.

A detailed description is provided in the Installation and Operation Instructions, which form an integral part of the source materials.

Basic technical specifications of the wood stove

(Table 1)

| Type | Main dimensions (mm) | | | Heat output (kW) | Fuel consumption (kg/h) | Diameter of flue gas connector (mm) | Operating draught (Pa) |
|----------------|----------------------|-------|-------|------------------|-------------------------|-------------------------------------|------------------------|
| | Height | Width | Depth | | | | |
| OVAL Ecodesign | 1008 | 605 | 490 | 8,7 | 2,8 | 150 | 12 |

II. Sample tested

Visual inspection and tests were performed on the sample mentioned in the table below:

(Table 2)

| Typ | Date | Sample Reg. No. |
|----------------|------------|------------------|
| OVAL Ecodesign | 2018-06-18 | 215.18.18027.006 |

The visual inspection, testing and evaluation of the product and technical documentation were conducted at the test station of the Engineering Test Institute in Brno in 2018-06-18 by Ing. Radek Machara.

The tests were conducted using measuring and test equipment with valid calibration



III. Measuring and test equipment:

| No. | Description | Inventory number: | Calibration valid until: |
|-----|---|-------------------|--------------------------|
| 1. | Barometer | 112541 | 01.2019 |
| 2. | Thermometer – ambient | 117044 | 02.2022 |
| 3. | Hygrometer | 117044 | 02.2022 |
| 4. | Draught gauge | MaR08_Tah | 06.2019 |
| 5. | Scale | 022151 | 02.2019 |
| 6. | THERM 5500-3 | 021990 | 02.2019 |
| 7. | Analytical scale | 021458 | 04.2019 |
| 8. | Calliper | 115884 | 10.2019 |
| 9. | Combustion product analyser, HORIBA ENDA – 680P | 022305 | x |
| 10. | Elemental analyser, PE 2400 CHNS | 022107 | |
| 11. | Gravimat SHC 5 - TU | 022328 | |
| 12. | Kit of temperature measurement | 022399-A_T | 11.2020 |

(Table 3)

Note:

× ... Verified with use of calibration standards prior to measurement

+ ... ± 5 % of the measured values

Measurement uncertainty:

(Table 4)

| Parameter measured | Uncertainty of measurement |
|--------------------|----------------------------|
| Gas analysis | |
| CO | ≤ 6% of the measured value |
| CO ₂ | ≤ 2% of the measured value |
| Temperature | |
| Flue gas | ≤ 5 K |
| Ambient room | ≤ 1.5 K |
| Surface | ≤ 2 K |
| Touchable areas | ≤ 2 K |
| Mass | |
| Fuel consumption | ± 20 g |
| Residue | ± 5 g |
| Fuel load ≤ 7.5 kg | ± 5 g |
| > 7.5 kg | ± 10 g |

"The stated extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient, $k=2$, corresponding to the coverage certainty of 95% as regards standard classification. The uncertainties do not reflect the impact of sample taking and lack of homogeneity. The standard uncertainty was determined in accordance with Document EA 4/02."



Verified requirement: **Structural safety**

Requirement specification: ČSN EN 13240/A2:2005 Art. 4.2.1 + 4.2.12

Test sample: OVAL Ecodesign

Test results: See the Table below

| Required product properties | Requirement specification | Result of evaluation | Note |
|--|---------------------------|----------------------|---------|
| Flue gases exhaust branch The flue gases exhaust branch in horizontal flue connections must be designed so that it can be inserted at a minimum distance of 40 mm. The minimum overlap in vertical flue duct connections is 25 mm. NOTE In built-in devices (designed for fireplace recesses), with a vertical chimney connection, and if the manufacturer's installation manual requires that insulation cement filling is applied around the connection in order to seal off the device and the chimney, the overlap for flue gases product exhaust may be shortened to a minimum of 6 mm. | 4.2.4 | + | > 25 mm |
| Flue gases product ducts The smallest dimension of the flue gases duct must be 30 mm except when it is permitted to reduce the duct to a minimum of 15 mm in appliances designed to burn only fuel other than black coal and peat briquettes, and when access openings for cleaning the flue gases ducts are provided. It must be possible to clean the flue gases ducts of the appliance completely, using readily available tools or brushes unless the manufacturer of the appliance has delivered service cleaning tools or brushes. | 4.2.5 | + | > 30 mm |
| Flue gases flow regulation If an exhaust damper is used, it must be of a design preventing the closing of the entire flue section. The exhaust damper must be easy to regulate, and must feature an opening of at least 20 sq cm or 3% of its cross-section area, whichever is greater. The setting of the position of the exhaust damper must be evident to the operator. If a draught stabilizer is used, the requirement for the smallest cross-section does not necessarily apply, but the equipment must be easily accessible for cleaning. | 4.2.9 | 0 | |

