



SLOVENSKI STANDARD

SIST EN 13203-2:2015

01-september-2015

Nadomešča:
SIST EN 13203-2:2006

Plinske gospodinjske naprave za pripravo tople sanitarne vode - 2. del: Ocenjevanje porabe energije

Gas-fired domestic appliances producing hot water - Part 2: Assessment of energy consumption

Gasbefeuerte Geräte zur Warmwasserbereitung für den Hausgebrauch - Teil 2:
Bewertung des Energieverbrauchs

Appareils domestiques produisant de l'eau chaude sanitaire utilisant les combustibles gazeux - Partie 2: Evaluation de la consommation énergétique

Ta slovenski standard je istoveten z: **EN 13203-2:2015**

ICS:

91.140.65 Oprema za ogrevanje vode Water heating equipment

SIST EN 13203-2:2015

en,fr,de

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EUROPEAN STANDARD

EN 13203-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2015

ICS 91.140.65

Supersedes EN 13203-2:2006

English Version

Gas-fired domestic appliances producing hot water - Part 2: Assessment of energy consumption

Appareils domestiques produisant de l'eau chaude sanitaire
utilisant les combustibles gazeux - Partie 2: Evaluation de la
consommation énergétique

Gasbeheizte Geräte für die sanitäre Warmwasserbereitung
für den Hausgebrauch - Teil 2: Bewertung des
Energieverbrauchs

This European Standard was approved by CEN on 3 April 2015.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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EN 13203-2:2015 (E)**Foreword**

This document (EN 13203-2:2015) has been prepared by Technical Committee CEN/TC 109 “Central heating boilers using gaseous fuels”, the secretariat of which is held by NEN.

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of an identical text or by endorsement, at the latest by November 2015, and conflicting national standards shall be withdrawn at the latest by November 2015.

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

This document supersedes EN 13203-2:2006.

The main purpose of this revision is to provide a means of conforming to requirements of Commission Delegated Regulation (EC) n° 813/2013, (EC) n° 811/2013, (EC) n° 812/2013 and (EC) n° 814/2013.

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 Regulation(s).

For relationship with EU Regulation(s), see informative Annexes ZA, ZB, ZC or ZD, which are integral parts of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organizations 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

The safety operation of the boiler or water heater is not covered by this standard. Safety should be proved by means of the essential safety requirements of the Gas Appliances Directive 2009/142/EC. This may be achieved by compliance with the appropriate existing harmonized standards.

NOTE Useful standards are EN 26, EN 89, EN 15502-1, EN 15502-2-1 and EN 15502-2-2.

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EN 13203-2:2015 (E)**1 Scope**

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

- a heat input not exceeding 70 kW; and
- a hot water storage tank 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.

EN 13203-1 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. The present document 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, kitchen, shower, bath and a combination of these, together with corresponding test procedures, enabling the energy performances of different gas-fired appliances to be compared and matched to the needs of the user. Where other technologies are combined with a gas-fired boiler or a water heater to produce domestic hot water, specific parts of EN 13203 apply.

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.

Not applicable.

3 Terms and definitions

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

3.1**storage tank**

reservoir for domestic hot water

3.2**nominal domestic hot water heat input (Q_{nw})**

value of the heat input for the production of domestic hot water stated in the instructions

— Symbol: Q_{nw}

— Unit: kilowatt (kW)

3.3**summer mode**

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

3.4**winter mode**

conditions during which the combination boiler supplies energy for the production of domestic hot water and space heating

3.5**domestic water test temperature**

temperature of the delivered water at which the tests are conducted

3.6**control cycle**

the time cycle for keeping components and/or the storage 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/or auxiliary energy) is operating, and an «OFF» duration time during which no heating occurs

3.7**useful water**

quantity of water delivered at the tap for which the temperature increase is in accordance with the requirement fixed for each individual delivery of the tapping cycles

3.8**wasted water**

quantity of water delivered at the tap for which the temperature increase is not in accordance with the requirement fixed for each individual delivery of the tapping cycles

3.9**stand by 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.

3.10**off mode**

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

3.11**useful water flow rate**

flow rate of water delivered at the tap for which the temperature increase is in accordance with the requirement fixed for each individual delivery of the tapping cycles

3.12**useful water temperature**

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

3.13**appliance flow rate**

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

3.14**appliance water temperature (T_d)**

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

3.15**water temperature rise (ΔT_m) in K**

difference between the useful water temperature and the cold water temperature, at which hot water is contributing to the reference energy as specified in the tapping cycles

3.16**water temperature rise for basin tapping types (ΔT_p) in K**

difference between the useful water temperature and the cold water temperature, calculated as a mean value over the water

EN 13203-2:2015 (E)**4 General test conditions****4.1 Reference conditions**

Unless otherwise stated, the general test conditions shall be as follows:

- cold water temperature: 10 °C;
 - maximum average variation over the test period: ± 2 K;
- cold water pressure: $(2 \pm 0,1)$ bar;
- ambient air temperature: 20 °C;
 - maximum average variation over the test period ± 1 K;
 - maximum variation during the tests ± 2 K;
- 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 be not greater than the maximum uncertainties indicated below.

