
Plinske gospodinske naprave za pripravo tople sanitarne vode - 5. del:
Ocenjevanje rabe energije plinskih aparatov, kombiniranih z električno toplotno
črpalko

Gas-fired domestic appliances producing hot water - Part 5: Assessment of energy consumption of gas-fired appliances combined with electrical heat pump

Gasbeheizte Geräte für die sanitäre Warmwasserbereitung für den Hausgebrauch - Teil 5: Bewertung des Energieverbrauchs von Gasgeräten mit elektrischer Wärmepumpe

Appareils domestiques produisant de l'eau chaude sanitaire utilisant les combustibles gazeux - Partie 5 : Évaluation de la consommation énergétique des appareils utilisant les combustibles gazeux combinés à une pompe à chaleur électrique

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**Gas-fired domestic appliances producing hot water - Part
5: Assessment of energy consumption of gas-fired
appliances combined with electrical heat pump**

Appareils domestiques produisant de l'eau chaude
sanitaire utilisant les combustibles gazeux - Partie 5 :
Évaluation de la consommation énergétique des
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Gasbeheizte Geräte für die sanitäre
Warmwasserbereitung für den Hausgebrauch - Teil 5:
Bewertung des Energieverbrauchs von Gasgeräten mit
elektrischer Wärmepumpe

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.

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prEN 13203-5:2021 (E)**European foreword**

This document (prEN 13203-5:2021) 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 will supersede EN 13203-5:2018.

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).

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

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.

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.

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

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Introduction

This document refers to clauses of prEN 13203-2:2020 or adapts clauses by stating in the corresponding clause, on the principle:

- shall be according to prEN 13203-2:2020, (clause number) with the following modification;
- shall be according to prEN 13203-2:2020, (clause number) with the following addition;
- prEN 13203-2:2020, (clause number) is replaced by the following;
- prEN 13203-2:2020, (clause number) is not applicable.

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1 Scope

This document is applicable to gas-fired appliances producing domestic hot water. It applies to both instantaneous and storage gas-fired combined with electric heat pump.

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

- a heat input not exceeding 400 kW; and
- a hot water storage tank capacity (if any) not exceeding 2000 l.

EN 13203-1:2015 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 gas fired appliances combined with heat pump with electrically driven compressor according to EN 16147. It defines a number of daily load profiles 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.

The present document does not apply for gas boilers with recovery systems using combustion products as heat source for the electrical heat pump.

When the electrical heat pump does not work for domestic hot water production in the summer period, the present standard is not applicable for energy performances assessing, prEN 13203-2:2020 is used.

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.

prEN 13203-2:2020, *Gas-fired domestic appliances producing hot water - Part 2: Assessment of energy consumption*

EN 14511-1:2018, *Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 1: Terms and definitions*

EN 14511-2:2018, *Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 2: Test conditions*

EN 14511-3:2018, *Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 3: Test methods*

EN 14511-4:2018, *Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors - Part 4: Requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 13203-2:2020 and the following apply.

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

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

3.19

indoor air

heat source for a heat pump which absorbs heat by a heat exchanger in direct contact with the air inside a building

3.20

brine

heat transfer medium which has a freezing point depressed relative to water

3.21

gas-fired appliance combined with electric heat pump air/water

appliance which is either placed on the market or specified as a complete package to deliver domestic hot water or domestic hot water and heating, comprising as relevant:

- electric heat pump;
- gas-fired appliance;
- ducts if appropriate;
- thermal store.

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3.22

exhaust air

air from the air conditioned space entering the outdoor heat exchanger

[SOURCE EN 14511-1:2018, 3.22]

3.23

external static pressure difference (Δp_{ext})

positive pressure difference measured between the air (or water) outlet section and the air (or water) inlet section of the unit, which is available for overcoming the pressure drop of any additional ducted air (or water) circuit

3.24

internal static pressure difference (Δp_{int})

negative pressure difference measured between the air (or water) outlet section and the air (or water) inlet section of the unit, which corresponds to the total pressure drop of all components on the air (or water) side of the unit

4 General test conditions

4.1 Reference conditions

Shall be according to prEN 13203-2:2020, 4.1, with the following additions:

"The tests shall be carried out at the test conditions specified in Table 1 as appropriate.

Table 1 — Test conditions for particular types of systems

Type of heat source	Heat source temperature (°C)	Range of ambient temperature for heat pump (°C)	Ambient temperature of storage tank (°C)
Outside air (heat pump indoor) with air duct	$7 \pm 0,2$	20 ± 3	20 ± 3
	$(6 \pm 0,3)$		
Outside air (heat pump outdoor)	$7 \pm 0,2$	7 ± 3 a)	20 ± 3
	$(6 \pm 0,3)$		
Exhaust air	$20 \pm 0,2$	20 ± 3 a)	20 ± 3 a)
	$(12 \pm 0,3)$		
Water (inlet)	$10 \pm 0,15$	20 ± 3	20 ± 3
Brine (inlet)	$0 \pm 0,15$	20 ± 3	20 ± 3
Direct evaporation	$4 \pm 0,5$	20 ± 3	20 ± 3
<p>a) In this case, the ambient temperature of the heat pump is the same as the temperature of the heat source. The difference with EN 16147 is justified because of the possible installation of the appliance into a living room.</p> <p>NOTE 1 All heat source temperatures are inlet temperatures in °C.</p> <p>NOTE 2 All air temperatures in (brackets) are wet bulb temperatures in °C.</p> <p>NOTE 3 Permissible external pressure difference or associated internal pressure difference at the outdoor heat exchanger as stated in the installation and/or operation manual in Pascal (Pa) for appliances with duct connection.</p>			

".

4.2 Measurement uncertainties

4.2.1 General

Shall be according to prEN 13203-2:2020, 4.2.1.

4.2.2 Steady-state conditions

Shall be according to prEN 13203-2:2020, 4.2.2.

4.3 Test conditions

4.3.1 General

Shall be according to prEN 13203-2:2020, 4.3.1, except the second sentence modified as follows:

"For gas fired appliances combined with electric heat pump (package), the tests shall be ...".

and the following sentence added:

"If liquid heat transfer media other than water are used, the specific heat capacity and density of such heat transfer media shall be determined and taken into consideration in the evaluation."

4.3.2 Test room

prEN 13203-2:2020, 4.3.2, is replaced by the following:

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

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

If the package incorporates an air source outdoor heat exchanger a further test room is needed. The size of this test room shall be designed to avoid any resistance to air flow at the air inlet and air outlet orifices of the test object. The air flow through this room shall not cause any short circuit between the two orifices, and therefore the velocity of air flow at these two locations shall not exceed 1,5 m/s when the test object is switched off. The air velocity in the room shall also not be greater than the mean velocity through the unit inlet.

Unless otherwise stated in the technical documentation, the air inlet and air outlet orifices shall not be less than 1m from the surfaces of the test room; this also applies to any measuring ducts.

The setting of the external static pressure difference on the air side for heat pumps with duct connection is described by 4.4.1.4 of EN 14511-3:2018.

For heat pumps separated from the tank, the liquid flow rate has to be set on the liquid outlet side of the heat pump to the nominal flow rate specified in the technical documentation.

The package shall be installed and connected for the test as specified in the installation instructions.

Temperature and pressure measuring points shall be situated in order to obtain significant mean values.

Set points for internal control equipment of the unit such as thermostats, pressure switches or mixing valves shall be set to the values stated in the technical documentation.

Air and entrained gases shall be removed from all water and other heat transfer liquid systems

In the case of package incorporating a single split heat pump, the following installation conditions shall be complied with for the tests:

- a) each refrigerant pipe shall be installed in accordance with the installation instructions;
- b) the connecting pipes shall be installed so that the difference in elevation does not exceed 2,5 m. The length of each connecting pipe shall be between 5 m and 7,5 m;
- c) thermal insulation shall be applied to the pipes in accordance with the installation instructions;
- d) unless constrained by the design at least half of the interconnecting pipes shall be exposed to the outdoor conditions with the rest of the pipes exposed to the indoor conditions.

For indirect systems each water pipe shall be installed in accordance with the installation instructions to the maximum stated length or 5 m whichever is shorter. Thermal insulation shall be applied to the pipes in accordance with the installation instructions."

4.3.3 Water supply

Shall be according to prEN 13203-2:2020, 4.3.3.

prEN 13203-5:2021 (E)

4.3.4 Initial adjustment of the appliance

Shall be according to prEN 13203-2:2020, 4.3.4.

4.3.5 Conditions for the determination of the maximum load profile

Shall be according to prEN 13203-2:2020, 4.3.5.

4.3.6 Electrical supply

Shall be according to prEN 13203-2:2020, 4.3.6.

5 Determination of the energy consumption of the appliance

5.1 General

prEN 13203-2:2020, 5.1, is replaced by the new clause as follows:

"5.1 Basic principles for the measurements of the performance

This clause defines the test methods to apply for the determination of the energy consumption of the covered appliances which consists of the following two preparation tests and the four measurement tests.

- [P1] Filling and storage volume (see 5.1.1);
- [P2] Stabilization at cold conditions (see 5.1.2);
- [M1] Heating up (see 5.1.3);
- [M2] Standby mode for electrical power input and gas input measurements (see 5.1.4);
- [M3] Tapping cycle application with all water draw-offs according to prEN 13203-2:2020, 5.2;
- [M4] Mixed water at 40 °C and reference hot water temperature (see "existing 7.7" OR "new 7.8").

The measurement steps 1 to 4 are performed according to in Figure 1.

Each individual test can be performed independently provided that its starting conditions are the same as the ending conditions of the tests just before.