SLOVENSKI STANDARD
SIST EN 303-3:1999

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Kotli za ogrevanje - 3. del: Plinski kotli za centralno ogrevanje – Sestava kotla in ventilatorskega gorilnika

Heating boilers - Part 3: Gas-fired central heating boilers - Assembly comprising a boiler body and a forced draught burner

Heizkessel - Teil 3: Zentralheizkessel für gasförmige Brennstoffe - Zusammenbau aus Kessel und Gebläsebrenner

Chaudieres de chauffage - Partie 3: Chaudieres de chauffage central utilisant les combustibles gazeux - Assemblage d'un corps de chaudiere et d'un bruleur a air soufflé

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English version

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This European Standard was approved by CEN on 22 August 1997.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 109 "Central heating boilers using gaseous fuels", the secretariat of which is held by NNI.

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of an identical text or by endorsement, at the latest by March 1999, and conflicting national standards shall be withdrawn at the latest by March 1999.

This European Standard 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).

This European Standard specifies the tests to be carried out on the assembly of a boiler body in conformity with standard EN 303-1 and a forced draught burner in conformity with standard EN 676.

The European Standard EN 303 includes six Parts :

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

- Part 2 : Heating boilers with forced draught burners - Special requirements for boilers with atomizing oil burners ;

- this Part 3;

- Part 4 : Heating boilers with forced draught burners - With outputs up to 70 kW and a maximum operating pressure of 3 bar - Terminology, special requirements, testing and marking ;

- Part 5 : Special heating boilers for solid fuels - Hand and automatically fired - Nominal heat output of up 300 kW - Terminology, requirements, testing and marking ;

- Part 6 : Heating boilers with forced draught burners - Specific requirements for the domestic hot water operation of liquid-fired combination boilers of nominal heat output not exceeding 70 kW

This European Standard does not deal with NO_X emissions, as they are treated in EN 676.

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this 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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the requirements and test methods for the construction, the safety and the rational energy usage of an assembly made up of a boiler body complying with EN 303- 1[1)] and a forced draught gas burner complying with EN 676, using combustible gases, hereafter referred to as a "boiler".

This European Standard applies to a boiler :

- with a nominal output not exceeding 1 000 kW.

This European Standard does not contain all the necessary requirements for :

- assemblies designed as units ;
- condensing boilers and low temperature boilers ;
- boilers intended to be installed in the open ;
- boilers permanently fitted with more than one flue outlet ;
- boilers fitted with a draught diverter ;
- boilers intended to be connected to a common flue having mechanical extraction.

This European Standard does not apply to living-space dedicated boilers (see 3.6).

If the boiler body has already been tested with a liquid fuel burner, in accordance with EN 303-1, EN 303-2 and EN 304, only the tests described in annex G need to be performed.

In the case of a range of boilers, see annex F.

This European Standard does not contain all the necessary requirements for low temperature boilers. Nevertheless, the testing methods defined by this European Standard for the determination of useful efficiencies can be used for low temperature boilers, after being adapted in accordance with annex H.

This European Standard only covers type testing.

2 Normative references

This present European Standard incorporates by means of 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 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 303-1	Heating boilers - Heating boilers with forced draught burners - Part 1 : Terminology, general requirements, testing and marking

1) The conformity with the standard EN 303-1 can be obtained jointly by the EN 303-1 specific tests and the EN 303-2 or EN 303-3 tests. If the boiler body has already been tested for conformity with EN 303-2, see annex G.

EN 303-2	Heating boilers - Heating boilers with forced draught burners - Part 2 : Special requirements for boilers with atomizing oil burners
EN 304	Heating boilers - Test code for heating boilers for atomizing oil burners
EN 676	Automatic forced draught burners for gaseous fuels

3 Definitions

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

3.1 gas rates

3.1.1 volumetric rate

The volume of gas consumed by the boiler in unit time during continuous operation, expressed in cubic metres per hour (m^3/h).

Symbols :

- V (under test conditions)
- V_r (under reference conditions)

3.1.2 mass rate

The mass of gas consumed by the boiler in unit time during continuous operation, expressed in kilograms per hour (kg/h), or on occasions in grams per hour (g/h).