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

- water rate: ± 1 %;

- gas rate: ± 1 %;

- time: $\pm 0,2$ s;

- temperatures:

- ambient: ± 1 K;

- water: $\pm 0,5$ K;

- gas: $\pm 0,5$ K;

- mass: $\pm 0,5$ %;

- gas pressure: ± 1 %;

- gas calorific value: ± 1 %;

- gas density: $\pm 0,5$ %;

- 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).

4.3 Test conditions

4.3.1 General

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

For combination gas boiler, the tests shall be carried out only in summer mode as defined in 3.3, and the appliance shall be set in summer mode.

For all tests defined by this standard, the same adjustment of the appliance shall be maintained.

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:

- the domestic water pressure is the static inlet pressure under dynamic conditions measured as close as possible to the appliance;
- the 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 together with the appliance.

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

"Rapid response temperature sensor" 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 the appliance is supplied with the specified test gas for 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 installation instructions.

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

The delivered water temperature (T_d) at the appliance outlet shall be as follows (see Figure A.1 and Figure A.2):

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- 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 in the appliance documentation, 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 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 Determination of the energy consumption of the appliance**5.1 General**

This clause defines the test methods to be employed in determining the energy consumption of appliances.

5.2 Tapping cycles

All patterns define a 24 h measurement cycle and within that cycle the starting times and the total energy content (in kWh equivalent of hot water tapped) of each draw-off are defined.

Furthermore, the draw-off can be characterized in two ways, either “basin” type draw-off versus “continuous flow” draw-off.

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The aim of the “basin” type is to arrive at an average temperature of the tub, so all supplied energy can be considered useful from the very beginning of the draw-off (minimum useful temperature increase is 0 K). The average temperature rising (ΔT) to be achieved during tapping, shall be for floor cleaning and bath 30 K and for the dish washes 45 K.

The aim of the “continuous flow” type is to use only the water with a minimum temperature. For the shower, household cleaning and large draw-offs a temperature rise of 30 K shall be reached before counting the useful energy. For the small draw-offs a temperature rise of 15 K shall be reached.

NOTE 1 The temperature rises (in K) stated above are equivalent to the temperatures (in °C) given by the load profiles tables in Regulations n° 811/2013, n° 812/2013, n° 813/2013 and n° 814/2013 based on 10 °C inlet water temperature. The tapping flow rates used to perform the different types of tapping of each of the seven tapping cycles are defined by Tables 1 to 7.

When these tapping rates result in a tapping period of less than 15 s the flow rate should be decreased such that the tapping period is (16 ± 1) s.

In the tapping cycles, the requirements for flow and temperatures are based on the delivery on the taps in a mix of hot and cold water. Under the conditions of the initial adjustment, the appliance itself produces hot water with a minimum temperature rise of 45 K.

To fulfil the requirements stated in Tables 1 to 7 mixing hot water from the appliance with cold water of 10 °C at the tap is allowed either by using a mixing device (see Figure B.5) or by recalculating the minimum appliance flow rate (see 3.13) according to the following formula:

$$D_{\min} = D_{\text{useful}(\Delta T)} \cdot \frac{\Delta T_{\text{useful}}}{\Delta T_d} \quad (1)$$

where

D_{\min} is the minimum test rig setting for the appliance flow rate of each individual tapping at temperature rise corresponding to ΔT_d , in l/min;

$D_{\text{useful}(\Delta T)}$ is the useful water flow rate according to Tables 1 to 7, in l/min;

ΔT_d is the delivered water temperature rise with a minimum of 45 K;

ΔT_{useful} is the higher value between the temperature rise to be achieved and the minimum temperature rise for counting the useful energy according to Tables 1 to 7.

The tests shall be performed by using the useful flow rates defined by Tables 1 to 7. If the appliance cannot deliver these flow rates, for instance due to the flow restrictor, it shall be checked that the requirements are fulfilled by checking that D_{\min} is delivered.

If by design the appliance is fitted with a flow restrictor, the tests shall be carried out with this flow restrictor.

Table 1 — Load profile S

Tapping n°	Start (h.min)	Energy (kWh)	Type of draw off	Useful water flow rate at the tap (l/min)	ΔT_p to be achieved during tapping ^a (K)	Minimum ΔT_m for counting useful energy (K)
1	07.00	0,105	Small	3		15
2	07.30	0,105	Small	3		15
3	08.30	0,105	Small	3		15
4	09.30	0,105	Small	3		15
5	11.30	0,105	Small	3		15
6	11.45	0,105	Small	3		15
7	12.45	0,315	Dish washing n°1	4	45	0
8	18.00	0,105	Small	3		15
9	18.15	0,105	Household cleaning	3		30
10	20.30	0,420	Dish washing n°2	4	45	0
11	21.30	0,525	Large	5		35
Q_{ref}		2,100				
^a On continuous basis						

Equivalent hot water litres at 60°C

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