

D]bg_Y[cgdcX]b'g_YbUdfUj Y'nUdf]dfUj c'gUb]hUfbY'hd'Y'j cXYE'BUdfUj Y'n'a c 't
Xc'j_'1' bc'+\$'_K']b'g' '\$\$!']f g_]a ' fUb]b]_ca 'j cXYE'%XY'.CWb'Yj Ub'Y
na c[']j cgh']df]dfUj Y'hd'Y'j cXY

Gas-fired domestic appliances producing hot water - Appliances not exceeding 70 kW heat input and 300 l water storage capacity - Part 1: Assessment of performance of hot water deliveries

Gasbeheizte Geräte für die sanitäre Warmwasserbereitung für den Hausgebrauch - Geräte, die eine Nennwärmebelastung von 70 kW und eine Speicherkapazität von 300 Liter Wasser nicht überschreiten - Teil 1: Bewertung der Leistung der Warmwasserbereitung

[SIST EN 13203-1:2006](https://standards.iteh.ai/catalog/standards/sist/c08dca41-f706-472d-b86e-2557bc9566/sist-en-13203-1-2006)

[https://standards.iteh.ai/catalog/standards/sist/c08dca41-f706-472d-b86e-](https://standards.iteh.ai/catalog/standards/sist/c08dca41-f706-472d-b86e-2557bc9566/sist-en-13203-1-2006)

Appareils domestiques produisant de l'eau chaude sanitaire utilisant les combustibles gazeux - Appareils de débit calorifique inférieur ou égal a 70 kW et de capacité de stockage inférieure ou égale a 300 litres - Partie 1 : Evaluation de la performance en puissance d'eau chaude

Ta slovenski standard je istoveten z: EN 13203-1:2006

ICS:

91.140.65

SIST EN 13203-1:2006

en,fr,de

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 13203-1:2006

<https://standards.iteh.ai/catalog/standards/sist/c08dca41-f706-472d-b86e-2b573e6856c6/sist-en-13203-1-2006>

English Version

**Gas-fired domestic appliances producing hot water - Appliances
not exceeding 70 kW heat input and 300 l water storage capacity
- Part 1: Assessment of performance of hot water deliveries**

Appareils domestiques produisant de l'eau chaude sanitaire
utilisant les combustibles gazeux - Appareils de débit
calorifique inférieur ou égal à 70 kW et de capacité de
stockage inférieure ou égale à 300 litres - Partie 1 :
Evaluation de la performance en puissance d'eau chaude

Gasbeheizte Geräte für die sanitäre Warmwasserbereitung
für den Hausgebrauch - Geräte, die eine
Nennwärmebelastung von 70 kW und eine
Speicherkapazität von 300 Liter Wasser nicht überschreiten
- Teil 1: Bewertung der Leistung der Warmwasserbereitung

This European Standard was approved by CEN on 18 May 2006.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

	Page
Foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 General test conditions	7
4.1 Reference conditions	7
4.2 Measurement uncertainties	7
4.3 Test conditions	8
4.3.1 General.....	8
4.3.2 Test room.....	8
4.3.3 Water supply	8
4.3.4 Steady state.....	8
4.3.5 Initial adjustment of the appliance.....	8
4.3.6 Initial state conditions.....	8
4.3.7 Electrical supply	9
5 Characterisation of the domestic hot water function of appliances	9
5.1 General.....	9
5.2 Characterisation according to the domestic hot water rates.....	9
5.2.1 Specific rate.....	9
5.2.2 Tapping capability	10
5.2.3 Classification according to the quantity of available domestic hot water	12
5.3 Classification according to the quality of the domestic hot water produced	12
5.3.1 Classification procedure.....	12
5.3.2 Test for classification according to the performance in delivery of domestic hot water production	14
6 Information	16
Annex A (informative) Test conditions.....	17
Annex B (informative) Test rig and measurement devices	27
Bibliography	31

Foreword

This document (EN 13203-1:2006) 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 January 2007, and conflicting national standards shall be withdrawn at the latest by January 2007.

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

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 13203-1:2006

<https://standards.iteh.ai/catalog/standards/sist/c08dca41-f706-472d-b86e-2b573e6856c6/sist-en-13203-1-2006>

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 300 l.

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

This document is formed in two parts, which cover two aspects of domestic hot water production.

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. This first part compliments EN 26, EN 89 and EN 625.

EN 13203-2 sets out a method for assessing the energy performance of the appliances. It defines a number of daily delivery programmes 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.

2 Normative references

The following referenced documents are indispensable for the application 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 625, *Gas-fired central heating boilers - Specific requirements for the domestic hot water operation of combination boilers of nominal heat input not exceeding 70 kW.*

3 Terms and definitions

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

3.1

control cycle

time cycle for keeping components and/or the hot 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

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

SYMBOL T_m

3.3

domestic water test temperature

temperature of the delivered water at which the tests are conducted

3.4**hot water tank**

reservoir for domestic hot water

3.5**kitchen specific rate**

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

SYMBOL D_C

NOTE 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

SYMBOL D_m

NOTE 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 water¹

SYMBOL Q_{nw}

NOTE 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

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

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

SYMBOL D

NOTE 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

¹ The manufacturer is the organization or company which assumes responsibility for the product.

