SLOVENSKI STANDARD
SIST EN 13203-4:2022

01-december-2022

Nadomešča:
SIST EN 13203-4:2017

Plinske gospodinjske naprave za pripravo tople sanitarne vode - 4. del: Ocenjevanje rabe energije plinskih naprav (mCHP) za soproizvodnjo tople vode in elektrike

Gas-fired domestic appliances producing hot water - Part 4: Assessment of energy consumption of gas combined heat and power appliances (mCHP) producing hot water and electricity

Gasgeräte für die häusliche Warmwasserbereitung - Teil 4: Bewertung des Energieverbrauchs von Gas-Kraft-Wärme-Kopplungsgeräten (μKWK), die Warmwasser und Strom erzeugen

Appareils domestiques produisant de l'eau chaude sanitaire utilisant les combustibles gazeux - Partie 4 : Évaluation de la consommation énergétique des appareils à gaz de production combinée de chaleur et d'électricité (mCHP) produisant de l'eau chaude et de l'électricité

Ta slovenski standard je istoveten z: **EN 13203-4:2022**

ICS:

91.140.65	Oprema za ogrevanje vode	Water heating equipment

SIST EN 13203-4:2022 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13203-4

August 2022

ICS 91.140.65

Supersedes EN 13203-4:2016

English Version

Gas-fired domestic appliances producing hot water - Part 4: Assessment of energy consumption of gas combined heat and power appliances (mCHP) producing hot water and electricity

Appareils domestiques produisant de l'eau chaude sanitaire utilisant les combustibles gazeux - Partie 4 : Évaluation de la consommation énergétique des appareils à gaz de production combinée de chaleur et d'électricité (mCHP) produisant de l'eau chaude et de l'électricité

Gasgeräte für die häusliche Warmwasserbereitung - Teil 4: Bewertung des Energieverbrauchs von Gas-Kraft-Wärme-Kopplungsgeräten (µKWK), die Warmwasser und Strom erzeugen

This European Standard was approved by CEN on 13 June 2022.

This European Standard was corrected and reissued by the CEN-CENELEC Management Centre on 7 September 2022.

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 CEN-CENELEC Management Centre 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 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword 4

Introduction 5

1 Scope 6

2 Normative references 6

3 Terms and definitions 6

4 General test conditions 8

4.1 Reference conditions 8
4.2 Measurement uncertainties 8
4.2.1 General 8
4.2.2 Steady state conditions 8
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 Initial adjustment of the appliance 8
4.3.5 Conditions for the determination of the maximum load profile 8
4.3.6 Electrical supply 8
4.3.7 Delivered electrical energy 8

5 Determination of the energy consumption and electrical energy generation of the appliance 8
5.1 General 8
5.2 Load profiles 9
5.3 Determination of the energy recovered by the useful water 9
5.4 Calculation of gas energy 9
5.4.1 Calculation of the daily gas energy consumption in summer mode 9
5.4.2 Calculation of daily gas energy consumption in winter mode 9
5.4.3 Daily gas energy consumption seasonally weighted 9
5.5 Calculation of the daily electrical energy 9
5.5.1 Calculation of the delivered electrical energy 10
5.5.2 Calculation of the produced electrical energy 12
5.5.3 Calculation of electrical auxiliary energy 13
5.6 Measurement of energy consumption and production in standby mode 13
5.6.1 General 13
5.6.2 Calculation of daily gas energy consumption in standby mode 14
5.6.3 Calculation of daily auxiliary electrical energy consumption in standby mode 14
5.7 Determination of the daily auxiliary electrical energy consumption in off mode 15

6 Determination of the ratio of wasted water to total water 15

7 Eco design Related Product Data 15
7.1 Water heating energy efficiency 15
7.2 Smart control factor (*SFC*) and *smart* 16

7.3 Annual fuel consumption (AFC) **16**
7.4 Annual electricity delivery (AED) **16**
7.5 Mixed water at 40 °C (V40) for storage water heaters **16**

Annex A (informative) **test conditions** **17**

Annex B (informative) **Examples of test rig and measurement devices** **18**

Annex C (informative) **Declaration of the Maximum Load Profile** **19**

Annex D (normative) **Test points** **20**

Annex ZA (informative) **Relationship between this European Standard and the ecodesign requirements of Commission Regulation (EU) n° 814/2013 [OJEU L239 of 6 September 2013] aimed to be covered** **22**

