



Testing Laboratory 1045.1

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

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**TEST REPORT
30-14948/2/T**

Product: SOLID FUEL FURNACE (Wood)

Type designation Arina

Customer: IKL Industrijski kombinat livnica d.o.o. Guča
Albanske Spomenice bb
32230 Guča
SERBIA
ID: 21277207

Manufacturer: IKL Industrijski kombinat livnica d.o.o. Guča
Albanske Spomenice bb
32230 Guča
SERBIA

Employee responsible: Milan Holomek

Report issue date: 2020-09-29

Distribution list: 1 copy to the Engineering Test Institute (SZU)
1 copy to the Customer

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The tests were performed based on these documents:

- Order B-69415 of 2020-03-10 (Order reg. no. B-69415 delivered on 2020-03-23)
- Contract B-69415/30
- Amendment B-19415.D1 of 2020-09-29

I. Description of product tested

Solid fuel furnace Arina is intended for heating and supplemental heating of dwelling and community rooms. The air in a room is warmed up mainly by convection heat and partly by radiant heat. The solid fuel furnaces are made of ceramic and cast iron parts. The fire door is glazed with a special glass. Cast-iron bottom grate is fixed and there is also an ashpan. Regulation of primary air is in lower part of the door. Secondary air supply is regulated with a lever above the door. 120 mm diameter flue spigot is at the top.

Detailed description is provided in the Instructions for installation and operation which forms integral part of source materials.

According to ČSN EN 13240/A2 Table 1 – Categorisation of appliances, the product is of category 1a.

Basic technical data of the solid fuel furnace

(Table 1)

| Type | Main dimensions (mm) | | | Nominal output (kW) | Fuel consumption (kg/h) (wood) | Diameter of flue gas connector (mm) | Operating draught (Pa) |
|-------|----------------------|-------|-------|---------------------|--------------------------------|-------------------------------------|------------------------|
| | Height | Width | Depth | | | | |
| Arina | 773 | 480 | 451 | 6.5 | 1.9 | 120 | 11 |

II. Sample tested

(Table 2)

| Reg. No. SZU | Product | Date of submission |
|-------------------|---------|--------------------|
| 0215.20.33000.001 | Arina | 2020-07-01 |

The visual inspection, tests and verification were carried out by Josef Duchan at the test station of SZU in 07/2020.

The tests were carried out with the use of validly calibrated measuring and test equipment.



III. Measuring and test equipment:

(Table 3)

| No. | Description | Inventory number | Calibration valid until: |
|-----|--|------------------|--------------------------|
| 1. | Barometer | 022435/P2 | 04.2022 |
| 2. | Thermometer – ambient (Testo 608-H) | 117044 | 02.2022 |
| 3. | Hygrometer (Testo 608-H) | 117044 | 02.2022 |
| 4. | Differential pressure and air velocity transmitter, MS-121-LCD | MaR09_Tah | 06.2021 |
| 5. | Ramp scale, PUA574-E600 | 022332 | 02.2021 |
| 6. | THERM 2285-2 | 021763 | 04.2022 |
| 7. | Calliper | 115884 | 10.2020 |
| 8. | Analytical scale, SARTORIUS | 021458 | 12.2020 |
| 9. | Combustion product analyser, HORIBA ENDA – 680P | 022305 | x |
| 10. | Elemental analyser, PE 2400 CHNS | 022107 | |
| 11. | Gravimat SHC 5 - TU | 022328 | |
| 12. | Kit for measurement of temperature | 022399-B/8 | 11/2020 |

Note:

- x ... Verified with calibration standards prior to measurement
- + ... ± 5 % of the measured values

Measurement uncertainty:

(Table 4)

| Parameter measured | Uncertainty of measurement |
|-------------------------|----------------------------------|
| Gas analysis | |
| CO | $\leq 6\%$ of the measured value |
| CO ₂ | $\leq 2\%$ 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 |
| Fuel load > 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.