Symbols :

- M (under test conditions)
- M_r (under reference conditions)

3.2 heat input

The product of the volumetric rate or the mass rate, and the net calorific value of the gas, under the same reference conditions, expressed in kilowatts (kW).

Symbol : Q

3.2.1 nominal heat input [2)]

The heat input stated by the manufacturer, expressed in kilowatts (kW).

Symbol : Q_n

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2) Boilers fitted with a range-rating device operate at a nominal heat input between the maximum and minimum adjustable heat inputs. Modulating boilers operate between the nominal heat input and the minimum controlled heat input. The maximum heat input corresponds to the nominal output of the boiler in accordance with EN 303-1.

3.3 outputs

3.3.1 useful output

The quantity of heat transmitted to the heat carrier in unit time, expressed in kilowatts (kW).

Symbol : P

3.3.2 nominal output

The useful output stated by the manufacturer, expressed in kilowatts (kW).

Symbol : P_n

3.4 useful efficiency

The ratio of the useful output to the heat input, expressed in percent (%).

Symbol : η_u

3.5 nominal voltage

The voltage or range of voltages stated by the manufacturer, at which the boiler can operate normally.

3.6 boiler to be installed in the living space

A boiler with an effective rated output of less than 37 kW, designed to provide heat to the part of the living space in which it is installed by means of the emission of heat from the casing having an open expansion chamber, supplying hot water using gravity circulation.

3.7 unit

Assembly comprising a boiler body and a forced draught burner, designed and marketed as a complete boiler.

4 Assembly requirements

4.1 General principles

The boiler body shall be in accordance with EN 303-1[3)] .

The forced draught gas burner shall be in accordance with EN 676.

NOTE : This European Standard also allows the results obtained with the assembly tested in accordance with this standard to be extended to assemblies of the same boiler body with other burners complying with EN 676 (see annex E about assembly criteria).

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3) The conformity with the standard EN 303-1 can be obtained jointly by the EN 303-1 specific tests and the EN 303-2 or EN 303-3 tests. If the boiler body has already been tested for conformity with EN 303-2, see annex G.

4.2 Materials

Asbestos-containing materials shall not be used.

4.3 Combustion products evacuation ducts

For information, the diameters of combustion products evacuation ducts in the various countries are stated in table A.1.

5 Operational requirements

5.1 General

Unless otherwise stated, the following requirements are checked under the test conditions of 6.1.

5.2 Heat inputs

Under the conditions of 6.2 and 6.1.2.8 at the normal test pressure, the maximum and minimum heat inputs shall be obtained to within ± 5 %.

5.3 Safety of operation

5.3.1 Limiting temperature of adjusting, control and safety devices

Under the conditions of 6.3.1, the temperature of the adjusting, control and safety devices shall not exceed the maximum value stated by the manufacturer, and their operation shall remain satisfactory.

The surface temperatures of control knobs and of all parts that have to be touched during normal use of the boiler, measured only in the zones intended to be gripped, and under the conditions stated in 6.3.1, shall not exceed the ambient temperature by more than :

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

5.3.2 Limiting temperature of the side walls, the front and the top

The temperature of the side walls, front and top of the boiler, under the conditions of 6.3.2, shall not exceed the ambient temperature by more than 80 K.

Nevertheless, the boiler doors, parts of the case within 5 cm of the sight glass and within 15 cm of the boiler combustion products outlet are exempt from this requirement.

Under the conditions of 6.3.2, the average temperature of the boiler doors shall not exceed the ambient temperature by more than 100 K.

5.3.3 Limiting temperature of the floor and the test panels

The temperature of the floor on which the boiler is placed and that of the test panels placed at the side of and behind the boiler shall at no point exceed 80 °C when measured under the conditions specified in 6.3.3.

Where the temperature is between 50 °C and 80 °C, the manufacturer's technical manual shall include information regarding the installation of protection between the boiler and the floor or walls, where these latter consist of flammable materials.

5.3.4 Operation of control and safety thermostats

Under the conditions of 6.3.4, the gas supply to the burner shall be shut off before the relevant water flow temperature is exceeded.

5.3.5 Carbon monoxide

Under the conditions of 6.3.5, the CO concentration of the dry, air-free combustion products shall not exceed 0,10 % when the boiler is supplied with the reference gas at the maximum nominal heat input.

