

Heating boilers — Heating boilers with forced draught burners —

Part 1: Terminology, general requirements, testing and marking

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National foreword

This British Standard has been prepared under the direction of the Refrigeration, Heating and Air Conditioning Standards Policy Committee and is the English language version of EN 303-1:1992 *Heating boilers — Heating boilers with forced draught burners — Part 1: Terminology, general requirements, testing and marking*, published by the European Committee for Standardization (CEN).

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 22, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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Descriptors: Central heating, boilers, liquid fuel appliances, definitions, specification, equipment specifications, thermodynamic properties, tests, marking

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Heating boilers — Heating boilers with forced draught burners — Part 1: Terminology, general requirements, testing and marking

Chaudières de chauffage — Chaudières avec brûleurs à air soufflé — Partie 1: Terminologie, spécifications générales, essais et marquage

Heizkessel — Heizkessel mit Gebläsebrenner — Teil 1: Begriffe, allgemeine Anforderungen, Prüfung und Kennzeichnung

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Foreword

This European Standard was drawn up by the Technical Committee CEN/TC 57 “*Central heating boilers*” of which the secretariat is held by DIN.

The following structure is intended for the Standards for heating boilers prepared by CEN/TC 57:

EN 303-1, *Heating boilers — Heating boilers with forced draught burners — Part 1: Terminology, general requirements, testing and marking.*

EN 303-2, *Heating boilers — Heating boilers with forced draught burners — Part 2: Special requirements for boilers with atomizing oil burners.*

EN 303-2, *Heating boilers — Heating boilers with forced draught burners up to a heat output of 70 kW and an operating pressure of max. 3 bar — Terminology, special requirements, testing and marking* (standard in preparation).

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

This European Standard shall be given the status of national standard, either by publication of an identical text or by endorsement, at the latest by March 1993, and conflicting national standards shall be withdrawn at the latest by March 1993.

The standard was approved and in accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

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1 Scope

1.1 This standard applies to heating boilers with burners using fans up to a nominal heat output of 300 kW. They are operated, either with negative pressure (natural draught boiler) or with positive pressure (pressurized boiler) in the combustion chamber, in accordance with the boiler manufacturers' instructions.

Particular requirements for boilers which can only be used with open vents are contained in a separate document (being prepared).

The requirements of this standard apply to heating boilers which are tested on an authorized test rig.

Boilers in accordance with this standard are designed for the heating of central heating installations in which the heat carrier is water, and the temperature of which is restricted to 100 °C at a maximum pressure of 6 bar. For boilers with a built-in or attached water heater (storage or continuous flow heater) this standard only applies to the parts of the water heater which are necessarily subject to the operating conditions of the heating boiler (heating Part).

This standard does not apply to gas boilers with atmospheric burners, boilers for solid fuels, oil or gas fired condensation boilers, boilers with oil vaporisation burners and low temperature boilers. For these boilers there are further requirements.

NOTE Low temperature boilers are those operating with a (water) variable temperature up to 40 °C or less, or those which cannot be set at a temperature higher than 55 °C.

1.2 The purpose of this standard is to lay down the necessary terminology, the requirements on the materials and testing of them, and marking requirements.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 226:1987, *Atomizing oil burners; connecting dimensions between burners and heat generators*.

EN 267:1991, *Atomizing oil burners of monobloc type; testing*.

prEN 287-1:1988, *Approval testing of welders; fusion welding — Part 1: steel*.

prEN 287-2:1988, *Approval testing of welders; fusion welding — Part 2: aluminium and aluminium alloys*.

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

EN 60335-1:1988, *Safety of household and similar electrical appliances — Part 1: General requirements*.

CENELEC HD 251 S3, *CENELEC Harmonization Document — Safety of household and similar electrical appliances — Part 1: General requirements*.

CENELEC HD 365 S3, *CENELEC Harmonization Document — Classification of degrees of protection provided by enclosures*.

EURONORM 3-79, *Brinell hardness measurement for steel*.

EURONORM 21-78, *General technical terms of delivery for steel and steel products*.

EURONORM 29-81, *Hot-rolled steel plates 3 mm thick or above; Tolerances on dimensions, shape and mass*.

ISO 7-1:1982, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Designation, dimensions and tolerances*.

ISO 7-2:1982, *Pipe threads where pressure-tight joints are made on the threads — Part 2: Verification by means of limit gauges*.

ISO 185:1988, *Grey cast iron — Classification*.

ISO 228-1:1982, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Designation, dimensions and tolerances*.

ISO 228-2:1987, *Pipe threads where pressure-tight joints are not made on the threads — Part 2: Verification by means of limit gauges*.

ISO 857:1990, *Welding, brazing and soldering processes; vocabulary*.

ISO 2553:1984, *Welds — symbolic representation on drawings*.

prEN 24063:1991, *Welding, brazing, soldering and braze welding of metals-nomenclature of processes and reference numbers for symbolic representation on drawings*.