*) Test result:

+.... Requirement fulfilled

0.... Requirement not applicable to the product in question



Accredited test number and title: T 004
T 005 **Test of residential solid fuel burning appliances – Roomheaters**
Test of heat output
Test of flue gas composition

Test method: ČSN EN 13240/A2:2005 Art. A1-A6, FprEN 16510-1 Annexes A-I, FprEN 16510-2-1 Annexes A-I

Sample tested: OVAL Ecodesign

Measuring equipment used: Nos. 1 ÷ 12 – Measuring and test equipment

Test results: OVAL Ecodesign

| | | | | |
|-------------------|--|--|--|------------------|
| Date of testing: | 2018-06-18 | $t_{ok} = 29$ °C | r.v. = 34 % | $p_a = 98,8$ kPa |
| Place of testing: | At SZU <input checked="" type="checkbox"/> | At Manufacturer's <input type="checkbox"/> | At Customer's <input type="checkbox"/> | Other: |

| Variables measured and calculated: Rated capacity | Unit | Tests | | | Limit according to: | | | | |
|--|--------------------|--------|--------|--------|---------------------|----------|----------|----------|---------------------|
| | | 1 | 2 | 3 | Average | EN 13240 | 15a B-VG | DIN plus | I.BImSch hV Stufe 2 |
| Fuel used: beech wood | mm | 250 | | | | | | | |
| Combustion air setting – primary/secondary | % | 80/-/- | | | | | | | |
| Fuel consumption | kg/hour | 1,89 | 1,90 | 1,91 | 1,90 | | | | |
| Achieved input | kW | 8,11 | 8,15 | 8,21 | 8,15 | | | | |
| Ambient temperature in the room and combustion air temperature | °C | 28 | 29 | 29 | 29 | | | | |
| Chimney draught | Pa | 13 | 12 | 12 | 12 | | | | |
| Combustion product average temperature | °C | 248 | 280 | 288 | 272 | | | | |
| CO ₂ | % | 9,39 | 10,81 | 11,05 | 10,42 | | | | |
| CO – measured | % | 0,0395 | 0,0355 | 0,0607 | 0,0452 | | | | |
| CO – at O ₂ = 13% | % | 0,0322 | 0,0256 | 0,0424 | 0,0334 | ≤ 1,0 | | | |
| CO – at O ₂ = 13% | mg/Nm ³ | 402 | 320 | 530 | 417 | | | ≤ 1500 | ≤ 1250 |
| CO – at O ₂ = 0% | mg/MJ | 278 | 221 | 367 | 289 | | ≤ 1100 | | |
| NO _x – measured | ppm | 73 | 68 | 67 | 69 | | | | |
| NO _x – at O ₂ = 13 % | mg/Nm ³ | 121 | 101 | 97 | 106 | | | ≤ 200 | |
| NO _x – at O ₂ = 0% | mg/MJ | 84 | 70 | 67 | 74 | | ≤ 150 | | |
| OGC – measured | ppm | 33 | 27 | 40 | 34 | | | | |
| OGC – at O ₂ = 13 % | mg/Nm ³ | 49 | 35 | 51 | 45 | | | ≤ 120 | |
| OGC – at O ₂ = 0% | mg/MJ | 34 | 25 | 35 | 31 | | ≤ 50 | | |
| Chimney loss | % | 18,1 | 18,7 | 18,8 | 18,5 | | | | |
| Loss of gas underburning | % | 0,3 | 0,2 | 0,4 | 0,3 | | | | |
| Loss of solid underburning | % | 0,5 | 0,5 | 0,5 | 0,5 | | | | |
| Efficiency | % | 81,1 | 80,6 | 80,4 | 80,7 | ≥ 60 | ≥ 80 | ≥ 75 | ≥ 73 |
| Total heat capacity achieved | kW | 9,3 | 9,8 | 9,7 | 9,6 | | | | |
| Uncertainty of total heat | | 0,3 | 0,3 | 0,3 | 0,3 | | | | |
| Nominal capacity | kW | 8,7 | | | | | | | |
| Mass flow rate of dry combustion products | g/s | 8,5 | 7,8 | 7,6 | 8,0 | | | | |