Annex ZB (informative) **Relationship between this European Standard and the energy labelling requirements of Commission Delegated Regulation (EU) No 812/2013 [OJEU L239 of 6 September 2013] aimed to be covered** **23**

Annex ZC (informative) **Relationship between this European Standard and the Ecodesign requirements of Commission Regulation (EU) n° 813/2013 [OJEU L239 of 6 September 2013] aimed to be covered** **24**

Annex ZD (informative) **Relationship between this European Standard and the energy labelling requirements of Commission Delegated Regulation (EU) No 811/2013 [OJEU L239 of 6 September 2013] aimed to be covered** **25**

Bibliography **26**

European foreword

This document (EN 13203-4:2022) 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 February 2023, and conflicting national standards shall be withdrawn at the latest by February 2023.

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 13203-4:2016.

The main technical changes compared to EN 13203-4:2016 are the following:

— improvement of editorial errors;

— incorporation of ECOTESTS results;

— alignment of the text with the relevant Eco-design and Energy Labelling provisions in force.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, ZB, ZC or ZD, which is an integral part of this document.

The safety operation of the boiler is not covered by this standard. Safety is proved by means of the essential safety requirements of the Gas Appliances Regulation n°426/2016/UE. This way be achieved by compliance with the appropriate existing harmonized standards.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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.

Introduction

This document refers to clauses of EN 13203-2:2022 or adapts clauses by stating in the corresponding clause, on the principle:

— shall be according to EN 13203-2:2022, (clause number) with the following modification;

— shall be according to EN 13203-2:2022, (clause number) with the following addition;

— EN 13203-2:2022, (clause number) is replaced by the following;

— EN 13203-2:2022, (clause number) is not applicable.

NOTE Useful standards are EN 26, EN 89, EN 15502–1, EN 15502–2–1, EN 15502–2–2 and EN 50465:2015.

1 Scope

This document is applicable to gas-fired mCHP 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 mCHP appliances marketed as single unit or as a package fully specified by a manufacturer that have:

— a gas heat input not exceeding 400 kW;

— an electrical output not exceeding 50 kW;

— a hot water storage capacity (if any) not exceeding 2 000 l.

EN 13203-1:2015 sets out in qualitative and quantitative terms the performance in delivery of domestic hot water for a 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 gas fired mCHP appliances. It defines several 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.

When the mCHP generator does not supply domestic hot water in the summer period, the present standard is not applicable. EN 13203-2:2022 is used for performance assessment of these generators.

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.

Shall be according to EN 13203-2:2022, Clause 2 with the following addition:

EN 13203-2:2022, *Gas-fired domestic appliances producing hot water — Part 2: Assessment of energy consumption*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13203-2:2022, Clause 3, and the following additions apply ISO and IEC maintain terminological 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
mCHP appliance
appliance which is placed on the market either as a complete package or specified as a complete package to deliver safely and effectively the heating, electrical power and the domestic hot water service claimed, comprising as relevant:

— primary heat and power generator;

— supplementary heat generator;

— flue ducts;

— thermal store

3.2
mCHP generator
preferential heat and power generator

3.3
supplementary heat generator
non-preferential heat source providing peak load

3.4
power conditioning and control system
equipment used to change electrical voltage level and waveform, or otherwise alter or regulate the electrical output of the primary heat and power generator to make it suitable and safe for export to other components within or outside the appliance including controls used to operate the primary heat and power generator such a gas valve, safety controls and internal cooling pumps

3.5
electric auxiliary energy ($E_{\mathbf{Auxiliary}}$)
electric energy consumed by the mCHP appliance components associated with the supplementary heat generator, thermal management and controls (e.g. pump, fan, valves, control unit)

Note 1 to entry: $E_{\mathrm{Auxiliary}}$ is expressed in kWh

3.6
produced electrical energy ($E_{\mathbf{CHP}}$)
electrical energy produced by the mCHP generator

Note 1 to entry: E_{CHP} is expressed in kWh

3.7
delivered electrical energy ($E_{\mathbf{delivered}}$)
electrical energy delivered by the mCHP appliance to the grid