3 Terminology

3.1

operating pressure

the operating pressure is that pressure at which the boiler can be operated safely. The operating pressure is less than the test pressure and the type test pressure

3.2**test pressure**

the test pressure is that pressure to which all boilers and their parts are subjected during production in the works of the manufacturer or during setting up by the installer

3.3**type test pressure**

the design pressure is that pressure to which the heating boilers and their parts are first subjected before start of mass production in the manufacturing works

3.4**operating temperature**

the operating temperature is that temperature at which the boiler can be operated under normal operating conditions at the maximum setting of the boiler's water temperature controller

3.5**heat output Q , heat output range**

the heat output Q is the amount of heat transferred to the heat carrier (water) per unit of time

the heat output range is the span of output below the nominal heat output specified by the manufacturer over which the boiler meets the requirements of this standard and over which it can be used

3.6**nominal heat output Q_N**

the nominal heating output is the continuous output specified by the manufacturer in accordance with the requirements of this standard. It is the maximum useful quantity of heat transferred to the heat carrier per hour

3.7**heat input Q_B**

the heat input is the amount of heat in unit time which is supplied to the furnace of the heating boiler by the fuel based on its net calorific value H_U

3.8**boiler efficiency η_K**

the boiler efficiency is the ratio of the heat output (Q) to the heat input (Q_B) supplied by the fuel

$$\eta_K = \frac{Q}{Q_B}$$

3.9**draught**

the draught requirement is the pressure differential between the static air pressure in the place of installation and the static pressure of the exhaust gases, as measured in the exhaust gas measuring section, which is required for correct operation of the boiler at nominal output

3.10**gas side resistance**

the gas side resistance of the boiler is the pressure differential between the combustion chamber and the boiler exit when operating at nominal output

3.11**soundness of combustion system**

the soundness of the combustion system of the boiler is the soundness of the combustion chamber, the flues and the boiler parts through which the exhaust gases flow

3.12**exit flue temperature**

the exit flue gas temperature t_A is the temperature measured at the exit of the boiler (exhaust stack)

3.13**flue gas loss**

the flue gas loss is that quantity of heat per unit time which leaves the flue gas exit of the boiler unused

3.14**gas volume**

the gas volume is the volume of the combustion chamber and the flueways up to the boiler outlet

3.15**standby loss**

standby loss is the quantity of heat which is necessary to maintain the boiler at a given temperature when no heat output is used. It is stated as q_B in relation to the heat input Q_B

3.16**water side resistance**

water side resistance means the pressure loss across the boiler measured at the flow and return connections of the boiler, with a volume flow corresponding to the nominal heat output

3.17**temperature control equipment**

the temperature control equipment hereinafter called the temperature controller, measures the temperature at the central point, compares it with the previously set nominal value, and influences the actual temperature in relation to the nominal value

3.18**safety temperature limiter**

an automatic operating device which, when the highest limiting temperature of the water is reached, causes shutdown and lock out of the fuel supply. The fuel supply can only be restored when the water temperature has fallen below the limit value and after resetting manually or with the use of a tool. The safety temperature limiter satisfies the requirements for further safety and differs from the high limit thermostat by having additional safety of the sensor

4 Requirements

Boilers shall be fire-resistant and safe to operate. They shall be made of non-combustible materials and shall be resistant to deformation and shall be such that:

- they can withstand the stresses arising during normal operation;
- the atomizing oil burner and the heat carrier (water) cannot become heated to a dangerous extent;
- dangerous accumulations of combustible gases (fuels mixed with air) in the combustion chamber and in the flues are prevented and that:
- gases cannot leak from the boiler in dangerous quantities.

Combustion materials are allowable for:

- 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;
- thermal insulation (see clause 4.1.5.10).

Component parts of covers, operating, control, and safety devices and electrical accessories containing combustible materials 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.

4.1 Construction requirements**4.1.1 General requirements**

The materials for the parts subject to pressure shall be in accordance with generally accepted technical requirements. They shall be suitable for the purpose and treatment intended. The mechanical and physical properties as well as the chemical composition of the materials shall be certificated by the relevant material producer.

4.1.2 Production documentation**4.1.2.1 Drawings**

The following shall be specified in the boiler drawings or in the relevant documents:

- the specified materials;
- the welding process, the seam type — generally the symbol for the seam type is sufficient — and the welding fillers;
- the permissible operating temperature in °C;
- the permissible operating pressure in bar;
- the test pressure in bar;
- the nominal heat output or the heat output range for every boiler size in kW.

4.1.2.2 Manufacturing controls

Manufacturing control shall be carried out.

4.1.3 Heating boilers of steel and of non-ferrous materials**4.1.3.1 Execution of welding work**

Boiler manufacturers who carry out welding work shall meet the requirements of prEN 287-1 and prEN 287-2.

- Only welders who are qualified in the welding of the materials to be processed may be used.
- Equipment shall be available to allow defect free welding to be carried out.
- Supervision of the welding shall be carried out by staff qualified in welding (at least one supervisor shall be so qualified).

4.1.3.2 Welding seams and welding fillers

The materials shall be suitable for welding. The materials in accordance with Table 1 are suitable for welding and do not require additional heat treatment after welding.

The welded seams shall not show any cracks or bonding faults and shall be defect free over the whole cross section for butt welds. One-sided fillet welds, and half Y-welds which have been welded through, shall be kept substantially free from bending stresses. Smoke tubes, inserted stays and similar components need not be counterwelded. Double fillet welds are only permissible when sufficiently cooled. Projections into the flue gas side in areas of high thermal stresses shall be avoided.

Corner welds, edge welds and similar welded connections which are subjected to high bending stresses during production and operation are to be avoided.

For welded in longitudinal stay bars or stay tubes the shearing cross section of the fillet weld should be 1.25 times the required stay bar or stay tube cross-sectional area.