| | | | | | | | | | |
|---------------------------------|--------------------|------|-------|-------|-------|--|------|------|------|
| CO ₂ | % | 9,00 | 10,88 | 10,89 | 10,26 | | | | |
| Dust – measured | mg/Nm ³ | 28 | 38 | 44 | 37 | | | | |
| Dust – at O ₂ = 13 % | mg/Nm ³ | 24 | 27 | 31 | 27 | | | ≤ 75 | ≤ 40 |
| Dust – at O ₂ = 0% | mg/MJ | 16 | 19 | 21 | 19 | | ≤ 35 | | |



Fuel analysis: OVAL Ecodesign

| Type of fuel | Beech wood | | | |
|-------------------------------|------------|---------------|-------|-------------|
| Analytical indicator | Symbol | Unit | Value | Uncertainty |
| Net calorific value | Q_i | [MJ/kg] | 15,18 | 0,14 |
| Total water in original state | W_t^r | [% of mass] | 12,13 | 0,02 |
| Ash | A | [% of mass] | 0,23 | 0,04 |
| Carbon | C | [% of mass] | 43,32 | 0,25 |
| Hydrogen | H | [% of mass] | 5,91 | 0,1 |

Note: Sample in original condition

Accredited test number and title: T 004 Test of residential solid fuel burning appliances - Roomheaters
T 005 Adjustability test

Test method: ČSN EN 13240/A2:2005 Art. A1-A6, FprEN 16510-1 Annexes A-I, FprEN 16510-2-1 Annexes A-I

Sample tested: OVAL Ecodesign

Measuring equipment: Nos. 1 ÷ 7, 12 see Table – Measuring and test equipment

Test results: OVAL Ecodesign

| | | | | | | | | | | |
|---|--|---|---------------------|--|--------------------------|-----------------|------------------|--------------------------|--------|--|
| Date of testing: 2018-06-18 | | | $t_{ok} = 29$ °C | | r.v. =34 % | | $p_a = 98,8$ kPa | | | |
| Place of testing: at the Engineering Test Institute | | <input checked="" type="checkbox"/> | at the manufacturer | | <input type="checkbox"/> | at the customer | | <input type="checkbox"/> | other: | |
| Variables measured and calculated | | | Unit | | Value | | Limit | | Note | |
| Fuel used: beech wood | | | mm | | 250 | | | | | |
| Fuel consumption | | | kg/hour | | 0,93 | | | | | |
| Heat input achieved | | | kW | | 3,2 | | | | | |
| Room and combustion air temperature | | | °C | | 29 | | | | | |
| Chimney draught | | | Pa | | 6 | | 6 ± 1 Pa | | | |
| Average combustion product temperature | | | °C | | 211 | | | | | |
| Period of burning | | | min | | 34 | | | | | |
| Combustion process restoration, after (time) | | | min | | to 4 | | ≤20 | | | |
| Note: | | The power consumption of the device is adjustable in the range of 33 to 100%. | | | | | | | | |



Accredited test number and title: T 004 Test of residential solid fuel burning appliances – Roomheaters
T 005 Flue gas temperature and surface temperature test

Test method: ČSN EN 13240/A2:2005 Art. A1-A6, FprEN 16510-1 Annexes A-I, FprEN 16510-2-1 Annexes A-I

Sample tested: OVAL Ecodesign

Measuring equipment: Nos. 1 ÷ 3, 7, 12 – Measuring and test equipment

Test results: OVAL Ecodesign

| | | | | | | | |
|-------------------|---|--|----|--|---|--------------|-----|
| Date of testing: | 2018-06-18 | $t_{ok} = 29$ | °C | r.v. = 34 | % | $p_a = 98,8$ | kPa |
| Place of testing: | at the Engineering Test Institute <input checked="" type="checkbox"/> | at the manufacturer <input type="checkbox"/> | | at the customer <input type="checkbox"/> | | other: | |

| Measured element | Material | Warming (K) | |
|------------------------|----------|-------------|-------|
| | | Measured | Limit |
| The handle of door | metal | 44*) | 35 |
| Regulator of total air | metal | 65*) | 35 |

| | | | |
|---|----|-----|---|
| Average flue gas temperature after spigot | °C | 325 | - |
|---|----|-----|---|

NOTE: *)... Protective glove ("cold hand") is supplied for manipulation with control elements.
The table shows the highest measured values.



Accredited test number and title:

**T 004
T 005**

**Test of residential solid fuel burning appliances –
Roomheaters
Thermal overload test – Temperature rise of the surrounding
flammable materials**

Test method:

ČSN EN 13240/A2:2005 Art. A1-A6, FprEN 16510-1 Annexes A-I, FprEN 16510-2-1 Annexes A-I

Sample tested:

OVAL Ecodesign

Measuring equipment used: Nos. 1 ÷ 6, 12 – see Measuring and Test Equipment, Table 3

Test results:

OVAL Ecodesign

| | | | | |
|-------------------|---|--|--|---------------------------------|
| Date of testing: | 2018-06-18 | $t_{ok} = 29$ °C | r.v. =34 % | $p_a = 98,8$ kPa |
| Place of testing: | at the Engineering Test Institute <input checked="" type="checkbox"/> | at the manufacturer <input type="checkbox"/> | at the customer <input type="checkbox"/> | other: <input type="checkbox"/> |

During nominal output test (A.4.7)

| During nominal output test (A.4.7) | | | | | | | | | |
|------------------------------------|---------------|--------------|--------------------------|-----|-----|-----|-----------------|-------|------------------|
| Test no. | Ambient temp. | Flue draught | Maximum temperature rise | | | | | | Quantity of fuel |
| | | | Trihedron – distance | | | | Floor protector | Limit | |
| | | | mm | | | | | | |
| | | | 400 | 400 | 800 | 800 | | | |
| - | °C | Pa | K | | | | | | kg/h |
| 1 | 29 | 12 | 58 | 58 | 53 | 55 | 57 | 65 | 2,8 |

During thermal overload test (A.4.9.2)

| During thermal overload test (A.4.3.2) | | | | | | | | | |
|--|---------------|--------------|--------------------------|-----|-----|-----|-----------------|-------|------------------|
| Test no. | Ambient temp. | Flue draught | Maximum temperature rise | | | | | | Quantity of fuel |
| | | | Trihedron – distance | | | | Floor protector | Limit | |
| | | | mm | | | | | | |
| | | | 400 | 400 | 800 | 800 | | | |
| - | °C | Pa | K | | | | | | kg |
| 1 | 29 | 15 | 60 | 61 | 55 | 58 | 60 | 65 | 3,0 |

NOTE: Trihedron placed 400 mm away from the appliance rear wall.
Trihedron placed 400 mm away from the appliance side wall.
Trihedron placed 800 mm away from the appliance front wall.
Trihedron placed 800 mm above the appliance.

The tables show the highest measured values.

After the thermal overload test, no permanent deformation or damage to the appliance was detected.

Tested by: Ing. Radek Machara

Date: 2018-06-18

Signed:

Reviewed by: Ing. Jiří Dvořák

Date: 2018-06-18

Signed:



IV. List of referenced documentation

- Order B-62208 of 2018-06-07
- Contract : B-62208/39 of 2018-06-13
- Amendment No 1 to Contract B-62208/39 of 2018-07-26
- Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC
- ČSN EN 13240:2002/A2:2005 – Roomheaters fired by solid fuel – Requirements and test methods

Report compiled by: Ing. Radek Machara

Person accountable for correctness of the Report:

Milan Holomek
Head of Heat and Environment-Friendly
Equipment Test Station

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