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Ocenjevanje zmogljivosti priprave tople vode

Gas fired domestic appliances producing hot water - Part 1: Assessment of performance of hot water deliveries

Gasbeheizte Geräte für die sanitäre Warmwasserbereitung für den Hausgebrauch - Teil 1: Bewertung der Leistung der Warmwasserbereitung

Appareils domestiques produisant de l'eau chaude sanitaire utilisant les combustibles gazeux - Partie 1 : Évaluation de la performance en puisage d'eau chaude

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sanitaire utilisant les combustibles gazeux - Partie 1 :
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Gasbeheizte Geräte für die sanitäre
Warmwasserbereitung für den Hausgebrauch - Teil 1:
Bewertung der Leistung der Warmwasserbereitung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 109.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 13203-1:2024) has been prepared by Technical Committee CEN/TC 109 “Central heating boilers using gaseous fuels”, the secretariat of which is held by NEN.

This document will supersede EN 13203-1:2015.

The changes in this revision were oriented to align, when relevant, the requirements and tests between instantaneous appliance and appliances with a storage tank. The main changes are the following:

- editorial improvement (definitions, tapping capacity, ...);
- alignment of some Figures with the revised text;
- reference conditions (4.1) aligned to EN 13203-2:2022;
- tests for classification of the appliance on domestic water production (5.3.2 - classification, 5.3.2.7 - temperature fluctuation).

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

NOTE Useful standards are EN 26, EN 15502-1, EN 15502-2-1 and EN 15502-2-2 (see the Bibliography).

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prEN 13203-1:2024 (E)

1 Scope

This document is applicable to gas-fired appliances producing domestic hot water. It applies to both instantaneous and storage appliances; water-heaters and combination boilers that have:

- heat input not exceeding 70 kW; and
- hot water storage capacity (if any) not exceeding 500 l.

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 document sets out in qualitative and quantitative terms the performance in delivery of domestic hot water for a selected variety of uses. It also gives a system for presenting the information to the user.

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 89:2015, *Gas-fired storage water heaters for the production of domestic hot water*

3 Terms and definitions

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

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

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

3.1 control cycle

time cycle for keeping components and/or the hot storage water tank (if any) of the domestic hot water circuit at predetermined temperature level, consists of an «ON» duration time during which the heating of the domestic hot water (by gas energy and auxiliary energy) is operating, and an «OFF» duration time during which no heating occurs

3.2 domestic water mean temperature

average temperature of the water delivered during the time Δt

$$T_m = \frac{1}{\Delta t} \int T \cdot dt$$

Note 1 to entry: SYMBOL = T_m

3.3 domestic water test temperature

temperature of the delivered water at which the tests are conducted

3.4 storage tank

reservoir for domestic hot water

3.5**kitchen specific rate**

domestic hot water flow rate corresponding to a mean temperature rise of 45 K that the appliance can supply

Note 1 to entry: SYMBOL = D_c

Note 2 to entry: D_c is expressed in litre per minute (l/min).

3.6**minimum declared water rate**

lowest water rate stated by the manufacturer maintaining a stable temperature

Note 1 to entry: SYMBOL = D_m

Note 2 to entry: D_m is expressed in litre per minute (l/min).

3.7**nominal domestic hot water heat input**

value of the heat input stated by the manufacturer for the production of domestic hot water

Note 1 to entry: SYMBOL = Q_{nw}

Note 2 to entry: Q_{nw} is expressed in kilowatt (kW).

3.8**overall performance factor**

numerical value used to quantify the overall performance associated with domestic hot water use, corresponding to the sum of the products of the particular performance factors multiplied by the weighting coefficients

Note 1 to entry: SYMBOL = F

$$F = \sum_{i=1}^n a_i \cdot f_i$$

3.9**particular performance factor**

numerical value which quantifies each of the performance criteria listed in Table 1

Note 1 to entry: SYMBOL = f_i

3.10**specific rate**

domestic hot water rate declared by the manufacturer corresponding to a mean temperature rise of 30 K that the appliance can supply in two successive delivery periods

Note 1 to entry: SYMBOL = D

Note 2 to entry: D is expressed in litre per minute (l/min).