Requirement verified: **Structural safety**

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

Test sample: SOLID FUEL FURNACE Arina

Test results: See the Table below

| Required product properties | Requirement specification | Test result | Note |
|--|---------------------------|-------------|-----------------|
| ČSN EN 13240/A2:2005 Art.: | | | |
| <p>Flue spigot or socket For horizontal flue connection, the flue spigot/socket shall be designed to allow fitting, internal or external, over a length of at least 40 mm, of a flue gas connector. For vertical flue connection, the fitting shall overlap by at least 25 mm. NOTE For inset appliances (made for fireplace recesses) with a vertical chimney flue connection and where the manufacturer's installation instructions specify, in addition to the flue gas connector, that an insulating mortar infill should be added around the connector to seal the appliance to the chimney flue, then in this case it is permissible for the flue spigot/socket overlap to be reduced to a minimum of 6 mm.</p> | 4.2.4 | + | Top, ø120 mm |
| <p>Flueways The size of the flueway in its minimum dimension shall be not less than 30 mm except it shall be permissible to reduce it to not less than 15 mm for appliances designed only to burn fuels other than bituminous coals and peat briquettes, and where an access door(s) is provided for cleaning the flueway. It shall be possible to clean the flueways of the appliance completely using commercially available tools or brushes, unless special tools or brushes are provided by the appliance manufacturer.</p> | 4.2.5 | + | > 30 mm |
| <p>Control of flue gas If a flue damper is fitted it shall be of a type, which does not block the flue totally. The damper shall be easy to operate and incorporate an aperture within the blade, which in a continuous area occupies at least 20 cm² or 3 % of the cross-sectional area of the blade if this is greater. The position of the damper shall be recognizable from the setting of the device. If a draught regulator is fitted the minimum cross sectional area requirement shall not be applicable but the device shall be easily accessible for cleaning.</p> | 4.2.9 | + | |

*) Evaluation result:

+... Requirement fulfilled

0... Not applicable to the product in question



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

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

Sample tested: SOLID FUEL FURNACE Arina
Measuring equipment used: Nos 1 ÷ 12 – Measuring and test equipment