Note 1 to entry: $E_{\mathrm{delivered}}$ is expressed in kWh

3.8
electrical output CHP ($P_{\mathbf{CHP}}$)
electrical output including electrical consumption of auxiliaries

3.9
delivered electrical output ($P_{\mathbf{delivered}}$)
electrical output excluding electrical consumption of auxiliaries

3.10
electrical consumption if auxiliaries
difference between the electrical ouput including electrical consumption of auxiliaries (P_{CHP}) and the electrical output excluding electrical consumption of auxiliaries ($P_{\mathrm{delivered}}$)

4 General test conditions

4.1 Reference conditions

Shall be according to EN 13203-2:2022, 4.1 with the following addition:

After the last indent "— electrical supply voltage:" *add* "— (410 ± 4) V three phase.".

4.2 Measurement uncertainties

4.2.1 General

Shall be according to EN 13203-2:2022, 4.2.1.

4.2.2 Steady state conditions

Shall be according to EN 13203-2:2022, 4.2.1.

4.3 Test conditions

4.3.1 General

Shall be according to EN 13203-2:2022, 4.3.1 except the second sentence modified as follows:

"**For combination mCHP generator**, the tests shall be …".

4.3.2 Test room

Shall be according to EN 13203-2:2022, 4.3.2.

4.3.3 Water supply

Shall be according to EN 13203-2:2022, 4.3.3.

4.3.4 Initial adjustment of the appliance

Shall be according to EN 13203-2:2022, 4.3.4.

4.3.5 Conditions for the determination of the maximum load profile

Shall be according to EN 13203-2:2022, 4.3.5.

4.3.6 Electrical supply

Shall be according to EN 13203-2:2022, 4.3.6.

The following subclause 4.3.7 is added: "

4.3.7 Delivered electrical energy

Arrangement shall be made to enable the delivered electrical energy to be measured.

NOTE The delivered electrical energy to be measured may be dissipated by a resistor or exported to the grid.".

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

5.1 General

Shall be according to EN 13203-2:2022, 5.1.

5.2 Load profiles

Shall be according to EN 13203-2:2022, 5.2.

5.3 Determination of the energy recovered by the useful water

Shall be according to EN 13203-2:2022, 5.3.

5.4 Calculation of gas energy

5.4.1 Calculation of the daily gas energy consumption in summer mode

Shall be according to EN 13203-2:2022, 5.4.1.

5.4.2 Calculation of daily gas energy consumption in winter mode

Shall be according to EN 13203-2:2022, 5.4.2 with the following modifications:

Formula (6) is replaced with the following:

$$Q_{\text{gas,W}} = \frac{Q_{\text{gas,S}}}{1 + 0{,}5 \cdot \left[\frac{\eta_{\text{CHP,Th}-100} \cdot Q_{\text{gas,S}}}{Q_{\text{ref}}} - 1 \right]} \quad (6)$$

Into the key, "$\eta_{\text{CH-nom}}$*" is replaced with "* $\eta_{\text{CHP,Th-100}}$*" as follows:*

"$\eta_{\text{CHP,Th-100}}$ is the useful thermal efficiency at nominal heat input of the mCHP generator (100 % by mCHP and 100 % by the supplementary heater) at the temperature regime specified in the product standard EN 50465:2015/A1:2019 for the appliance space heating function or at the maximum declared average temperature. The useful thermal efficiency at nominal heat input will be determined including hydraulic circuit and storage tank if applicable. See the Figures D.1 and D.2.".

The last 4th paragraphs are replaced with the following:

"The heat engine for a combination mCHP appliance in winter mode spends most of the demand time on space heating, outside any night (or day) set-back periods (which require a lower room temperature and hence heating load).

When a combination mCHP appliance switches from space heating to domestic hot water mode and back to space heating the standby losses usually generated from the domestic hot water mode are not lost but are instead used in the space heating mode.

That means combination heaters have lower domestic hot water heat losses in winter mode than in summer mode.

These energy savings benefits of combination mCHP appliances have to be taken in account.".

5.4.3 Daily gas energy consumption seasonally weighted

Shall be according to EN 13203-2:2022, 5.4.3.

5.5 Calculation of the daily electrical energy

EN 13203-2:2022, 5.5 is replaced with the following: