



**SLOVENSKI STANDARD**  
**oSIST prEN 1:2013**

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**Peči za ogrevanje na tekoča goriva z uparjalnimi gorilniki in priključkom na dimnik**

Flued oil stoves with vaporizing burners

Heizöfen für flüssige Brennstoffe mit Verdampfungsbrenner und Schornsteinanschluss

Poêles à combustible liquide avec brûleurs à vaporisation raccordés à un conduit évacuation des produits de la combustion

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## Flued oil stoves with vaporizing burners

Poêles à combustible liquide avec brûleurs à vaporisation  
raccordés à un conduit évacuation des produits de la  
combustion

Heizöfen für flüssige Brennstoffe mit Verdampfungsbrenner  
und Schornsteinanschluss

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 46.

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## Foreword

This document (prEN 1:2013) 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 supersedes EN 1:1998.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

For relationship with EU Directive, see informative Annex ZA which is an integral part of this document.

This standard specifies the constructional and operating requirements, conditions for functional testing, and marking and instructions for flued oil stoves with vaporizing burners.

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## 1 Scope

This European Standard applies to flued oil stoves with one or more vaporizing burners (hereafter referred to as "stoves") as used for individual heating in the domestic field and having either a draught regulator or a combustion air limiter as defined in 3.13 and a nominal heating capacity of not more than 15 kW.

This standard also applies to appliances with fan assisted vaporizing burners.

This standard does not cover

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

According to the type of fuels used in the country of destination, the stoves are supplied for use with either:

- fuel oil with a maximum kinematic viscosity of 6,0 mm<sup>2</sup>/s at 20 °C
- or kerosene with a flash point of not less than 40 °C.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 50165, *Electrical equipment of non-electric appliances for household and similar purpose – Safety requirements*

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EN 60335-2-102, *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)*

ISO 2859 (all parts), *Sampling procedures for inspection by attributes*

## 3 Terms and definitions

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

### 3.1

#### **flue gas**

flue gas is the products of combustion leaving the stove by means of the flue gas outlet

### 3.2

#### **flue gas mass flow**

flue gas mass flow is the mass of flue gas being evacuated over a given period of time

### 3.3

#### **steady operating condition of the stove**

the operating condition of the stove corresponding to a given heat input in which the flue gas temperature in the measuring sleeve (see figure 3) does not vary by more than 5 K over a period of 15 min

### 3.4

#### **control device**

the control device is a component of the oil regulator for adjusting the oil flow from a closed to a maximum open position



**3.5****maximum oil flow position**

the maximum oil flow position is the control device setting with the maximum oil flow to the burner

**3.6****heating gases**

heating gases are the combustion gases flowing inside the stove

**3.7****minimum oil flow position**

the minimum oil flow position is the control device setting with the minimum oil flow to the burner

**3.8****nominal heating capacity**

the nominal heating capacity is the heating capacity indicated on the rating plate

**3.9****storage tank**

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

**3.10****oil derivatives**

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

**3.11****oil regulator**

the oil regulator is a device which ensures an adjustable, constant flow of oil to the burner

**3.12****smoke number**

smoke number (SN) is the degree of blackening which the soot causes on white filter paper under the conditions specified in this standard

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

the combustion air limiter is a device for limiting the combustion air supply

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

the combustion air conveyor is a device for conveying the combustion air supply

**3.15****combustion chamber**

the combustion chamber is the area in the stove where combustion takes place

**3.16****vaporizing burner**

the vaporizing burner is a 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**

the 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****heating capacity**

the heating capacity is the useful amount of heat given off hourly by the stove

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**prEN 1:2013 (E)****3.19****Efficiency**

efficiency is the ratio of the actual heating capacity to the related heat input, expressed as a percentage

**3.20****ignition device**

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

**3.21****content of  $NO_x$** 

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

**3.22****content of unburnt Hydrocarbons**

content of unburnt hydrocarbons in the dry flue gases measured as volume in ppm, calculated as  $C_3H_8$ , expressed in mg/MJ

**4 Constructional requirements****4.1 Heating capacity**

The nominal heating capacity, expressed in kilowatts, shall be:

- selected by the manufacturer;
- verified during the tests;
- indicated on the rating plate.

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The nominal heating capacity shall be rounded off to the nearest multiple of 500 W.

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**4.2 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 Clause 6 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.

The stove shall be made of non-combustible materials except that combustible materials shall be allowed for the following:

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

— electrical equipment.

Component parts of covers, operating, 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 manufacturer or in the component part standard.

NOTE Because the entire heat dissipating surfaces of the appliance including the flue spigot/socket and the flue gas connector are working surfaces, there is no requirement for limiting the surface temperature of the appliance.

#### 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 oil 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 Oil regulator

Oil regulators, or equivalent devices, shall maintain the flow of oil 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 oil regulator shall have clearly visible and permanent markings.

#### 4.7 Safety device

The stove shall have a safety device to prevent overflowing of the oil 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 oil 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 specified by the manufacturer. 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

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that there is no leakage or seepage. It shall not be possible to remove any component in the oil supply line to the burner without the use of a tool.

**4.10 Storage tank**

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

- at least 10 h in the case of nominal heating capacity  $\leq 8$  kW and
- at least 8 h in the case of a nominal heating capacity  $> 8$  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 oil 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 Oil-level indicator**

Built-in storage tanks shall have an oil-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 outlet**

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 indicated by the manufacturer. This value shall be given in the installation instructions.

Draught regulators and combustion air limiters built into the stove shall be fitted at the manufacturers' works and shall operate automatically.

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

#### 4.16 Assembly

The stove shall be supplied by the manufacturer 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 manufacturer'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 oil;
- 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 oil 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 oil 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 Dangerous substances

National regulations on dangerous substances may require verification and declaration on release and sometimes content of dangerous substances when construction products covered by this standard are placed in those markets.

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In the absence of European test methods verification and declaration on release / content should be done taking into account national provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through <http://ec.europa.eu/enterprise/construction/cpd-ds/index.cfm> .)

## 5 Performance and operating requirements

Under the test conditions given in clause 6, the following requirements shall be met:

### 5.1 Maximum oil flow

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

### 5.2 Minimum oil flow

With the control device in the minimum position, the average hourly oil flow shall not exceed one third of the nominal flow at nominal heating capacity. Stoves having a maximum flow of 0,200 kg/h in the minimum setting are excluded from this requirement.

If the control device of oil-fired heating appliances is reduced by hand, the maximal rate shall not be more than 50 % of the oil rate per hour at nominal heat input.

### 5.3 Ignition

It shall be possible easily to light the burner from cold following the manufacturer's operating instructions.

### 5.4 Appliance classes for efficiency and emissions

The requirements of Table 1 shall be fulfilled as appropriate to the appliance class.

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**Table 1 – Appliance Classes**

Appliance Class	CO mg/MJ	C <sub>n</sub> H <sub>m</sub> mg/MJ	NO <sub>x</sub> mg/MJ	Efficiency at nominal heat output %		Smoke number	
				appliances < 4 kW	appliances ≥ 4 kW	Gas oil	Kerosene
1 <sup>a</sup>	20	6	35	78	81	1	1
2 <sup>b</sup>	400	—	—	75	75	2	2
3 <sup>b</sup>	400	—	—	75	75	3	2
4 <sup>b</sup>	400	—	—	70	70	3	2
5 <sup>b</sup>	400	—	—	60	60	—	—

<sup>a</sup> measured at nominal heat output and low rate only  
<sup>b</sup> measured in the whole heat output range

NOTE 1 National regulations might request the statement of efficiency values as well as the class. Therefore in these cases it is allowed to state the efficiency value in addition on the data plate and/or in the technical information (see 7.4).

NOTE 2 National regulations might request the statement of efficiency values in addition to these measured at nominal heat output.

## 5.5 Smoke number

For appliances of the classes 1, 2 and 3 according to Table 1, in the whole heat output range the smoke number shall not exceed 3 for gas oil and 2 for kerosene. For appliances of class 1 according to Table 1, at nominal heat output and at low rate only the smoke number shall not exceed 1 for both gas oil and kerosene.

The flue gases shall not contain oil rest particles.

Under the test conditions of 6.5.1.2, 6.5.1.4 and 6.5.3.1 for gas oil, the smoke number may be one more.

## 5.6 Flue gas temperature

During the tests, the flue gas temperature shall not be less than 90 K, nor more than 350 K, above the ambient temperature.

## 5.7 Carbon monoxide content of the flue gas

The emission of carbon monoxide (CO) in the flue gases, of an amount of fuel corresponding to 1 MJ (based on  $H_i$ ), shall not exceed the value of 0,4 g/MJ at all rates of operation.

This value shall be calculated as the mean value from the tests as described in 6.5.2.1, 6.5.2.2 and 6.5.3.2.

In addition for appliances of class 1 according to Table 1, the content of CO measured at nominal heat output and at low rate shall not exceed 20 mg/MJ.

## 5.8 Oil temperature

The temperature of the fuel in the built-in storage tank and oil regulator shall not exceed 20 K above ambient temperature for fuel oil, or 15 K above ambient temperature for kerosene.

## 5.9 Floor temperature

The surface temperatures of the underside of the drip tray shall not exceed 45 K above ambient temperature when using fuel oil, or 35 K above ambient temperature when using kerosene.

The surface temperatures of the floor shall not exceed 60 K above ambient temperature.

This requirement is not applicable if the manufacturer states that the appliance shall not be installed on combustible floor.

## 5.10 Wall temperature

The surface temperatures of the walls, behind and adjacent to the stove, shall not exceed 60 K above ambient temperature at the minimum clearances given by the manufacturer in the installation instructions under the test conditions described in 6.5.

## 5.11 Temperature of the control knobs

The temperatures of the control knobs on their contact surface shall not exceed ambient temperature by more than:

- 35 K for metals
- 45 K for porcelain
- 60 K for plastics

This also applies to other similar materials.