
**Plinske gospodinjske naprave za pripravo sanitarne tople vode - 4. del:
Ocenjevanje zmogljivosti rabe energije mikro soproizvodnih naprav za toplo vodo
in elektriko
do toplotne moči 70 kW, do vključno 50 kWe električne moči in hranilnikom vode
do 500 l**

Gas fired domestic appliances producing hot water - Part 4: assessment of energy consumption of gas fired appliances combined heat and power (micro CHP) producing hot water and electricity not exceeding 70 kW heat input, not exceeding 50 kWe electrical output and 500 l water storage capacity

Gasbefeuerte Geräte für die sanitäre Warmwasserbereitung für den Hausgebrauch - Teil 4: Bewertung des Energieverbrauchs von Gasgeräten mit Kraft-Wärme-Kopplung (KWK) zur Warmwasserbereitung und Stromerzeugung, die eine Nennwärmebelastung von 70 kW, eine elektrische Leistung von 50 kWe und eine Speicherkapazität von 500 Liter Wasser nicht überschreiten

Appareils domestiques produisant de l'eau chaude sanitaire utilisant les combustibles gazeux - Appareils à gaz de production combinée de chaleur et d'électricité (micro CHP) produisant de l'eau chaude et de l'électricité de débit calorifique inférieur ou égal à 70 kW de capacité de stockage inférieure ou égal à 500 litres - Partie 4: Évaluation de la consommation énergétique

Ta slovenski standard je istoveten z: prEN 13203-4

ICS:

91.140.65 Oprema za ogrevanje vode Water heating equipment

oSIST prEN 13203-4:2011

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 13203-4:2011](https://standards.iteh.ai/catalog/standards/sist/b032e72b-053b-4e6f-b2ca-b54327e0d8ca/osist-pren-13203-4-2011)

<https://standards.iteh.ai/catalog/standards/sist/b032e72b-053b-4e6f-b2ca-b54327e0d8ca/osist-pren-13203-4-2011>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 13203-4

October 2010

ICS 91.140.65

English Version

**Gas fired domestic appliances producing hot water - Part 4:
assessment of energy consumption of gas fired appliances
combined heat and power (micro CHP) producing hot water and
electricity not exceeding 70 kW heat input, not exceeding 50
kWe electrical output and 500 l water storage capacity**

Appareils domestiques produisant de l'eau chaude sanitaire utilisant les combustibles gazeux - Appareils à gaz de production combinée de chaleur et d'électricité (micro CHP) produisant de l'eau chaude et de l'électricité de débit calorifique inférieur ou égal à 70 kW de capacité de stockage inférieure ou égal à 500 litres - Partie 4: Évaluation de la consommation énergétique

Gasbefeuerte Geräte für die sanitäre Warmwasserbereitung für den Hausgebrauch - Teil 4: Bewertung des Energieverbrauchs von Gasgeräten mit Kraft-Wärme-Kopplung (KWK) zur Warmwasserbereitung und Stromerzeugung, die eine Nennwärmebelastung von 70 kW, eine elektrische Leistung von 50 kWe und eine Speicherkapazität von 500 Liter Wasser nicht überschreiten

(standards.iteh.ai)

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.

CEN members are the national standards bodies of 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
1 Scope	3
2 Normative references	3
3 Definitions	4
4 General test conditions	5
4.1 Reference conditions	5
4.2 Measurement uncertainties	5
4.3 Test conditions	6
4.3.1 General.....	6
4.3.2 Test room.....	6
4.3.3 Water supply	6
4.3.4 Steady state	7
4.3.5 Initial adjustment of the appliance.....	7
4.3.6 Electrical supply	7
4.3.7 Electrical energy output.....	7
5 Determination of the energy consumption and electrical energy generation of appliances.....	7
5.1 General.....	7
5.2 Tapping cycles	7
5.2.1 General.....	7
5.2.2 Test for determination of the daily energy consumption	14
Annex A (informative) Test conditions	21
Annex B (informative) Test rig and measurement devices	24
B.1 General.....	24
B.2 Pressure measurement	25
B.3 Temperature measurement.....	25

Foreword

This document (prEN 13203-4:2010) 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 is currently submitted to the CEN Enquiry.

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).

1 Scope

This European Standard is applicable to gas-fired micro CHP appliances producing domestic hot water and electricity. The electricity is generated in a process linked to the production of useful heat.

It applies to a package marketed as single unit or a package fully specified by a manufacturer that have :

- a gas heat input not exceeding 70 kW;
- an electrical output not exceeding 50 kW_e and
- a hot water storage capacity not exceeding 500 litres.

This European Standard EN 13203 is formed in four parts which cover aspects of domestic hot water production.

Standard 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 complements EN 26, EN 89 and EN 625. Standard EN 13203-2 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.

PR EN 13203-3 deals with the assessment of energy consumption of solar supported gas-fired domestic appliances producing hot water.