3.11**summer mode**

conditions during which the appliance supplies energy only for the production of domestic hot water

prEN 13203-1:2024 (E)**3.12****tapping capability**

hot water delivery rate, declared by the manufacturer, at which water can be drawn off for a specified time or times (5 min; 10 min; 20 min or continuous) with a predetermined temperature rise

Note 1 to entry: SYMBOL = R

Note 2 to entry: R is expressed in litre per minute (l/min).

3.13**temperature fluctuation at a constant water rate**

difference between the minimum and maximum water temperatures that can occur during delivery at a constant water rate with a constant inlet temperature

Note 1 to entry: SYMBOL = ΔT_2

Note 2 to entry: ΔT_2 is expressed in Kelvin (K)

3.14**temperature fluctuation between successive deliveries**

maximum domestic hot water temperature difference between successive deliveries

Note 1 to entry: SYMBOL = ΔT_3

Note 2 to entry: ΔT_3 is expressed in Kelvin (K)

3.15**temperature stabilization time following a variation of the water flow rate**

time taken to obtain a predetermined fluctuation, following a rapid variation of the water flow rate

Note 1 to entry: SYMBOL = t_s

Note 2 to entry: t_s is expressed in second (s)

3.16**temperature variation according to water rate**

variation of the mean hot water temperature consequent upon variations of the water flow rate

Note 1 to entry: SYMBOL = ΔT_1

Note 2 to entry: ΔT_1 is expressed in Kelvin (K)

3.17**waiting time**

time taken to reach, at appliance outlet, 90 % of the domestic hot water temperature rise of 45 K without subsequently falling below 34 K

Note 1 to entry: SYMBOL = t_m

Note 2 to entry: t_m is expressed in second (s)

3.18**weighting coefficient**

numerical coefficient used to quantify the importance given to each particular performance factor in connection with the use of domestic hot water

Note 1 to entry: SYMBOL = a_i

3.19

rapid response thermometer

measuring instrument with a response time such that 90 % of the final temperature rise, from 15 °C to 100 °C, is obtained within about 1 s, when the sensor is plunged into still water

4 General test conditions

4.1 Reference conditions

Unless otherwise stated, the general test conditions are as follows:

- cold water temperature: 10 °C;
 - range over the whole duration of the test: (8 °C to 12 °C);
- cold water pressure: 2 bar;
- ambient air temperature: 20 °C;
 - range over the whole duration of the test: (18 °C to 22 °C);
- electrical supply voltage: (230 ± 2) V (single phase).

4.2 Measurement uncertainties

Except where otherwise stated in the clauses describing the tests, the uncertainties of measurements carried out shall not be greater than the maximum uncertainties indicated below.

The standard deviations take account the various sources of uncertainty: contribution from the instrument, repeatability, calibration, ambient conditions, etc.

- water rate: ± 1 %;
- gas rate: ± 1 %;
- time: ± 0,2 s;
- temperatures:
 - ambient: ± 1 K;
 - water: ± 0,5 K;
 - gas: ± 0,5 K;
- mass: ± 0,5 %;
- gas pressure: ± 1 %;
- gas calorific value: ± 1 %;
- gas density: ± 0,5 %;
- electrical energy: ± 2 %.

The stated measurement uncertainties relate to individual measurements. For measurements that combine a number of individual measurements, smaller uncertainties on the individual measurements may be necessary to ensure a total uncertainty within ± 2 % under the steady state conditions.

These uncertainties correspond to two standard deviations (2σ).

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4.3 Test conditions

4.3.1 General

Except where otherwise stated, the appliance shall be tested under the following conditions.

Some examples of measurement profiles as a purely informative indication are given in Annex A (informative).

Information on test rig and measurement devices are given in Annex B (informative).

4.3.2 Test room

The appliance shall be installed in a well-ventilated, draught-free room (air speed less than 0,5 m/s).

The appliance shall be protected from direct solar radiation and radiation from heat generators.

4.3.3 Water supply

For the tests:

- domestic water pressure is the static inlet pressure under dynamic conditions measured as close as possible to the appliance;
- inlet and outlet temperatures of the domestic water shall be measured in the centre of the flow and as close as possible to the appliance.

The inlet temperatures shall be measured immediately upstream of the water inlet connection. Except where otherwise stated, the outlet temperatures shall be measured immediately downstream of the outlet connection or, in the case of an appliance with spout delivery, by means of an immersed temperature measuring device, e.g. a u-tube fitted at the outlet of a tube of the same length as the minimum length of the spout normally supplied by the manufacturer.

The hot water temperature shall be measured with a rapid response thermometer.

"Rapid response thermometer" means a measuring instrument with a response time such that 90 % of the final temperature rise, from 15 °C to 100 °C, is obtained within about 1 s, when the sensor is plunged into still water.

4.3.4 Steady state

Steady state operating conditions shall be regarded as established when the appliance operates for sufficient time to reach thermal stabilization. The steady state is reached when the water temperature at the outlet does not vary by more than $\pm 0,5$ K.

NOTE This condition can be reached with a gas which is different from the specified test gas, provided that appliance is supplied with the specified test gas at least 5 min before the requirements are verified.

4.3.5 Initial adjustment of the appliance

The appliance shall be installed in accordance with the manufacturer's instructions.

The heat input shall be adjusted to within ± 2 % of the nominal domestic hot water heat input.

The delivered water temperature at the appliance outlet is defined as follows (see Figures A.1 and A.2):

- a) appliances with an adjustable temperature: the tests shall be carried out at a temperature not greater than 65 °C, with a minimum temperature increase equal to or greater than 45 K above water inlet temperature.
- b) appliances with a fixed temperature: the tests shall be carried out at the temperature specified by the manufacturer, with a minimum temperature increase equal to or greater than 45 K.

The same conditions of initial adjustment stated in the appliance documentation shall be used for all the tests.

These conditions shall be included in the test report.

4.3.6 Initial state conditions

All the tests of this standard shall be conducted as follows (see Figures A.3 and A.4):

- when there is no control cycle to consider: with exception of test of 5.3.2.7, at least 1h after the previous delivery;
- when there is a control cycle to consider: after a time corresponding to 20 % (but not exceeding 1h) of the "OFF" time of the burner or circulators if any. The time (t_a) is taken from the time the burner or circulators if any turns off in the control cycle.

The same initial state conditions shall be used for all the tests. These conditions shall be included in the test report.

For appliances with a central heating function, tests shall be conducted in summer mode.

4.3.7 Electrical supply

The appliance shall be supplied with the nominal voltage or a voltage included within the range of nominal voltages stated in the installation instructions.

5 Characterisation of the domestic hot water function of appliances

5.1 General

The domestic hot water function shall be characterised in two different ways:

- firstly, according to the domestic hot water specific rates, the tapping capability and the corresponding uses (see 5.2);
- secondly, according to the quality of the domestic hot water produced (see 5.3); obtaining a number of stars corresponding to a determined level of performance.

5.2 Characterisation according to the domestic hot water rates

5.2.1 Specific rate

5.2.1.1 Requirement

The measured value of the specific rate shall be not lower than 95 % of that stated by the appliance documentation.

5.2.1.2 Test

The appliance shall be adjusted to deliver hot water at the rate stipulated by the installation instructions for this test.

The pressure loss across the appliance shall not exceed 2 bar.

During the measurement of the specific rate, the minimum temperature increase shall be equal to or greater than 30 K.

Before the test, the appliance shall be adjusted in accordance with 4.3.5. A first delivery shall be carried out over a period of 10 min, followed by 20 min with no delivery and then by a second delivery over a period of 10 min (see Figures A.5 and A.6).