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

Heizkessel - Teil 1: Heizkessel mit Gebläsebrenner - Begriffe, Allgemeine Anforderungen, Prüfung und Kennzeichnung

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

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

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This European Standard was approved by CEN on 26 June 2017.

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European foreword

This document (EN 303-1:2017) 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of an identical text or by endorsement, at the latest by March 2018, and conflicting national standards shall be withdrawn at the latest by March 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate M/534 and M/535 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 and Annex ZB, which are integral parts of this document.

This document supersedes EN 303-1:1999 and EN 15034:2006.

The following essential changes have been made:

a) Construction requirements were adopted from EN 15034;

b) Terminology of EU-Regulations 811/2013 and 813/2013 adopted;

c) the document was completely revised technically;

d) the document was completely revised editorially.

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

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

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

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

— EN 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*

— EN 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*

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

1 Scope

This European Standard applies to boilers used for central heating (heating boilers) with forced draught burners with a nominal heat output not exceeding 1 000 kW, which are operated either with negative pressure (natural draught boilers) or with positive pressure (pressurized boiler) in the combustion chamber, in accordance with the boiler instructions.

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

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

The requirements of this standard apply to heating boilers that 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 and water heaters (storage or continuous flow heater) this standard only applies to the parts 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, boilers with oil vaporization burners. For these boilers there are further requirements.

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 226:1987, *Atomizing oil burners - Connecting dimensions between burners and heat generators*

EN 303-2:2017, *Heating boilers - Part 2: Heating boilers with forced draught burners - Special requirements for boilers with atomizing oil burners*

EN 303-4:1999, *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*

EN 304:2017, *Heating boilers - Test code for heating boilers for atomizing oil burners*

EN 10025-2:2004, *Hot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10027-2:2015, *Designation systems for steels - Part 2: Numerical system*

EN 10028-2:2017, *Flat products made of steels for pressure purposes - Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

EN 10028-3:2017, *Flat products made of steels for pressure purposes - Part 3: Weldable fine grain steels, normalized*

EN 10029:2010, *Hot-rolled steel plates 3 mm thick or above - Tolerances on dimensions and shape*

EN 10088-2:2014, *Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

EN 10204:2004, *Metallic products - Types of inspection documents*

EN 13501-1:2007+A1:2009, *Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests*

EN 14597:2012, *Temperature control devices and temperature limiters for heat generating systems*

EN 60335-1:2012, *Safety of household and similar electrical appliances — Part 1: General requirements (IEC 60335-1:2010)*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 60730-1:2011, *Automatic electrical controls for household and similar use - Part 1: General requirements (IEC 60730:2010), modified*

EN 60730-2-9:2010, *Automatic electrical controls for household and similar use - Part 2-9: Particular requirements for temperature sensing controls (IEC 60730-2-9:2008), modified*

EN 61000-6-2:2005, *Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments (IEC 61000-6-2:2005)*

EN 61000-6-3:2007, *Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3:2006)*

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 + A1:2008, modified + A2:2012, modified)*

EN ISO 4063:2010, *Welding and allied processes - Nomenclature of processes and reference numbers (ISO 4063:2009)*

EN ISO 6506 (all parts), *Metallic materials - Brinell hardness test*

EN ISO 9606-1:2013, *Qualification testing of welders - Fusion welding - Part 1: Steels (ISO 9606-1:2012 including Cor 1:2012)*

EN ISO 9606-2:2004, *Qualification test of welders - Fusion welding - Part 2: Aluminium and aluminium alloys (ISO 9606-2:2004)*

EN ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)*

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 7-2:2000, *Pipe threads where pressure-tight joints are made on the threads — Part 2: Verification by means of limit gauges*

ISO 185:2005, *Grey cast irons - Classification*

ISO 228-1:2000, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

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 857-2:2005, *Welding and allied processes — Vocabulary — Part 2: Soldering and brazing processes and related terms*

ISO 2553:2013, *Welding and allied processes - Symbolic representation on drawings - Welded joints*

ISO 7005-1:2011, *Pipe flanges — Part 1: Steel flanges for industrial and general service piping systems*

ISO 7005-2:1988, *Metallic flanges — Part 2: Cast iron flanges*

ISO 7005-3:1988, *Metallic flanges — Part 3: Copper alloy and composite flanges*

3 Terms and definitions, units and symbols

3.1 Terms and definitions

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

3.1.1
operating pressure
maximum allowable pressure at which the boiler is to be normally operated

Note 1 to entry: The operating pressure is less than the test pressure and the type test pressure.