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 ; 10 ; 20 min or continuous) with a predetermined temperature rise

SYMBOL R

NOTE 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

SYMBOL ΔT_2

NOTE ΔT_2 is expressed in Kelvin (K)

3.14

temperature fluctuation between successive deliveries

maximum domestic hot water temperature difference between successive deliveries

SYMBOL ΔT_3

NOTE 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

SYMBOL t_s

<https://standards.iteh.ai/catalog/standards/sist/c08dca41-f706-472d-b86e-2b573e6856c6/sist-en-13203-1-2006>

NOTE 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

SYMBOL ΔT_1

NOTE 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

SYMBOL t_m

NOTE 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

SYMBOL a_j

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 ± 2) °C;
- cold water pressure: $(2 \pm 0,1)$ bar;
- ambient air temperature: (20 ± 3) °C;
- electrical supply voltage: (230 ± 2) V

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.

These uncertainties correspond to two standard deviations.

The laboratory evaluates these standard deviations 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 °C;
 - water: $\pm 0,5$ °C;
 - gas: $\pm 0,5$ °C;
- mass: $\pm 0,5$ %;
- gas pressure: ± 2 %;
- 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 %.

4.3 Test conditions

4.3.1 General

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

4.3.2 Test room

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

The appliance is protected from direct solar radiation.

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 are measured in the centre of the flow and as close as possible to the appliance.

The inlet temperatures are measured immediately upstream of the water inlet connection. Except where otherwise stated, the outlet temperatures are 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 is measured with a rapid response thermometer.

[SIST EN 13203-1:2006](https://standards.iteh.ai/catalog/standards/sist/c08dca41-f706-472d-b86e-2b573e6856c6/sist-en-13203-1-2006)

<https://standards.iteh.ai/catalog/standards/sist/c08dca41-f706-472d-b86e-2b573e6856c6/sist-en-13203-1-2006>

4.3.4 Steady state

Steady state operating conditions are regarded as established when the rate of change of the domestic hot water temperature at the appliance outlet has become less than the temperature fluctuation at constant water rate (ΔT_2).

4.3.5 Initial adjustment of the appliance

The appliance is 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 determined according to the relevant clause of EN 625 under the conditions prevailing at the time of the test.

The delivered water temperature at the appliance outlet is defined as follows (see Figures A.1.1 and A.1.2):

- a) appliances with an adjustable temperature: the tests are 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 are 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 by the manufacturer are used for all the tests. These conditions are included in the test report.

4.3.6 Initial state conditions

All the tests of this standard are conducted as follows (see Figures A.2.1 and A.2.2):

- when there is no control cycle to consider: at least one hour after the previous delivery;
- when there is a control cycle to consider : after a time corresponding to 20 % (but not exceeding 1 h) of the "OFF" time of the burner. The time is taken from the time the burner turns off.

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

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

4.3.7 Electrical supply

The appliance is supplied with the nominal voltage or a voltage included within the range of nominal voltages.

5 Characterisation of the domestic hot water function of appliances

5.1 General

The domestic hot water function of domestic hot water appliances is 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

SIST EN 13203-1:2006
<https://standards.iteh.ai/catalog/standards/sist/c08dca41-f706-472d-b86e-2b573e6856c6/sist-en-13203-1-2006>

5.2.1.1 Requirement

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

5.2.1.2 Test

The appliance is adjusted to deliver hot water at the rate stipulated by the manufacturer 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 is adjusted in accordance with 4.3.4. A first delivery is 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.3.1 and A.3.2).

The test follows the sequence:

- water delivery of 10 min duration;
- 20 min period of no water delivery;
- further water delivery of 10 min duration.

Measurements of temperature and flow rate are made and recorded, at intervals not exceeding 2 s. A plot of temperature against time is made, to obtain the mean water temperature rise during each delivery.

For each delivery the following is calculated:

$$D_i = \frac{m_{i(10)}}{10} \times \frac{\Delta T}{30}$$

where:

- D_i is the calculated rate for each delivery; D_1 and D_2 are determined respectively during the first and second deliveries, in litre per minute (l/min)
- $m_{i(10)}$ is the quantity of water collected during the first or second delivery with a minimum temperature rise of 30 K, in litre (l);
- ΔT is the mean temperature rise of the collected water, in Kelvins (K) during the first and second deliveries

If the difference between D_1 and D_2 does not exceed numerically 10 % of their average value then

$$D = \frac{D_1 + D_2}{2}$$

where D is the determined specific rate.

If the difference between D_1 and D_2 exceeds numerically 10 % of their average value, then D is the lower value.

The kitchen specific rate is calculated by the formula:

$$D_C = D \times \frac{30}{45}$$

NOTE when the water temperature is adjustable, the manufacturer can produce if he wants an additional measurement of the specific rate with a delivery temperature of his choice.

5.2.2 Tapping capability

5.2.2.1 Requirement

The appliance shall be capable of delivering water at the rate declared by the manufacturer with a temperature rise not less than 30 K, for the standard time of 10 min and continuously. Manufacturers may choose to declare two additional flow rate times of 5 min and 20 min.

The tapping capability corresponding to these time periods shall be available to the consumer.

The measured tapping capability shall not be more than 5 % below the value stated by the manufacturer.

5.2.2.2 Test

The appliance is adjusted to deliver water at the flow rate and temperature declared by the manufacturer for this test.

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

Before starting the tapping test, the appliance shall be in the initial state conditions and in the initial adjustment conditions defined in 4.3.4 and 4.3.5. The flow rate and temperature of the delivery are recorded at intervals not exceeding 2 sec. The domestic water mean temperature is calculated.

Tapping capability is measured during the standardised times 10 minutes and continuously (with the additional options of 5 min and/or 20 min).