Test results: SOLID FUEL FURNACE Arina

| | | | | | | | | |
|--|--|---|--------|--------|---|---------------------------|--------|--------------------|
| Date of testing: | 2020-07-08 | t _{ok} = See tab. °C | | | r.v. = 36 % | p _a = 98.3 kPa | | |
| Place of testing: | At SZU <input checked="" type="checkbox"/> | At the Manufacturer's premises <input type="checkbox"/> | | | At the Customer's premises <input type="checkbox"/> | | Other: | |
| Values measured and calculated: Nominal output | Unit | | | | | Limit acc. to | | |
| | | 1 | 2 | 3 | Average | EN 13240 | DIN+ | I. BImSchV Stufe 2 |
| Fuel used: Beech wood | mm | 250 | | | | | | |
| Combustion air setting – primary/secondary | % | 0/50 | | | | | | |
| Mass of the test fuel fired hourly | kg/h | 1.91 | 1.95 | 1.87 | 1.91 | | | |
| Input attained | kW | 8.1 | 8.3 | 8.0 | 8.1 | | | |
| Combustion air temperature | °C | 30 | 29 | 30 | 30 | | | |
| Flue draught | Pa | 11 | 11 | 11 | 11 | | | |
| Average flue gas temperature | °C | 282 | 261 | 262 | 268 | | | |
| CO ₂ | % | 10.04 | 9.53 | 9.06 | 9.54 | | | |
| CO – measured | % | 0.1513 | 0.0857 | 0.0822 | 0.1064 | | | |
| CO – at O ₂ = 13 % | % | 0.1058 | 0.0647 | 0.0651 | 0.0785 | ≤1.0 | | |
| CO – at O ₂ = 13 % | mg/Nm ³ | 1323 | 809 | 814 | 982 | | ≤1500 | ≤ 1250 |
| CO – at O ₂ = 0 % | mg/MJ | 864 | 528 | 532 | 641 | | | |
| NO _x – measured | mg/Nm ³ | 69 | 61 | 63 | 64 | | | |
| NO _x – at O ₂ = 13 % | mg/Nm ³ | 98 | 95 | 103 | 99 | | ≤200 | |
| NO _x – at O ₂ = 0 % | mg/MJ | 64 | 62 | 67 | 64 | | | |
| OGC – measured | ppm | 86 | 42 | 40 | 56 | | | |
| OGC – at O ₂ = 13 % | mg/Nm ³ | 109 | 57 | 57 | 74 | | ≤ 120 | |
| OGC – at O ₂ = 0 % | mg/MJ | 71 | 37 | 37 | 48 | | | |
| Chimney loss | % | 19.0 | 18.3 | 19.1 | 18.8 | | | |
| Proportion of losses through latent heat in flue gases | % | 1.0 | 0.6 | 0.6 | 0.7 | | | |
| Proportion of losses through combustible constituents in the residue | % | 0.5 | 0.5 | 0.5 | 0.5 | | | |
| Efficiency | % | 79.5 | 80.6 | 79.8 | 80.0 | ≥50 | ≥ 75 | ≥ 75 |
| Total heat output attained | kW | 6.5 | 6.7 | 6.4 | 6.5 | | | |
| Heat output uncertainty | kW | 0.2 | 0.2 | 0.2 | 0.2 | | | |
| Water heat output | kW | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| Nominal heat output | kW | 6.5 | | | | | | |
| Dry flue gases mass flow | g/s | 5.4 | 5.8 | 5.9 | 5.7 | | | |
| CO ₂ | % | 10.16 | 10.07 | 9.29 | 9.84 | | | |
| Dust – measured | mg/Nm ³ | 54 | 48 | 43 | 48 | | | |
| Dust – at O ₂ = 13 % | mg/Nm ³ | 37 | 34 | 34 | 35 | | ≤ 75 | ≤ 40 |
| Dust – at O ₂ = 0 % | mg/MJ | 25 | 24 | 22 | 24 | | | |



Fuel analysis

| Type of fuel | Beech wood | | |
|-------------------------------|------------|---------------|-------|
| Analytical indicator | Symbol | Unit | Value |
| Carbon | C | [% of mass] | 41.73 |
| Hydrogen | H | [% of mass] | 5.60 |
| Total water in original state | W'_t | [% of mass] | 12.04 |
| Ash | A | [% of mass] | 0.38 |
| Net calorific value | Q_j | [kJ/kg] | 15360 |

Note: Sample in original state

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, ČSN EN 16510-1 Annexes A-I, FprEN 16510-2-1 Annexes A-I

Sample tested: SOLID FUEL FURNACE Arina

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

Test results: SOLID FUEL FURNACE Arina

| | | | | | | | |
|---|--|---|--------------|---|-------------|--------------|-----|
| Date of testing: | 2020-07-08 | $t_{ok} =$ See tab. | °C | r.v. = 36 | % | $p_a = 98.3$ | kPa |
| Place of testing: | At SZU <input checked="" type="checkbox"/> | At the Manufacturer's premises <input type="checkbox"/> | | At the Customer's premises <input type="checkbox"/> | | Other: | |
| Values measured and calculated | | Unit | Value | Limit | Note | | |
| Fuel used: Hard firewood | | mm | 250 | | | | |
| Mass of the test fuel fired hourly | | kg/h | 0.7 | | | | |
| Heat input attained | | kW | 3.0 | | | | |
| Ambient room temperature and combustion air temperature | | °C | 29 | | | | |
| Flue draught | | Pa | 6 | 6 ± 1 Pa | | | |
| Average flue gas temperature | | °C | 217 | | | | |
| Combustion period | | min | 35 | | | | |
| Recovery capability, after time | | min | within 2 | ≤ 20 | | | |

Note: The appliance input is adjustable within the range of 33-100 %



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, ČSN EN 16510-1 Annexes A-I, FprEN 16510-2-1 Annexes A-I

Sample tested: SOLID FUEL FURNACE Arina

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

Test results: SOLID FUEL FURNACE Arina

| | | | | | | | |
|---|--|--------------------------------|--------------------------|----------------------------|-----------------------------|--------------|-----|
| Date of testing: | 2020-07-08 | $t_{ok} =$ See tab. | °C | r.v. = 36 | % | $p_a = 98.3$ | kPa |
| Place of testing: | At SZU <input checked="" type="checkbox"/> | At the Manufacturer's premises | <input type="checkbox"/> | At the Customer's premises | <input type="checkbox"/> | Other: | |
| Measured point | Material | Temperature rise (K) | | Measured | Limit acc. to ČSN EN | | |
| | | Door handle | Metal | 51*) | 35 | | |
| Primary air lever | 71*) | | | | | | |
| Secondary air lever | 91*) | | | | | | |
| Average flue gas temperature after spigot | | °C | 305 | - | | | |

Note: The tables show the highest values measured (fuel: fir wood)

*) ... For safe operation, the Manufacturer includes a protective glove in the stove delivery of CE marked stoves.



Accredited test number and title: T 004 **Test of residential solid fuel burning appliances – Roomheaters**
T 005 **Thermal overload test – Temperature rise of the surrounding flammable materials**

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

Sample tested: SOLID FUEL FURNACE Arina

Measuring equipment used: Nos 1 ÷ 7 and 12 – Measuring and test equipment

Test results: SOLID FUEL FURNACE Arina

| | | | | | | | |
|-------------------|--|---|----|---|---|--------------|-----|
| Date of testing: | 2020-07-08 | $t_{ok} =$ See tab. | °C | r.v. = 36 | % | $p_a = 98.3$ | kPa |
| Place of testing: | At SZU <input checked="" type="checkbox"/> | At the Manufacturer's premises <input type="checkbox"/> | | At the Customer's premises <input type="checkbox"/> | | Other: | |

During nominal output test (A. 4.7)

| Test no. | Ambient temp. | Flue draught | Maximum temperature rise | | | | Floor protector | Limit | Quantity of fuel |
|----------|---------------|--------------|--------------------------|-----|-----|-----|-----------------|-------|------------------|
| | | | Trihedron – distance | | | | | | |
| | | | mm | | | | | | |
| - | °C | Pa | 400 | 400 | 800 | 600 | | | kg/h |
| 1 | 29 | 11 | 41 | 54 | 47 | 42 | 35 | 65 | 1.9 |

During thermal overload test (A. 4.9.2)

| Test no. | Ambient temp. | Flue draught | Maximum temperature rise | | | | Floor protector | Limit | Quantity of fuel |
|----------|---------------|--------------|--------------------------|-----|-----|-----|-----------------|-------|------------------|
| | | | Trihedron – distance | | | | | | |
| | | | mm | | | | | | |
| - | °C | Pa | 400 | 400 | 800 | 600 | | | kg |
| 1 | 29 | 15 | 45 | 59 | 52 | 46 | 40 | 65 | 2.6 |

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 600 mm above the appliance.

The tables show the highest values measured.
After the thermal overload test, no permanent deformation or damage to the appliance was detected.

Tested by: Josef Duchan

Date: 2020-09-29

Signed:

Reviewed by: Ing. Petr Smolinský

Date: 2020-09-29

Signed:



IV. A list of other referenced documents

- Order B-69415 of 2020-03-10 (Order reg. no. B-69415 delivered on 2020-03-23)
- Contract B-69415/30
- Amendment B-69415.D1 of 2020-09-29
- 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

Test Report compiled by: Ing. Lukáš Rajdlík

Test Report approved by:

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



-End-