SLOVENSKI STANDARD
SIST EN 13842:2005

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Oljni grelniki zraka s prisilno konvekcijo ï Nepremiļ ni in prenosni za gretje prostorov

Oil fired forced convection air heaters - Stationary and transportable for space heating

Ölbefeuerte Warmlufterzeuger - Ortsfest und ortsbeweglich für die Raumheizung

Générateurs d'air chaud à convection forcée fonctionnant au fioul domestique - Fixes et transportables pour le chauffage des locaux

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97.100.40 Grelniki na tekoļ e gorivo Liquid fuel heaters

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English version

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Contents

Foreword

This document (EN 13842:2004) has been prepared by Technical Committee CEN/TC 57 “Central heating boilers”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2005, and conflicting national standards shall be withdrawn at the latest by January 2005.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This document specifies the requirements and test methods for the safety and efficiency of oil-fired air heaters using only forced draught oil burners, hereafter referred to as “appliances”.

This document applies to stationary and portable appliances. It also applies to appliances intended for outdoor installation. Provision of the heated air may be by means of ducting or may be directly into the heated space.

For the purpose of this document the heat generation is by the combustion of liquid fuel oils as defined in EN 267 (gas oil with a viscosity at the burner inlet of 1,6 mm²/s (cSt) up to 6 mm²/s (cSt) at 20 °C). Alternatively, if the manufacturer requests, the fuel of kerosene may be used as defined in EN 304. Kerosene with a viscosity at the burner of 1,3 mm^2/s (cSt) to 2,9 mm^2/s (cSt) at 20 °C) or other suitable liquid fuel oils may also be used.

This document does not apply to:

— appliances intended for use in a single unit residential dwelling;

— appliances of the condensing type;

— appliances with atmospheric burners without a fan to assist the transportation of combustion air;

— dual purpose air conditioning appliances (heating and cooling);

— appliances where the air is heated by an intermediate fluid;

— appliances fitted with manual or automatic flue dampers;

— appliances having multiple heating units with a single flue;

— appliances fitted with more than one flue outlet.

This document is applicable to appliances which are intended to be type tested.

NOTE Requirements for appliances which are not type tested would need to be subject to further consideration.

2 Normative references

The following referenced documents are indispensable for the application 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 230, *Monobloc oil burners — Safety, control and regulation devices and safety times.*

EN 267, *Forced draught oil burners — Definitions, requirements, testing, marking.*

EN 304:1992, *Heating boilers — Test code for heating boilers for atomizing oil burners.*

prEN 50156-1, *Electrical equipment for furnaces and ancillary equipment — Part 1: Requirements for application design and installation.*

EN 60335-1:2002, *Household and similar electrical appliances — Safety — Part 1: General requirements (IEC 60335-1:2001, modified).*

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989*).

EN 60730-2-1, *Automatic electrical controls for household and similar use — Part 2: Particular requirements for electrical controls for electrical household appliances (IEC 60730-2-1:1989, modified).*

EN 60730-2-9, *Automatic electrical controls for household and similar use — Part 2-9: Particular requirements for temperature sensing controls (IEC 60730-2-9:2000, modified).*

EN ISO 1182:2002, *Reaction to fire tests for building products - Non-combustibility test (ISO 1182:2002)*.

3 Terms and definitions

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

3.1 Appliance and its constituent parts

3.1.1
stationary air heater
fixed appliance designed for the heating and possibly ventilation of a building

3.1.2
forced convection air heater
appliance designed to provide space heating from a central source by distributing heated air, by means of an air moving device, either through ducting or directly into the heated space.

The appliance may consists of the following components:

— combustion chamber;

— heat exchanger;

— fan with drive motor;

— housing (casing);

— air control device;

— integrated oil burner or atomising oil burner of the monobloc-type according to EN 267.