5.4 Useful efficiencies

5.4.1 Useful efficiency at the maximum nominal heat input (see figure 4)

Under the conditions of 6.4.1, the useful efficiency, expressed in percent, shall be at least equal to the values derived from table 1 :

Table 1 : Useful efficiency requirement at maximum nominal heat input

Ranges of nominal heat output	Efficiency requirement expressed at maximum nominal heat input %
4 kW ≤ P_n ≤ 400 kW	84 + 2 log P_n 1)
400 kW < P_n ≤ 1 000 kW	89,2
1) P_n is the maximum nominal output, expressed in kilowatts (kW).	

5.4.2 Useful efficiency at part load (see figure 4)

Under the conditions of 6.4.2, the useful efficiency for a load corresponding to 30 % of the maximum nominal heat input, expressed in percent, shall be at least equal to the values derived from table 2 :

Table 2 : Useful efficiency requirement at part load

Ranges of nominal output	Efficiency requirement expressed at part load %
4 kW $\leq P_n \leq$ 400 kW	80 + 3 log P_n [1)]
400 kW < $P_n \leq$ 1 000 kW	87,8
1) P_n is the maximum nominal output, expressed in kilowatts (kW).	

5.5 Required draught and combustion products circuit resistance

During the tests, the combustion products circuit resistance or draught shall be determined.

For boilers which operate with negative pressure in the combustion chamber, the values of draught requirements listed in figure 5 are normally to be regarded as limits. They are also guide values for the sizing of the flue.

For boilers which operate with positive pressure in the combustion chamber, the values for the combustion products circuit resistance listed in figure 6 are to be regarded as limits.

If these values of combustion products circuit resistance or draught requirements are exceeded reference shall be made to this in the technical literature.

6 Test methods

6.1 General

The following test conditions are generally applicable except where otherwise specified in particular subclauses.

6.1.1 Conduct of the tests

The boiler is supplied with a reference gas for its category (or a distributed gas for the boilers with a nominal output exceeding 300 kW) and adjusted in accordance with the information given by the manufacturer. Except where otherwise stated, the tests are performed at the maximum nominal heat input.

6.1.2 General test conditions

6.1.2.1 Test room

The boiler is installed in a well ventilated, draught-free room, which has an ambient temperature of about 20 °C ; the boiler is protected from direct solar radiation.

6.1.2.2 Installation requirements

For all the tests, the boiler is installed, used and put into operation under the conditions specified in the manufacturer's instructions.

The combustion products are sampled by devices shown in figures 2 or 3, as appropriate.

6.1.2.3 Water circuit

The boiler is connected to the insulated test rig shown schematically in figures 1a or 1b, or to other equipment giving equivalent results ; it is purged of air in accordance with the information stated in the manufacturer's instructions.

If the boiler is fitted with an adjustable water temperature thermostat, the tests are carried out with a water flow temperature of (80 ± 2) °C.

However, where these conditions cannot be obtained (due to the design of the boiler or non adjustable thermostat), the tests are carried out with the maximum possible water temperatures.

Valves I and II from figures 1a or 1b are used to obtain a temperature difference between the flow and return of (20 ± 1) K or the value stated by the manufacturer if the design of the boiler control system does not allow correct operation at a 20 K temperature difference.

6.1.2.4 Thermal equilibrium

Except where otherwise stated, the tests are carried out with the boiler at thermal equilibrium, i.e. when the water flow and return temperatures of the boiler have stabilized to ± 2 K.

6.1.2.5 Electrical supply

The boiler shall be supplied at the nominal voltage.

6.1.2.6 Uncertainty of measurements

Except where otherwise stated in the particular clauses, measurements shall be carried out with the maximum uncertainties indicated below :

1) atmospheric pressure	± 5 mbar ;
2) combustion chamber and test flue pressure	± 5 % full scale or 0,05 mbar ;
3) gas pressure	± 2 % full scale ;
4) water-side pressure loss	± 5 % ;
5) water rate	± 1 % ;
6) gas rate	± 1 % ;
7) time	± 0,2 s up to 1 h ;
	± 0,1 % beyond 1 h ;
8) auxiliary electrical energy	± 2 % ;