

Heating boilers —

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

The European Standard EN 303-1:1999, with the incorporation of amendment A1:2003, has the status of a British Standard

ICS 91.140.19

National foreword

This British Standard is the official English language version of EN 303-1:1998, including amendment A1:2003. It supersedes BS EN 303-1:1992 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **[A1]** **[A1]**. Tags indicating changes to CEN text carry the number of the amendment. For example, text altered by CEN amendment A1 is indicated in the text by **[A1]** **[A1]**.

This standard partially supersedes the following British Standards; BS 779:1989 and BS 855:1990. It is important to use this standard if the heating boilers being considered fall within its scope. The British Standards will not be valid for such boilers. The scope of BS 779:1989 and BS 855:1990 will be amended to state that they are no longer valid for heating boilers within the scope of this standard.

The UK voted against EN 303-1(Rev) for a number of reasons including concerns over the increase in the safety temperature limit to 120 °C and the possible need for over pressure protection. Manufacturers using this standard to produce heating boilers in the UK should take all the necessary steps to comply with the relevant national legislation.

The UK participation in its preparation was entrusted to Technical Committee RHE/10, Heating boilers, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

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

Heizkessel — Teil 1: Heizkessel mit
Gebläsebrenner — Begriffe, allgemeine
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This European Standard was approved by CEN on 21 August 1998.

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CEN

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 57, Central heating boilers, the Secretariat of which is held by DIN.

This European Standard supersedes EN 303-1:1992.

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 July 1999, and conflicting national standards shall be withdrawn at the latest by July 1999.

The following structure is intended for the European standards for heating boilers:

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

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

prEN 303-3, *Heating boilers — Part 3: Gas fired central heating boilers — Assembly comprising a boiler body and a forced draught burner.*

prEN 303-4, *Heating boilers — Part 4: Heating boilers with forced draught burners — Special requirements for boilers with forced draught oil burners with outputs up to 70 kW and a maximum operating pressure of 3 bar — Terminology, special requirements, testing and marking.*

prEN 303-5, *Heating boilers — Part 5: Heating boilers for solid fuels, hand and automatically fired, with a nominal heat output of up to 300 kW — Terminology, requirements, testing and marking.*

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

Concerning the required extension of the heat output from 300 kW up to 1 000 kW the following essential changes were agreed:

- a) modification of clause 1;
 - b) amendments of Table 3 and Table 7;
 - c) amendment in 4.1.5.8 “Burner matching dimensions”;
 - d) revision of Table 1.
- According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Foreword to amendment A1

This document (EN 303-1:1999/A1:2003) has been prepared by Technical Committee CEN/TC 57 “Central heating boilers”, the secretariat of which is held by DIN.

This Amendment to the European Standard EN 303-1:1999 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2004, and conflicting national standards shall be withdrawn at the latest by March 2004.

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(s).

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

This Amendment to the European Standard EN 303-1:1999 specifies the requirements for low-temperature central heating boilers. Its purpose is to complete, amend or shorten EN 303-1:1999. This does not affect the main standard.

WARNING : Other requirements and other EU Directives may be applicable to the products falling within the scope of this European Standard.

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

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1 Scope

[A1] This European Standard applies to standard boilers and low-temperature boilers with forced draught burners with a nominal heat output not exceeding 1000 kW, which are operated either with negative pressure (natural draught boilers) or with positive pressure (pressurised boiler) in the combustion chamber, in accordance with the boiler manufacturers' instruction. **[A1]**

This standard specifies the necessary terminology, the requirements on the materials and testing of them, and marking requirements for heating boilers.

Particular requirements for boilers which can be used with open vented systems are contained in prEN 303-4.

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 maximum allowable operating temperature of which is restricted to 100 °C. The maximum allowable operating pressure is 8 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).

[A1] This standard does not apply to gas boilers with atmospheric burners, boilers for solid fuels, oil or gas fired condensing boilers and boilers with oil vaporisation burners.

Note deleted **[A1]**

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, *Atomizing oil burners — Connecting dimensions between burners and heat generators.*

EN 287-1, *Approval testing of welders — Fusion welding — Part 1: Steels.*

EN 287-2, *Approval testing of welders — Fusion welding — Part 2: Aluminium and aluminium alloys.*

[A1] EN 303-1:1999, *Heating boilers — Part 1: Heating boilers with forced draught burners — Terminology, general requirements, testing and marking.* **[A1]**

prEN 303-4, *Heating boilers — Heating boilers with forced draught burner — Part 4: Special requirements for boilers with forced draught oil burners with outputs up to 70 kW and a maximum operating pressure of 3 bar — Terminology, special requirements, testing and marking.*

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

EN 10003-1, *Metallic materials — Brinell hardness test — Part 1: Test method.*

EN 10021, *General technical delivery requirements for steel and iron products.*

EN 10025, *Hot rolled products of non-alloy structural steels — Technical delivery conditions* (includes amendment A1:1993).

EN 10027-2, *Designation systems for steels — Part 2: Numerical system.*

EN 10028-2, *Flat products made of steels for pressure purposes — Part 2: Non-alloy and alloy steels with specified elevated temperature properties.*

EN 10029, *Hot-rolled steel plates 3 mm thick or above — Tolerances on dimensions, shape and mass.*

EN 10088-2, *Stainless steels — Part 2: Technical delivery conditions for sheet/plate and strip for general purposes.*

EN 10120, *Steel sheet and strip for welded gas cylinders.*

EN 24063, *Welding, brazing, soldering and braze welding of metals; nomenclature of processes and reference numbers for symbolic representation on drawings.* (ISO 4063:1990)

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

EN 60529, *Degrees of protection provided by enclosures (IP-Code).* (IEC 529:1989)

EN 60730-2-9, *Automatic electrical controls for household and similar use — Part 2: Particular requirements for temperature sensing controls.* (IEC 730-2-9:1992, modified)

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

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

ISO 185, *Grey cast iron — Classification.*

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

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

ISO 857, *Welding, brazing and soldering processes — Vocabulary.*

ISO 2553, *Welded, brazed and soldered joints — Symbolic representation on drawings.*

ISO 7005-1, *Metallic flanges — Part 1: Steel flanges.*

ISO 7005-2, *Metallic flanges — Part 2: Cast iron flanges.*

ISO 7005-3, *Metallic flanges — Part 3: Copper alloy and composite flanges.*

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1

operating pressure

the maximum allowable pressure at which the boiler is to be normally operated. The operating pressure is less than the test pressure and the type test pressure

3.2

test pressure

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

pressure to which the pre-production heating boiler(s) and associated parts are subjected before start of mass production in the manufacturing works

3.4

operating temperature

the maximum allowable 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

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

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

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_i

3.8

boiler efficiency

η_K

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

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

is the pressure differential between the combustion chamber and the boiler exit

3.11

soundness of combustion system

is the soundness of the combustion circuit through which the exhaust gases flow

3.12

exit flue temperature

t_A

is the temperature measured at the flue exit of the boiler

3.13

flue gas loss

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

3.14

combustion circuit

comprises the combustion chamber, the heat exchanger, the air supply circuit and the combustion product circuit up to the flue exit

3.15

standby loss

q_B

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

is 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

control thermostat

a device enabling the water temperature to be kept automatically, within a given range, at a predetermined value

3.18

safety temperature limiter

a device that causes safety shutdown and non-volatile lockout so as to prevent the water temperature exceeding a present limit

A1 3.19

condensate

liquid formed from the combustion products during the condensation process

3.20

standard boiler

boiler for which the average water temperature can be restricted by design

3.21

low temperature boiler

boiler which can work continuously with a water return temperature of 35 °C to 40 °C, possibly producing condensation in certain circumstances without impairing the boiler's operation

NOTE For oil condensing boilers see WI 0057021. **A1**

4 Requirements

4.1 Construction requirements

4.1.1 General 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 burner and the boiler cannot become heated to create a hazard;
- dangerous accumulations of combustible gases (fuels mixed with air) in the combustion chamber and in the flues are prevented and
- gases cannot leak from the boiler in dangerous quantities.

Combustible 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 **4.1.5.9**); only asbestos-free materials are allowable.

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.

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 guaranteed by the relevant material producer/supplier.

A1 The boiler body of a low-temperature boiler must at least meet the requirements of EN 303-1.

For low-temperature boilers, all parts of the heat exchanger(s) and other parts of the boiler likely to come into contact with condensate shall be constructed of sufficiently corrosion resistant materials or materials protected by a suitable coating in order to ensure a reasonable life for a boiler that is installed, used and maintained in accordance with the manufacturer's instructions.

Surfaces in contact with condensate shall be designed to prevent condensate retention. **A1**

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 weld type (generally the symbol for the weld type is sufficient) and the welding fillers;
- the maximum allowable operating temperature in °C;
- the maximum allowable 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 following requirements of EN 287-1 and EN 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).