This Part 4 sets out a method for assessing the energy performance of gas fired micro CHP appliances.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 26, *Gas-fired instantaneous water heaters for the production of domestic hot water, fitted with atmospheric burners*

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

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*

EN 13203-1, *Gas-fired domestic appliances producing hot water – Appliances not exceeding 70 kW heat input and 300 litres water storage capacity. Part 1 : Assessment of performance of hot water deliveries*

prEN 13203-4:2010 (E)

EN 13203-2, *Gas-fired domestic appliances producing hot water – Appliances not exceeding 70 kW heat input and 300 litres water storage capacity. Part 2 : Assessment of energy consumption*

PR EN 13203-3, *Solar supported gas-fired domestic appliances producing hot water – Appliances not exceeding 70 kW heat input and 500 litres water storage capacity. Part 3 : Assessment of energy consumption*

3 Definitions

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

3.1**control cycle**

the time cycle for keeping components and/or the 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

3.2**domestic water mean temperature**

the average temperature of the water delivered during the time Δt

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

SYMBOL T_m

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.3**domestic water test temperature**

temperature of the delivered water at which the tests are conducted

3.4**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)

3.5**off mode**

state of an appliance, selected by the user, in which hot sanitary water can not be provided.

3.6**stand by mode**

operating state in which the appliance can provide hot sanitary water at any time.

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

3.7**summer mode**

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

3.8**tank**

reservoir for domestic hot water and or central heating water

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

3.9**useful water**

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

3.10**wasted water**

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

3.11**winter mode**

conditions during which the appliance supplies energy for the production of domestic hot water and/or space heating

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 single phase;
 - (400 ± 4) V three phase.
- electrical output voltage :
 - (230 ± 2) V single phase;
 - (400 ± 4) V three 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.

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 :

prEN 13203-4:2010 (E)

- 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 auxiliary energy: ± 2 %.
- electrical generated 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**

The tests are carried out in the summer mode when the appliance is producing domestic hot water only. .

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:

- 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 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.

"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 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 according to 3.8 of EN 13203-1).

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 $\pm 2\%$ of the nominal domestic hot water heat input under the conditions prevailing at the time of the test.

The delivered water temperature at the appliance outlet is defined as follows :

- 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 cold 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 above cold water inlet temperature.

The same conditions of initial adjustment stated by the manufacturer and used for all the tests specified in EN 13203-1 are also used for the tests of this standard. These conditions are included in the test report.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

4.3.6 Electrical supply

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

4.3.7 Electrical energy output

<https://standards.iteh.ai/catalog/standards/sist/b032e72b-053b-4e6f-b2ca-b54327e0d8ca/osist-pren-13203-4-2011>

Arrangement shall be made to enable electrical energy output to be measured.

NOTE The electrical output to be measured may be dissipated by a resistor or injected in the grid.

5 Determination of the energy consumption and electrical energy generation of appliances

5.1 General

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

5.2 Tapping cycles

5.2.1 General

All patterns define a 24h 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 characterised in two ways, either :

- a) "Basin" type draw-off (bath, dishwasher) versus "continuous flow" draw-offs (shower, etc).

The aim of the former 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).

prEN 13203-4:2010 (E)

The latter start to be useful only from a certain temperature (minimum useful temperature increase is 15 K lower than the desired temperature), or

b) "Dish washing" type draw-off which are carried out with a water temperature of 45 K rather than the 30 K in a).

The tapping flow rates used to perform the different types of tapping of each of the five tapping cycles defined by Tables 2 to 6 should be taken as given by Table 1.

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

If by design of the appliance the test cannot be carried out with these low flow rates, the minimum flow rate for the ignition of the appliance is taken.

If by design the appliance is fitted with an excess flow valve, the tests are carried out with this excess flow rate.

Table 1 – Tapping flow rates

Type of tapping	Energy (kWh)	Hot water flow rates corresponding to a temperature rise of 45K (l/min)
Household cleaning	0,105	3± 0,5
Small	0,105	3± 0,5
Floor cleaning	0,105	3± 0,5
Dish washing	0,315	4± 0,5
Dish washing	0,420	4± 0,5
Dish washing	0,735	4± 0,5
Large (cycle n°1)	0,525	4± 0,5
Shower	1,400	6± 0,5
Shower (cycles n°4 et n°5)	1,800	6± 0,5
Bath	3,605	10± 0,5
Bath (cycle n°4)	4,420	10± 0,5
Shower + Bath (cycle n°5)	6,240	16± 0,5

NOTE For all other temperature rises a proportional correction has to be applied to the hot water flow rate, as follows : $K = (55 - 10) / (\text{delivered water temperature defined by 4.3.5} - 10)$.

Table 2 – Tapping cycle n° 1

	Start (h.min)	Energy (kWh)	Type of delivery	ΔT desired (K), to be achieved during tapping	Min. ΔT (K), = start of counting useful energy
1	07.00	0,105	Small		15
2	07.30	0,105	Small		15
3	08.30	0,105	Small		15
4	09.30	0,105	Small		15
5	11.30	0,105	Small		15
6	11.45	0,105	Small		15
7	12.45	0,315	Dish washing	45	0
8	18.00	0,105	Small		15
9	18.15	0,105	Household cleaning		30
10	20.30	0,420	Dish washing	45	0
11	21.30	0,525	Large		30
Total		2,1			

Equivalent hot water litres at 60°C

36

iTeh STANDARD PREVIEW (standards.iteh.ai)

oSIST prEN 13203-4:2011

<https://standards.iteh.ai/catalog/standards/sist/b032e72b-053b-4e6f-b2ca-b54327e0d8ca/osist-pren-13203-4-2011>