The appliance may consist of several assemblies which are joined together

3.1.3
portable warm air heaters
appliance with a heat exchanger in accordance with 3.1.2 but designed to be portable or moveable. It may contain a built-in fuel tank

3.1.4
oil burner
burner that is intended to assure the thermal function of the appliance and is generally called the burner

3.1.5 Combustion products circuit

3.1.5.1
combustion chamber
enclosure inside which combustion of the air-fuel mixture takes place

3.1.5.2
heat exchanger
part of the appliance designed to transfer heat from the combustion products to the transport air

3.1.5.3
flue outlet
part of the appliance that connects with a flue to evacuate the products of combustion

3.2 Adjusting, control and safety devices

3.2.1
automatic burner control system
system comprising automatic start and stop sequencing flame detector device and flame supervision

NOTE See also EN 230

3.2.2
automatic shut-off valve
valve designed to open the fuel supply to the burner when energised and to close automatically when de-energised

3.2.3
control thermostat
device controlling the operation of the appliance (by on/off, high/low or modulating control) and enabling the temperature to be kept automatically, within a given tolerance, at a predetermined value

3.2.4
overheat cut-off device
device that shuts off and locks out the fuel supply to the burner when the temperature of the delivered air exceeds a certain pre-set value, and that requires manual intervention to restore the fuel supply. This should be before the appliance is damaged and/or before safety is put into question. This device is pre-set and sealed by the manufacturer (see 4.8.3.2)

3.2.5
fan delay control
control that starts and/or stops the air delivery fan when the temperature of the delivered air reaches a certain predetermined value

3.2.6
temperature sensing element; temperature sensor
component that detects the temperature of the environment to be supervised or controlled

3.2.7
modulating control
automatic control by which the heat input of the appliance can be varied in a continuous manner between the nominal heat input and a minimum value

3.2.8
high/low control
automatic control which permits an appliance to operate either at the nominal heat input or at a fixed reduced heat input

3.3 Operation of the appliance

3.3.1
volumetric flow rate
volume of fuel consumed by the appliance in unit time during continuous operation

Symbol: V

NOTE Litres per hour (l/h), cubic decimetres per hour (dm^3/h).

3.3.2
mass flow rate
mass of fuel consumed by the appliance in unit time during continuous operation

Symbol: m

NOTE Kilograms per hour (kg/h).

3.3.3
heat input
quantity of energy used in unit time corresponding to the volumetric or mass flow rates, the calorific value to be used being the net calorific value

Symbol: Q_0

NOTE Kilowatts (kW).

3.3.4
nominal heat input
value of heat input declared by the manufacturer

Symbol: Q_N

NOTE Kilowatts (kW).

3.3.5
nominal heat output
value of heat output declared by the manufacturer, which is the time related quantity of heat transferred to the delivered air.

It is calculated as the heat input less the heat lost to the products of combustion leaving the flue

Symbol: Q

NOTE Kilowatts (kW).

3.3.6
delivered air volume
time related volume of air leaving the appliance corrected to standard conditions of absolute pressure 1 013,25 mbar and temperature of 15 °C

NOTE Cubic metres per second (m^3/s) or cubic metres per hour (m^3/h).

3.3.7
delivered air pressure
static pressure available within the duct system provided by the appliance fan related to the delivered air volume

NOTE Pascal's (Pa) or millibar (mbar); 1 Pa = 1 N/m^2; 1 mbar = 100 N/m^2.

3.3.8
controlled shut-down
process where the power to the fuel shut off valves and/or the burner motor is removed immediately, e.g. as a result of the action of a controlling function

3.3.9
safety shut-down
process which is effected immediately following the response of a safety limiter or sensor or detection of a fault in the burner control system and which puts the burner out of operation by immediately removing the power to the fuel shut-off valves, the ignition device and/or the burner motor

3.3.10
lock-out
safety shut-down condition of the system, such that a restart can only be accomplished by a manual reset of the system and by no other means

3.3.11
running condition of the system
condition in which the burner is in normal operation under the supervision of the programming unit and its flame detector

3.4 Conditions of operation and measurement

3.4.1
cold condition
condition of the appliance required for some tests and obtained by allowing the unlit appliance to attain thermal equilibrium at room temperature

3.4.2
hot condition
condition of the appliance required for some tests and obtained by heating to thermal equilibrium at the nominal heat input specified by the manufacturer, any thermostat remaining fully open

3.4.3
equivalent resistance
resistance to flow in millibars, measured at the outlet of the appliance, which is equivalent to that of the actual flue

Units: Pascal (Pa), Millibar (mbar)

3.5
Reference conditions
- for calorific values, temperature 15 °C;

- for fuel and air volumes dry, brought to 15 °C and absolute temperature of 1 013,25 mbar.

4 Requirements of construction

4.1 General

When the appliance is installed in accordance with the manufacturer's instructions, all components, including the heat exchanger, shall withstand the mechanical, chemical and thermal conditions to which they may be subjected in the course of normal use.

If condensation occurs, this shall not affect the operational safety. With the exception of the outlet of the flue system, any condensate formed shall not drop outside the appliance.

Asbestos or materials containing asbestos shall not be used.

Solder that contains cadmium shall not be used.

Where appropriate, materials used on the appliance shall be non-combustible in accordance with the requirements of EN ISO 1182.

4.2 Accessibility for maintenance and use

Parts that are intended to be removable for maintenance or cleaning shall be readily accessible and capable of correct assembly and difficult to assemble incorrectly. Such parts shall be impossible to assemble incorrectly where incorrect assembly would create a hazardous condition or result in damage to the appliance and its controls.

Access shall be possible to all handles, buttons etc. required during normal use of the appliance, without having to remove any part of the case. For this purpose, the opening of a door or access panel is permitted.

Constructional parts accessible during use and maintenance shall be free from sharp edges and corners that might cause damage or personal injury during use or maintenance.

The products of combustion shall not be drawn into the air distribution system when user access panels are removed.

4.3 Insulation

Any thermal insulation shall retain its insulating properties under the influences of heat and ageing. The insulation shall withstand the normally expected thermal and mechanical stresses. Should any acoustic insulation be fitted to the appliance it shall be at least flame retardant.

4.4 Supply of combustion air and evacuation of combustion products

4.4.1 General

All appliances shall be designed so that there is an adequate supply of combustion air during ignition and operation over the whole range of possible heat inputs stated by the manufacturer.

4.4.2 Appliance combustion products outlet

The cross-section of the appliance combustion products outlet shall not be adjustable.

The combustion products outlet shall be female and shall allow, if necessary by means of an adapter supplied with the appliance, connection to a flue pipe whose diameter complies with the standards in force where the appliance is to be installed.

The internal diameter of the combustion products outlet shall be such as to ensure compliance with requirements concerning operation.

It shall be possible to insert a flue pipe of nominal external diameter (D – 2) mm to a depth of at least D/4 but not so far that the evacuation of the combustion products is impaired. However, for a vertical connection, the depth of insertion can be reduced to 15 mm for an appliance with heat input up to 70 kW and 25 mm for an appliance with heat input exceeding 70 kW.

NOTE D is the outside diameter of the duct.

4.5 Electrical equipment

For the electrical equipment and connections of the burner the following requirements of prEN 50156-1 and EN 60335-1 shall apply:

a) rated value;

b) protection against accessibility to live parts;

   1) leakage current and electric strength;

   2) internal wiring;

   3) components;

   4) supply connection and external flexible cords;

   5) connection terminals for external conductors;

6) provision for earthing;

7) creepage distances, clearances and distances through insulation;

c) radiation;

1) resistance to heat, fire and tracking.

The leakage current and electrical strength tests on the complete burner need not be performed if the components and sub-assemblies have been separately tested and the interconnection is carried out in accordance with the manufacturer's instructions.

If the measurements of the leakage current as required in EN 60335-1:2002, 13.2, are not possible, because the circuits of protective impedance or radio interference filters cannot be disconnected, then the leakage limit specified for leakage current is to be calculated taking into account the current through those circuits.

NOTE For industrial application, see EN 60204-1.

In addition the documentation of the electrical connections for the individual components shall be provided by means of an electrical wiring and connection diagram.

If the appliance is fitted with electronic components or electronic systems providing a safety function, these shall comply with the relevant requirements of EN 230 with regard to electromagnetic compatibility immunity levels.

If the manufacturer specifies the nature of the electrical protection of the appliance on the data plate, this specification shall comply with EN 60529:

— to give the degree of personal protection against contact with dangerous electrical components inside the appliance case;

— to give the degree of electrical protection, inside the appliance case, against harmful actions due to water penetration.

4.6 Operational safety

The fluctuation of, or the interruption and subsequent restoration of the electricity supply at any time during the starting up or operation of the appliance shall result in continued safe operation, or safety shut-down (lockout).

Interruption and subsequent restoration of the electricity supply shall not override any lock-out condition.

4.7 Motors and fans

The direction of rotation of fans shall be clearly marked.

Motors and fans, including any belt drives, shall be protected by suitable guards, shields or screens of adequate size, strength and durability so that they are not liable to be touched (see also EN 60529, class IP 20). Removal of such guards, shields or screens shall be possible only with the use of tools.

Where necessary, means shall be provided to facilitate the adjustment of the belt tension by the use of tools.

4.8 Adjusting, control and safety devices

4.8.1 General

The functioning of any safety device shall not be overruled by that of any control device.

All controls and safety devices shall be appropriate for use over the range of ambient temperatures declared by the appliance manufacturer.

When there are several control knobs (taps, thermostats, etc.), they shall not be interchangeable if this could lead to confusion or they shall be clearly marked to identify their function.

4.8.2 Facility for remote control

4.8.2.1 General

Where the appliance is capable of being controlled remotely by means of thermostats or a time control, electrical connections of these controls shall be possible without disturbing any internal connections in the appliance other than a link exclusively designed for this purpose. When the heater is installed in accordance with the manufacturer's instructions, no hazardous condition shall occur as a result of failure of the normal means of air temperature control.

Thermostats and control of air temperature.

4.8.2.2 General requirements

Electrical thermostats shall comply with the requirements of EN 60730-2-1.

Overheat cut-off devices shall comply with Type 2K requirements of EN 60730-2-9.

4.8.2.3 Overheat cut-off device

An overheat cut-off device shall be fitted to the appliance to cause shut-down and non-volatile lock-out in the event of an overheat condition occurring.

The operating temperature of the overheat device shall be set and sealed by the manufacturer.

The lock-out action shall not rely on the operation of the flame detection circuits. In particular, the device shall not be wired in series with either the flame sensor or the line supply from a programming unit to any automatic shut-off valve.

This device shall not operate during the normal operation of the appliance.

4.8.3 Fan delay controls

4.8.3.1 Delayed start

Where means are provided to delay the operation of the air delivery fan after ignition of the burner to prevent the discharge of cold air into the heated space, the fan start delay shall not be such as to cause the overheat device(s) to operate under normal conditions.

4.8.3.2 Delayed shut-down

Means shall be provided to delay the shut-down of the air delivery fan after shut-down of the burner(s).

4.8.4 Sensors

Control thermostats and overheat cut-off devices may have the same sensor if failure of the sensor results in lock-out of the appliance.

4.9 Combustion chamber pressure relief

Where a pressure relief device is fitted and it is on the same side of the appliance as any user-operated controls, means shall be provided to prevent hazard to personnel in the event of its operation. Any shields or deflectors shall not interfere with the operation of the relief, and the installation instructions shall draw attention to the location and free area required to provide safe operation. Any such pressure relief shall be capable of withstanding the temperature of the enclosed combustion products.