



**SLOVENSKI STANDARD**  
**oSIST prEN 1-1:2023**

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**Grelne naprave na tekoča goriva za stanovanjske stavbe - 1. del: Splošne zahteve in preskusne metode**

Residential liquid fuel burning appliances - Part 1: General requirements and test methods

Häusliche Feuerstätten für flüssige Brennstoffe - Teil 1: Allgemeine Anforderungen und Prüfverfahren

Équipement de chauffage domestique à combustible liquide - Partie 1 : Exigences et méthodes d'essai générales

**Ta slovenski standard je istoveten z: prEN 1-1**

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## Residential liquid fuel burning appliances - Part 1: General requirements and test methods

Équipement de chauffage domestique à combustible liquide - Partie 1 : Exigences et méthodes d'essai générales

Häusliche Feuerstätten für flüssige Brennstoffe - Teil 1: Allgemeine Anforderungen und Prüfverfahren

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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## European foreword

This document (prEN 1-1:2023) has been prepared by Technical Committee CEN/TC 46 “Fireplaces for liquid fuels”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1:1998 and EN 1:1998/A1:2007.

In relation to EN 1:1998 and EN 1:1998/A1:2007, the following technical changes have been made:

- completely revised according to the requirements of M/577;
- energy efficiency and energy class labelling and seasonal space heating efficiency added;
- requirements for environmental sustainability added.

The structure of EN 1, Residential liquid fuel burning appliances, is as follows:

- Part 1: *General requirements and test methods*;
- Part 2: *Flued oil stoves with vaporizing burners*;
- Part 3: *Flued oil stoves with vaporizing burners and boiler*;
- Part 4: *Flued ethanol stoves*.

EN 1-1 is used in conjunction with the appropriate Part 2, 3 or 4. The Parts 2, 3 and 4 contain clauses that supplement or modify the corresponding clauses in this Part 1. Part 1 together with Part 2, 3 or 4 provides the requirements for each type of appliance.

**prEN 1-1:2023 (E)****1 Scope**

This document is applicable to residential liquid fuel burning appliances intended for space heating.

This document specifies requirements relating to the design, manufacture, construction, safety and performance (efficiency and emission) of appliances fired by liquid fuel (hereafter referred to as “appliance(s)”) and provides instructions for them. Furthermore, it also gives provisions for the evaluation of conformity, i.e. initial type testing (ITT) and factory production control (FPC) and marking of these appliances.

This document specifies the test methods for the determination of the smoke number, and CO, NO<sub>x</sub>, and OGC emission test methods.

This document is not applicable for:

- built-in appliances;
- appliances equipped with an atomizing burner;
- appliances incorporating a boiler or connected to a water system.

**2 Normative references**

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15456:2008, *Heating boilers — Electrical power consumption for heat generators — System boundaries — Measurements*

EN 15804:2012+A2:2019, *Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products*

EN 60335-2-102:2016, *Household and similar electrical appliances — Safety — Part 2-102: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections (IEC 60335-2-102:2004, modified)*

**3 Terms and definitions**

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

**3.1****flue gas**

product of combustion leaving the appliance by means of the flue gas outlet

**3.2****flue gas mass flow**

mass of flue gas drawn off from the appliance per unit of time

**3.3****steady operating condition of the stove**

operating condition of the appliance corresponding to a given heat input in which the flue gas temperature in the measuring sleeve (see Figure A.1) does not vary by more than 5 K over a period of 15 min

**3.4****control device**

component of the fuel regulator for adjusting the fuel flow from a closed to a maximum open position

**3.5****maximum fuel flow position**

control device setting with the maximum fuel flow to the burner

**3.6****heating gases**

combustion gases flowing inside the stove

**3.7****minimum fuel flow position**

control device setting with the minimum fuel flow to the burner

**3.8****nominal heat output**

heat output indicated on the rating plate

**3.9****storage tank**

part in the stove from which the burner is supplied with fuel

**3.10****oil derivatives**

organic substances which are deposited onto the filter paper when determining the smoke number

**3.11****fuel regulator**

device which ensures an adjustable, constant flow of fuel to the burner

**3.12****smoke number****SN**

degree of blackening which the soot causes on white filter paper under the conditions specified in this document

**3.13****combustion air limiter**

device for limiting the combustion air supply

**3.14****combustion air conveyor**

device for conveying the combustion air supply

**prEN 1-1:2023 (E)****3.15****combustion chamber**

area in the appliance where combustion takes place

**3.16****vaporizing burner**

burner in which combustion of the fuel occurs under the effect of heat and, together with the combustion air, forms a combustible fuel vapour/air mixture

**3.17****heat input**

amount of heat supplied by the fuel on an hourly basis to the stove, calculated using the calorific value,  $H_i$  of the fuel

**3.18****heat output**

quantity of useful heat released by the appliance

**3.19****efficiency**

ratio of the heat output to the related heat input, expressed as percentage

**3.20****ignition device**

built-in device for igniting the fuel vapour/air mixture

**3.21** **$NO_x$  emission**

content of  $NO_x$  in the dry flue gases measured as volume in ppm, calculated as  $NO_2$ , expressed in mg/MJ

**3.22****hydrocarbon emissions**

OGC emissions

mean OGC concentration calculated to 13 % oxygen ( $O_2$ ) content in the flue gas, measured in accordance with Annex D

**3.23****flue draught**

difference between the static pressure in the place of installation and the static pressure at the specified point in the measurement section

**3.24****energy efficiency index**

EEI

basis for a labelling scheme of the appliances in relation to the appliance's efficiency

**3.25****flue gas outlet temperature**

calculated temperature of the flue gas at the exit of the appliance

**3.26****seasonal space heating energy efficiency** $\eta_s$ 

ratio between the space heating demand, supplied by a liquid fuel local space heater and the annual energy consumption required to meet this demand

**3.27****nominal heat output**

specified maximum expected heat output of an appliance when the control device is set to maximum fuel flow position

**3.28****part load heat output**

heat output achieved when the control device is set to minimum fuel flow position

**4 Descriptive features****4.1 Heat output**

The nominal heat output, expressed in kilowatts, shall be:

- specified;
- verified during the tests;
- indicated on the rating plate.

The nominal heat output shall be rounded off to the nearest multiple of 500 W.

**4.2 Construction and materials**

The quality of the materials as well as the shape and dimensions of the components shall ensure that, provided the operational procedures are met and with the associated mechanical, chemical and thermal stresses which occur, the stoves will remain safe and operable over a given period.

The stove shall be fire-resistant and safe to operate, and shall be designed such that:

- no visible deformations following the performance tests according to A.5 occur;
- it can withstand the stresses arising during normal operation;
- the burner and the stove cannot become heated to create a hazard;
- dangerous accumulations of combustible gases (fuel mixed with air) in the combustion chamber and in the flues are prevented (for automatically operated burners only);
- gases cannot leak from the stove in dangerous quantities.

Non-combustible materials (materials according to the annex of Commission Decision (96/603/EU) or A1 materials according to EN 13501-1:2018) shall be used, except that it shall be permissible to use combustible materials for the following applications:

- components of accessories e.g. burner covers, if the parts are fitted outside of the burner;
- internal components of controls and safety equipment;

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- operating handles;
- electrical equipment.

Components for covering, operation, control and safety devices and electrical accessories shall be arranged in such a way that their surface temperatures, under steady state conditions, do not exceed those specified either by the component manufacturer or in the component part standard.

NOTE Since the entire heat dissipating surfaces of the appliance including the flue spigot/socket and the flue gas connector are working surfaces there are no limits for their surface temperature.

**4.3 Combustion chamber**

The combustion chamber shall be properly sealed and fitted with a device (e.g. lid, door, etc.) which cannot be locked, and designed to compensate for any excess pressure.

**4.4 Filter**

The stove shall include at least one filter situated either before or inside the fuel regulator and a strainer in the filling orifice. The filter shall retain particles with a diameter of over 0,25 mm. The filter and strainer shall be easy to remove and clean.

**4.5 Fuel regulator**

Fuel regulators, or equivalent devices, shall maintain the flow of fuel reaching the burner at a constant value corresponding to the setting selected.

The closed and maximum open positions shall each have a limiting stop.

The minimum position shall be clearly marked and be sensed as a resistance that can be overcome mechanically.

**4.6 Marking of operating settings**

The control device for the fuel regulator shall have clearly visible and permanent markings.

**4.7 Safety device**

The stove shall have a safety device to prevent overflowing of the fuel from the burner.

**4.8 Fan for the supply of combustion air**

Irrespective of the operating setting of the stove, the supply of combustion air from the fan shall not create excess pressure in the combustion chamber. The operation of the fan shall be trouble free.

The function of the burner shall be linked with that of the fan. In the event of a failure of the fan, the flow of fuel to the burner shall be either totally interrupted or reduced to a flow such that the smoke number does not exceed the maximum permissible value for the operation of the burner without the fan.

If the fuel supply to the burner is completely cut off by an electric current failure, then for manually operated burners (without automatic ignition), when the current is restored, the fuel shall be readmitted to the burner manually. For automatically operated burners (automatic ignition), when the current is restored, the ignition without a blow-out shall be ensured.

**4.9 Fuel lines**

The fuel lines shall not be load-bearing parts of the construction.

The fuel lines shall be resistant to the fuel and shall not exceed the maximum permissible surface temperatures as specified. Removable fuel lines shall be connected by means of metal screw threads

including at least four engaged threads. The sealing of the parts containing fuel shall be such that there is no leakage or seepage. It shall not be possible to remove any component in the fuel supply line to the burner without the use of a tool.

#### 4.10 Storage tank

When the stove includes a storage tank, its effective output shall enable operation of the stove for

- at least 10 h in the case of nominal heat output  $\leq 8$  kW and
- at least 8 h in the case of a nominal heat output  $> 8$  kW.

The filling orifice of the storage tank shall have a cap.

It shall be possible to cut off the supply of fuel from the storage tank to the burner by means of a shut-off device fitted before the fuel regulator. If it is a rotary device, closing shall be by turning in a clockwise direction.

To ensure that any fire external to the stove is not transmitted to the contents of the built-in storage tank or, if a fire does occur, its effects are limited by either the tank being made of non-combustible materials e.g. metal or be enclosed with non-combustible fire resisting materials or construction. Any fuel lines from the tank to the burner shall also be fire resistant.

The filling orifice of the built-in storage tank shall have a cap and shall be easily accessible and it shall be so arranged that when filling the tank with fuel it is not possible to ignite the fuel from any hot components.

#### 4.11 Fuel-level indicator

Built-in storage tanks shall have a fuel-level indicator.

#### 4.12 Drip tray

Any stove incorporating a built-in storage tank shall incorporate a drip tray, below the parts of the stove containing fuel, for the collection of any spillage, having an edge height of at least 10 mm (inside depth) and capacity of at least 1 dm<sup>3</sup>.

#### 4.13 Flue gas outlet components

The flue outlet can be of the push-on or push-in type and shall have a circular cross-section at its end and permit the attachment of a flue gas pipe, the diameter of which complies with the applicable standards of the country in which the stove is to be installed.

It shall be possible to fit a flue pipe, having a diameter  $D$  in a length  $D/4$ , but at least 30 mm, onto or into the flue outlet.

#### 4.14 Damper

Dampers or other movable devices for restricting the flow of flue gases are not permitted.

#### 4.15 Draught regulators and combustion air limiters

Draught regulators shall be able to be set in a permanent manner at the maximum draught as indicated in the installation instructions.

Draught regulators and combustion air limiters built into the stove shall be fitted at the production process of the appliance and shall operate automatically.

One of these two devices shall be fitted if the stove has no fan for the supply of combustion air.

**prEN 1-1:2023 (E)****4.16 Assembly**

The stove shall be supplied with all parts assembled; the flue outlets and burner rings may be built in subsequently. Non-removable parts shall be securely fitted in their position of use. For removable parts, see 7.2.

**4.17 Maintenance**

Parts which are removable to allow for maintenance and cleaning shall be readily accessible and designed so that they can be correctly reassembled in accordance with the appliance's instructions.

**4.18 Additional requirements for appliances with automatic burners**

The burner and control system in combination shall be such that, in the event of failure to ignite when starting, the burner will assume a safe condition (lock-out) and will require a manual reset of its sequencing control. In the event of a flame failure occurring when running, the appliance shall fail safe.

A temperature or pressure sensing device shall be provided on the appliance to start and stop the burner. In addition, a separately operating limiting device shall be provided to stop the burner before the temperature in the appliance exceeds safe limits.

Controls and safety devices shall be coupled so that operation of each occurs in the correct sequence and timing; coupling may be electrical or mechanical. The controls and safety devices shall:

- a) ensure that the start-up sequence is not able to commence unless the flame sensing equipment has confirmed the no-flame condition;
- b) establish satisfactory ignition of the fuel;
- c) maintain normal operation if the flame is satisfactorily established, and switch off ignitor;
- d) automatically vary the burner firing rate, where applicable;
- e) stop the burner when the demand for heat is satisfied;
- f) stop the fuel supply and lock-out system if flame is not satisfactorily established;
- g) provide means for a visible or audible indication that the unit is in a lock-out condition;
- h) ensure that any interruption of the electricity supply does not give rise to a dangerous condition.

If the control sequences are such that an attempt to re-ignite the burner can be made the burner shall either:

- i. ignite and burn in a safe manner whilst the surplus fuel is burnt off and the burner is returning to normal operation conditions; or
- ii. not ignite.

Manually operated dampers or other movable devices for restricting the flow of gases shall not be fitted. Automatically operated dampers, if fitted, shall be interlocked with the fuel supply and arranged so that the burner cannot operate with a closed flue.

#### 4.19 Cleaning of heating surfaces

All surfaces in contact with the combustion products shall be able to be cleaned.

For appliances with an integrated water heat exchanger, the surfaces of the water heat exchanger that are in contact with flames or hot combustion gases shall be accessible for cleaning. Means shall be provided for cleaning the appliance outlet and flue connector. Advice on how this cleaning is to be carried out shall be given in the appliance operating instructions.

Where cleaning and servicing requires the use of special tools (e.g. special brushes), these shall be supplied with the appliance.

#### 4.20 Ashpan and ash removal

A means for the removal of the ash residue from the appliance shall be provided. When an ashpan is provided, it shall be at least capable of containing the combustion residue from two full charges of fuel whilst retaining sufficient space above to allow adequate primary air flow through the bottomgrate or firebed. If the ashpan resides in the appliance it shall locate in the ashpit in such a way that it allows the free passage of primary air and in such a position that it does not obstruct any primary air inlet control.

The ashpan shall be designed and constructed to ensure that:

- a) it effectively collects the residue from beneath the bottomgrate;
- b) it can be easily and safely withdrawn, carried and emptied when hot, using the tool(s) provided, without undue spillage of residue material.

NOTE The ashpan can be shovel shaped.

#### 4.21 Bottomgrate

Where the bottomgrate is removable it shall be so designed or marked as to ensure correct fitting.

If a de-ashing mechanism is fitted it shall be capable of effectively de-ashing the firebed. The bottomgrate shall not become dislodged during the de-ashing process.

The preferred design with the charging door(s) and ashpit door(s) closed shall allow de-ashing to be carried out. The de-ashing shall be possible without undue effort.

If it is necessary to remove the ashpit door to de-ash the fire, the appliance shall be designed to minimize ash or fuel spillage during the de-ashing operation.

#### 4.22 Damper

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 cm<sup>2</sup> or 3 % of the cross-sectional area of the blade, whichever is greater. The continuous area shall prevent blockage and therefore be a circle or a part of a circle, an annular gap is not allowed.

The position of the damper shall be recognizable from the setting of the device.

### 5 Performance and operating requirements

Under the test conditions given in Annex A, the following requirements shall be met:

#### 5.1 Maximum fuel flow

With the control device in the maximum position, the heat output shall be equal to, or greater than, the nominal heat output.