SLOVENSKI STANDARD
SIST EN 303-6:2019

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Kotli za gretje - 6. del: Kotli z ventilatorskimi gorilniki - Posebne zahteve za delovanje in energijske lastnosti grelnikov sanitarne vode in kombiniranih kotlov z razprševalnimi oljnimi gorilniki z nazivno močjo do vključno 70 kW

Heating boilers - Part 6: Heating boilers with forced draught burners - Specific requirements for the domestic hot water operation and energy performance of water heaters and combination boilers with atomizing oil burners of nominal heat input not exceeding 70 kW

Heizkessel - Teil 6: Heizkessel mit Gebläsebrennern - Spezielle Anforderungen an die trinkwasserseitige Funktion und energetische Bewertung von Wassererwärmern und von Kombi-Kesseln mit Ölzerstäubungsbrennern mit einer Nennwärmeleistung kleiner als oder gleich 70 kW

Chaudières de chauffage - Partie 6 : Chaudières avec brûleurs à air soufflé - Exigences spécifiques à la fonction eau chaude sanitaire et à la performance énergétique des préparateurs d'eau chaude et des chaudières à deux services avec brûleurs fioul à pulvérisation dont le débit calorifique nominal est inférieur ou égal à 70 kW

Ta slovenski standard je istoveten z: **EN 303-6:2019**

ICS:

27.060.30	Grelniki vode in prenosniki toplote	Boilers and heat exchangers
91.140.65	Oprema za ogrevanje vode	Water heating equipment

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EUROPEAN STANDARD

NORME EUROPÉENNE

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English Version

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This European Standard was approved by CEN on 10 June 2019.

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

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European foreword

This document (EN 303-6:2019) 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of an identical text or by endorsement, at the latest by February 2020, and conflicting national standards shall be withdrawn at the latest by February 2020.

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 supersedes EN 303-6:2000.

EN 303-6 is revised to update it for:

— EN 13203-1 for the specific flow rate where a new method replaced the method used in EN 625 which was deleted (replaced partially by EN 15502-1 and EN 13203-1);

— ERP requirements for water heating appliances based on the work done by CEN/TC 109 WG4 in the revision of EN 13203-2.

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: Special heating boilers for solid fuels, hand and automatically stoked, 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*

Annexes A and B of this European Standard are informative.

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 Annexes ZA, ZB, ZC and ZD, which are an integral part of this document.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document is composed of two parts.

The first part supplements EN 303-1, EN 303-2, EN 303-4 and EN 304, hereafter called boiler standards. It specifies the supplementary requirements and tests for the construction, safety, rational use of energy, fitness for purpose, classification and marking related to the domestic hot water operation of oil-fired water heaters and combination boilers.

The domestic hot water is produced on either the instantaneous or storage principle. The domestic hot water production is integrated or coupled, the whole being marketed as a single unit.

The second part covers the energy performance of domestic hot water production of the appliances covered by the first part.

This second part sets out a method for assessing the energy performance of the appliances. It defines a number of daily tapping cycles for each domestic hot water use such as kitchen, shower, bath and a combination of these, together with corresponding test procedures, enabling the energy performances of combination boilers and water heaters to be compared and matched to the needs of the user.

The heat output of the appliances covered by this standard does not exceed 400 kW.

In the case of combination boilers, with or without storage tank, domestic hot water production is integrated or coupled, the whole being marketed as a single unit.

This standard only covers type testing.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 303-1:2017, *Heating boilers — Part 1: Heating boilers with forced draught burners — Terminology, general requirements, testing and marking*

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

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

EN 1057, *Copper and copper alloys — Seamless, round copper tubes for water and gas in sanitary and heating applications*

EN 13203-2, *Gas-fired domestic appliances producing hot water — Part 2: Assessment of energy consumption*

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13203-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
combination boiler
boiler designed both for central heating and for the production of domestic hot water

Note 1 to entry: Depending on its type of domestic hot water production, the combination boiler is classed as follows, in accordance with the manufacturer's declaration.

3.1.1
instantaneous type
combination boiler which can continuously supply the specific domestic hot water rate "D" stated by the manufacturer

3.1.2
storage type
combination boiler which can intermittently supply the specific domestic hot water rate "D" stated by the manufacturer

3.2
"summer" operating mode
operating mode in which the boiler only provides heating of the domestic water

3.3
specific rate
D
domestic hot water rate declared by the manufacturer, corresponding to a mean temperature rise of 30 K, that the boiler can supply in two successive delivery periods (in l/min)

3.4
nominal domestic hot water heat input
Q_{nw}
value of the heat input in the domestic hot water mode indicated by the manufacturer (in kW)

3.5
maximum water service pressure
PMS
maximum pressure permitted in the domestic water circuit, as declared by the manufacturer (in bar)

3.6
tank
reservoir of domestic water

3.7
thermal store
heat reservoir sited mainly in heating water, as opposed to the domestic hot water storage in the tank

3.8
pressure relief valve
valve that opens automatically at a given pressure to discharge hot water

3.9
thermostatic control of the domestic hot water operation
means of control in which the fuel rate is subordinated to a thermostatic device controlling the domestic hot water temperature, the set point of the device may be adjustable

3.10
temperature holding thermostat
device which maintains the water in the tank or the thermal store at a given temperature

3.11
low inertia thermometer
measuring instrument with a response time such that 90 % of the final temperature rise, in the range 15 °C to 100 °C, is obtained within 5 s when the sensor is plunged into still water

3.12
nominal domestic hot water input
Q_{nw}
value of the heat input for the production of domestic hot water stated in the instructions (in kW)

3.13
summer mode
conditions during which the appliance supplies energy only for the production of domestic hot water (is also domestic hot water mode)

3.14
winter mode
conditions during which the combination boiler supplies energy for the production of domestic hot water and space heating (the appliance produces domestic hot water and central heating hot water simultaneously with a priority for domestic hot water production)

Note 1 to entry: A water heater operates always in summer mode, while a combination boiler operates in summer and winter modes.

3.15
domestic water test temperature
temperature of the delivered water at which the tests are conducted

3.16
control cycle
time cycle for keeping components and/or the storage tank (if any) of the domestic hot water circuit at predetermined temperature level

Note 1 to entry: It consists of an "ON" duration time during which the heating of the domestic hot water (by liquid fuel and/or auxiliary energy) and an "OFF" duration time.

3.17
useful water
quantity of water delivered at the tap for which the temperature rise above the inlet water temperature is in accordance with the requirement fixed for each individual delivery of the tapping cycles

3.18
wasted water
quantity of water delivered at the tap for which the temperature rise above the inlet water temperature is not in accordance with the requirement fixed for each individual delivery of the tapping cycles

3.19
standby mode
operating state in which the appliance can provide domestic hot water at any time

Note 1 to entry: In the case of an appliance with a control cycle for keeping components and/or the storage tank (if any) of the domestic hot water circuit at predetermined temperature level no tapping is made.

3.20
off mode
state of an appliance, selected by the user, in which domestic hot water cannot be provided

3.21
useful water flow rate
flow rate of water delivered at the tap for which the temperature rise above the inlet water temperature is in accordance with the requirement fixed for each individual delivery of the tapping cycles

3.22
useful water temperature
water temperature, expressed in degrees Celsius, delivered at the tap

Note 1 to entry: Tap at the exit of the appliance.

3.23
appliance flow rate
flow rate delivered by the appliance before the mixing device, if applicable

3.24
appliance water temperature
water temperature, expressed in degrees Celsius, delivered by the appliance before the mixing device

4 Constructional requirements

4.1 General

It is checked that the assembly meets the constructional requirements by visual examination of the boiler or the water heater and possibly the tank, and also by inspection of the technical file.

4.2 Materials and method of construction of components of the domestic water circuit

Materials shall be appropriate for their use, under intended application and at the maximum water pressure stated by the manufacturer.

The requirements relating to thermal insulation and its use specified in the standards about boilers only apply to parts of the domestic water circuit likely to come into contact with flames or sited close to the combustion products outlet.

The materials of the parts containing domestic water shall not affect the quality of the domestic water in respect of either health or taste.

The whole of the domestic hot water circuit shall be made up of corrosion resistant materials or shall be protected against corrosion.

4.3 Domestic water connections

Threaded connections shall comply with ISO 228-1 or ISO 7-1.

If copper tubes are used for the connection, the end of the tube shall comply with EN 1057.

In accordance with the manufacturer's instructions, the domestic water circuit shall be able to be drained, without the discharge of water compromising electrical safety.

4.4 Soundness of the domestic water circuit

The domestic hot water circuit and the heating circuit shall be separate. If an actuator or a control has a sliding shaft or a link with the diaphragm separating the heating water circuit and the domestic water circuit there shall be an air vent between these circuits. The area of this aperture shall be at least 19 mm^2 and it shall be possible to introduce a 3,5 mm pin gauge into it.

4.5 Adjusting, control and safety devices for the domestic hot water circuit

The domestic hot water circuit shall be fitted with control and safety devices necessary to comply with the requirements "Temperature sensing control type TR and temperature sensing control type STB" of EN 303-1:2017, 4.1.2.6.

The tank shall be fitted with a device for controlling the water temperature. This device shall allow a temperature to be attained which is sufficient to prevent the build-up of bacteria (see 5.2.3.3).

When local installations require a temperature relief valve operating at 100 °C, any device controlling the temperature of the domestic hot water shall act before this valve.

5 Operational requirements

5.1 General

If the nominal heat input in domestic hot water mode exceeds the nominal heat input in the central heating mode, the combination boiler shall be tested according to the EN 303-2 at the nominal heat input in the domestic hot water mode.

A combination boiler certified with an atomizing oil burner will also meet the requirements of this standard if the same boiler is fixed with a forced draught burner for gaseous fuels.

5.2 Safety of the domestic hot water circuit

5.2.1 Instantaneous and storage types

5.2.1.1 Soundness of parts containing domestic water

Under the test conditions of 6.2.1.1, the parts containing domestic water shall withstand the test pressure without permanent distortion or soundness defects, with respect to the outside or the heating circuit.

5.2.1.2 Overheating of the domestic hot water by the heating circuit

Under the test conditions of 6.2.1.2, the domestic hot water temperature shall not exceed 95 °C.

5.2.1.3 Failure of the domestic hot water temperature control device

Under the test conditions of 6.2.1.3, in the domestic water mode and in the event of failure of the normal control the requirements for safety limiter (see EN 303-1:2017, 4.1.2.6) concerning the limit thermostat or the safety temperature limiter shall be met.

5.2.2 Instantaneous type

5.2.2.1 Maximum domestic hot water temperature

Under the test conditions of 6.2.2.1, the domestic hot water temperature shall not exceed 95 °C.

5.2.2.2 Overheating of the domestic hot water

Under the test conditions of 6.2.2.2, the domestic hot water temperature shall not exceed 95 °C.

5.2.3 Storage type

5.2.3.1 Maximum temperature of the domestic hot water

Under the test conditions of 6.2.3.1, the domestic hot water temperature shall not exceed 95 °C.

5.2.3.2 Overheating of the domestic hot water

Under the test conditions of 6.2.3.2 for boilers in which part of the tank is in contact with products of combustion, the domestic hot water temperature shall not exceed 95 °C.

5.2.3.3 Temperature of the domestic hot water

Under the test conditions of 6.2.3.3, it shall be possible to adjust to or obtain a domestic hot water temperature of at least 60 °C in the tank.

5.3 Rational use of energy

The considered useful efficiency is that measured in the central heating mode.

5.4 Fitness of purpose

5.4.1 Instantaneous and storage types — Specific water rate

Under the test conditions of 6.4.1, the measured value of the specific rate shall not be more than 5 % below the value *D* stated by the manufacturer on the data plate.

5.4.2 Instantaneous type

5.4.2.1 Nominal domestic hot water heat input

Under the test conditions of 6.4.3.1, the nominal domestic hot water heat input shall be obtained or may be adjusted to within ±5 %.

5.4.2.2 Water pressure to obtain the nominal heat input

Under the test conditions of 6.4.3.2, the heat input obtained shall be at least 95 % of the heat input obtained in 6.4.3.1.

5.4.2.3 Obtaining the domestic hot water temperature

Under the conditions of 6.4.3.3, it shall be possible to achieve or adjust to a water rate that corresponds to a temperature of between 50 °C and 80 °C for boilers with a thermostatic control or a temperature rise at the boiler outlet of between 45 K and 65 K for boilers with proportioning control.

5.4.2.4 Heating-up time of the domestic hot water

Under the test conditions of 6.4.3.4, the heating-up time shall not exceed 2 min.

6 Test methods

6.1 General

6.1.1 Test conditions

Unless otherwise specified, the general test conditions of the standards about boilers are supplemented as stated below:

— cold water: (10 ± 2) °C;

— hot water: 50 °C or as near as possible;

— central heating water (if necessary): see standards about boilers (flow 80 °C – return 60 °C).

For the tests:

— the domestic water pressure is the difference between the static inlet and outlet pressures of the boiler measured as close as possible to the boiler;

— the inlet and outlet temperatures of the domestic water are measured in the centre of the flow and as close as possible to the boiler.

In certain tests, a low inertia thermometer is used.

6.1.2 Adjustment of the domestic water pressure

The domestic water pressure shall be adjusted to the required value within a tolerance of ±4 %.

6.1.3 Operation of the boiler

Except where otherwise specified, the tests are carried out with the boiler operating in the domestic water mode and the “summer” operating mode.

6.2 Safety of the domestic hot water circuit

6.2.1 Instantaneous and storage types

6.2.1.1 Soundness of the parts containing domestic water

The domestic water circuit is subjected to a pressure of 1,5 times the maximum pressure given on the data plate for 10 min.

It is checked that the requirements of 5.2.1.1 are met.

6.2.1.2 Overheating of the domestic hot water by the central heating circuit

The central heating circuit thermostat is set at its maximum position.

The appliance operates continuously for one hour at the nominal heat input in the central heating mode, without drawing domestic hot water. A draw off at the specific rate D is then carried out and the requirement of 5.2.1.2 is checked.

6.2.1.3 Failure of the domestic hot water temperature control device

To check the requirements of 5.2.1.3, the draw off domestic water rate is progressively reduced after having put out of action the adjusting control of the domestic water circuit, in accordance with the test methods relating to the limit thermostat or the temperature limiter with the boiler operating at its maximum heat input.

6.2.2 Instantaneous type

6.2.2.1 Maximum temperature of the domestic hot water

The boiler is operated at the nominal domestic hot water heat input with a domestic water supply pressure of 2 bar.

Starting with this 2 bar supply pressure, the pressure is progressively reduced until the burner is extinguished. The water outlet temperature is measured continuously with a low inertia thermometer. The maximum temperature is measured and shall satisfy the requirements of 5.2.2.1.

6.2.2.2 Overheating of the domestic hot water

The boiler is operated at the nominal domestic hot water heat input, where appropriate. The water rate and any water temperature control are adjusted to obtain the maximum water temperature at the nominal domestic hot water heat input.

After the boiler has operated for 10 min, the hot water delivery tap is turned off quickly. After 10 s the tap is turned on quickly and the highest temperature at the centre of the flow, as close as possible to the boiler outlet, is measured by means of a low inertia thermometer. The boiler remains in operation until it has again reached its steady-state condition. The same measurements are made during similar operating cycles, but with the time that the draw off is stopped increased each time by 10 s, until the maximum temperature is obtained.

It is checked that the requirement of 5.2.2.2 is met.

6.2.3 Storage type

6.2.3.1 Maximum temperature of the domestic hot water

The boiler is operated at the nominal domestic hot water heat input with the domestic water thermostat at its maximum position. A draw off is carried out after a shut-down of the burner. The maximum temperature measured shall meet the requirement of 5.2.3.1.

6.2.3.2 Overheating of the domestic hot water

The test starts after the tank or the thermal store has reached temperature and after the burner has been shut down a second time by the controls. Water is drawn off several times at a rate corresponding to 5 % of the water capacity of the tank, in litres per minute.

On each occasion, water is drawn until the burner ignites and at least 95 % of the nominal domestic hot water heat input is obtained. The next draw off then takes place immediately after the burner shuts down, and so on until the maximum temperature is obtained.

For modulating burners or multi-stage burners, the following draw off takes place when the fuel rate has decreased at least to 50 % of the maximum domestic hot water heat input reached.

At the start of each draw off, the temperature of the delivered water is measured and it is checked that the requirement of 5.2.3.2 is met.

6.2.3.3 Temperature of the domestic hot water

Where applicable, the adjuster is placed in the position stated by the manufacturer. After a controlled shutdown of the boiler, a draw off is carried out for 10 min at a rate equivalent to 5 % of the water capacity of the tank per minute or at the minimum rate stated by the manufacturer which allows burner ignition if this is greater than 5 % of the capacity of the tank per minute. After 1 min, it is checked that the requirements of 5.2.3.3 are met.

6.3 Rational use of energy

6.3.1 Useful efficiency

The test is carried out in the central heating mode in the relevant boiler standards.

6.3.2 Losses

6.3.2.1 General

Depending on the way in which hot water is produced, the requirement of 5.3 is checked under the test conditions defined below.

6.3.2.2 Tank which can be disconnected from the boiler

6.3.2.2.1 General

The losses from the boiler/tank assembly are determined by adding up the losses from the boiler and the tank.

The manufacturer states how the tank shall be separated from the boiler, and which pipework shall be taken into account in the boiler losses and which will be counted with the tank.

6.3.2.2.2 Boiler

For the boiler, the losses (standby losses) are measured according to EN 304.

The heat exchanger for the tank is disconnected from the boiler.

Also, where the boiler and the tank are coupled within the same case, the losses from the boiler alone are measured with the tank empty.

6.3.2.2.3 Tank

For the tank, the following mode of operation is used:

If the tank and the boiler are coupled within the same case, the losses from the tank alone are determined with the boiler empty.

a) Preliminary conditions

The test is carried out with a rig equivalent to that described in Figure 1, in a room where the ambient temperature is between 15 °C and 25 °C, with a permitted temperature variation of ±5 °C during the test.

The installation includes an electrical resistance and a circulating pump (long circuit of Figure 1).

Before the test is carried out, the tank is placed in the position recommended by the manufacturer. For a tank with two positions, vertical or horizontal, the test is done in the vertical position.

It is filled with water heated to a temperature of (65 ± 2) °C by circulation in a closed circuit, having the tank and its exchanger in series. The tank domestic water temperatures are deemed to have reached uniformity at the moment t_1 that circulation stops, if the following conditions are met:

— the difference between the domestic water outlet temperature (T_s) and the domestic water inlet temperature (T_e) remains less than 1 K continuously for the 15 min before moment t_1;

— the inlet temperature (T_e) has not changed by more than 1 K during this period.