3.1.2
test pressure
pressure to which all boilers and their parts are subjected during production

3.1.3
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

3.1.4
operating temperature
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

3.1.5
heat output
P
amount of heat transferred to the heat carrier (water) per unit of time

3.1.6
heat output range
span between the minimal and the maximal heat output over which the boiler meets the requirements of this standard and over which it can be used, whether it is a range rated or a modulating boiler

3.1.7
nominal heat output
P_N
continuous output in accordance with the requirements of this standard

Note 1 to entry: The nominal heat output is equal to the rated heat output P_4 according to EU Regulation 813/2013.

3.1.8
heat input
Q_B
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

3.1.9
boiler efficiency
η
ratio of the heat output (P) to the heat input (Q_B) supplied by the fuel

$$\eta = \frac{P}{Q_B}$$

Note 1 to entry: η is equal to η_4 according to EU Regulation 813/2013, if P is equal to $100\ \%\ P_N$ (full load).

Note 2 to entry: η is equal to η_1 according to EU Regulation 813/2013, if P is equal to $0,3 \times P_N$.

3.1.10
draught
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

3.1.11
flue gas resistance
pressure differential between the combustion chamber and the boiler exit

3.1.12
combustion circuit
comprises all components between air inlet and flue gas outlet of boiler which may include the air supply device, the burner, the combustion chamber, the heat exchanger and the flue gas evacuation device

3.1.13
soundness of the boiler
limited leakage of the combustion circuit

3.1.14
flue gas temperature
T_{dfg}
temperature measured at the outlet of the boiler

3.1.15
flue gas loss
quantity of heat per unit time lost at the flue gas exit of the boiler

3.1.16
water side resistance
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

3.1.17
condensate
liquid formed from the combustion products during the condensation process

3.1.18
standard boiler
boiler for which the average water temperature can be restricted by design

3.1.19
low temperature boiler
boiler which can work continuously with a water return temperature of 35 ° to 40 °C or lower, possibly producing condensation in certain circumstances without impairing the boiler's operation and without necessity of condensate drainage

Note 1 to entry: No nozzle for condensate drainage intended.

3.1.20
condensing boiler
boiler that, under normal operating conditions and at certain operating water temperatures, partially condenses the water vapour in the combustion products in order to make use of the latent heat of water vapour for heating purposes

Note 1 to entry: Always with nozzle for condensate drainage.

3.1.21
electrical power consumption at rated output
el_{max}
auxiliary electricalpower consumption at full load, expressed in kW

3.1.22
electrical power consumption at part load
el_{min}
auxiliary electrical power consumption at part load, expressed in kW

3.1.23
Electrical power consumption at standby
P_{SB}
auxiliary electrical power consumption of a heater in standby mode, expressed in kW

3.1.24
seasonal space heating energy efficiency in active mode
η_{son}
weighted average of the useful efficiency at rated heat output and the useful efficiency at 30 % of the rated heat output, expressed in %

[SOURCE: EU Regulation 813/2013 Annex I, Definition 11]

3.1.25
seasonal space heating energy efficiency
η_s
ratio between the space heating demand for a designated heating season, supplied by a heater and the annual energy consumption required to meet this demand, expressed in %

[SOURCE: EU Regulation 813/2013, §2 (20)]

Note 1 to entry: Weighted average of the useful efficiency at rated heat output and the useful efficiency at 30 % of the rated heat output, expressed in % corrected with respect to control, the electrical consumption, the standby heat loss and the pilot consumption if any.

3.1.26
temperature sensing control type TR
thermostat or modulating thermostat used in heat generating systems for controlling the temperature of liquid or/and gaseous media, which has provisions for setting by the user and which, if equipped with an electrical output, provides at least type 1B action

Note 1 to entry: See 2.2.4 and 2.2.6 of EN 60730–1:2011 and see 2.2.105 of EN 60730–2-9:2010.

3.1.27
temperature sensing control type STB
safety temperature limiter (thermal cut out, protective control) for heat generating systems which can only be reset manually or by a tool and which provides at least the actions according to EN 14597

Note 1 to entry: Type 2K action will be considered to be provided if type 2N action is provided.

Note 2 to entry: Actions according to EN 14597: type 2B, type 2K, type 2P and type 2V and optionally any of the following actions: type 2F and type 2N; the settings of this control are unchangeably fixed or can be fixed with a tool or a special tool.

3.1.28
nominal condensing output
P_{cond}
value of useful output, in kW and corresponding to the operation of the boiler in a 50 °C/30 °C water temperature regime

[SOURCE: EN 15034:2006, definition 3.2]

3.2 Units and symbols

3.2.1 Units

The unit system applied in this standard is the SI system, cf. ISO 80000-1 and others.

The following units and their multiples are used:

Length	m	(metre);
	mm	(millimetre);
Mass	kg	(kilogram);
Power	kW	(kilowatt);
Efficiency	η	(percent);

Other units applied:

Temperature	°C	(degrees Celsius).