SLOVENSKI STANDARD
oSIST prEN 12309-3:2022

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Absorpcijske in adsorpcijske plinske naprave za gretje in/ali hlajenje z grelno močjo do vključno 70 kW - 3. del: Zahteve, preskusni pogoji in preskusne metode

Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70 kW - Part 3: Requirements, test conditions and test methods

Gasbefeuerte Sorptions-Geräte für Heizung und/oder Kühlung mit einer Nennwärmebelastung nicht über 70 kW - Teil 3: Prüfbedingungen

Ta slovenski standard je istoveten z: prEN 12309-3

ICS:

27.080	Toplotne črpalke	Heat pumps
91.140.30	Prezračevalni in klimatski sistemi	Ventilation and air-conditioning systems

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EUROPEAN STANDARD

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English Version

Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70 kW - Part 3: Requirements, test conditions and test methods

Gasbefeuerte Sorptions-Geräte für Heizung und/oder Kühlung mit einer Nennwärmebelastung nicht über 70 kW - Teil 3: Prüfbedingungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 299.

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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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.

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

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European foreword

This document (prEN 12309-3:2022) has been prepared by Technical Committee CEN/TC 299 “Gas-fired sorption appliances, indirect fired sorption appliances, gas-fired endothermic engine heat pumps and domestic gas-fired washing and drying appliances”, the secretariat of which is held by UNI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12309-3:2014, EN 12309-4:2014 and EN 12309-5:2014.

In comparison with the previous edition, the following technical modifications have been made:

— The content of previous standards EN 12309-3:2014, EN 12309-4:2014 and EN 12309-5:2014 has been merged;

— Nomenclature has been updated to be aligned with Commission Regulation (EU) No 813/2013 of 2 August 2013, Commission Delegated Regulation (EU) No 811/2013 of 18 February 2013, Commission Regulation (EU) No 2016/2281 of 30 November 2016;

— Test conditions have been rationalized;

— c_{pump} definition and application has been better detailed;

— Test methods have been simplified;

— Permissible deviations have been revised;

— Informative Annex F (Measurement control criteria for water(brine) to water(brine) appliances) has been deleted.

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 or ZC, which is an integral part of this document.

This standard comprises parts under the general title, Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70 kW. A list of all parts in a series can be found on the CEN website.

These documents will be reviewed whenever new mandates could apply.

1 Scope

1.1 Scope of EN 12309 series

Appliances covered by this document include one or a combination of the following:

— gas-fired sorption chiller;

— gas-fired sorption chiller/heater;

— gas-fired sorption heat pump;

— hybrids based on gas sorption appliances

This document applies to appliances designed to be used for space heating or cooling or refrigeration with or without heat recovery.

This document applies to appliances having flue gas systems of type B and type C (according to EN 1749:2020) and to appliances designed for outdoor installations. EN 12309 does not apply to air conditioners, it only applies to appliances having:

— integral burners under the control of fully automatic burner control systems,

— closed system refrigerant circuits in which the refrigerant does not come into direct contact with the water or air to be cooled or heated,

— mechanical means to assist transportation of the combustion air and/or the flue gas.

The above appliances can have one or more primary or secondary functions (i.e. heat recovery - see definitions in EN 12309-1:2014).

In the case of packaged units (consisting of several parts), this document applies only to those designed and supplied as a complete package.

The appliances having their condenser cooled by air and by the evaporation of external additional water are not covered by EN 12309.

Installations used for heating and/or cooling of industrial processes are not within the scope of EN 12309. All the symbols given in this text are to be used regardless of the language used.

1.2 Scope of this Part 3 of EN 12309

This part of EN 12309 specifies the requirements, test methods and conditions for gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70 kW.

This part of EN 12309 deals particularly with test protocols and tools to calculate the capacity, the gas utilization efficiency and the electrical power input of the appliance. This data can be used in particular to calculate the seasonal efficiency of the appliance.

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.

EN 437:2021, *Test gases - Test pressures - Appliance categories*

EN 1749:2020, *Classification of gas appliances according to the method of supplying combustion air and of evacuation of the combustion products (types)*

EN 12102-1:2017, *Air conditioners, liquid chilling packages, heat pumps, process chillers and dehumidifiers with electrically driven compressors - Determination of the sound power level - Part 1: Air conditioners, liquid chilling packages, heat pumps for space heating and cooling, dehumidifiers and process chillers*

EN 12309-1:2014, *Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70 kW - Part 1: Terms and definitions*

EN 12309-2:2015, *Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70 kW - Part 2: Safety*

EN 12309-6:2014, *Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70 kW - Part 6: Calculation of seasonal performances*

EN 12309-7:2014, *Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70 kW - Part 7: Specific provisions for hybrid appliances*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12309-1:2014 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

4 Classification

4.1 General

Appliances shall be classified according to:

— the gases they use;

— the mode of air supply and evacuation of combustion products;

— the temperatures of their heat transfer media;

— their denomination.

4.2 Classification of gases

Gases are classified into three families, divided into groups according to the value of the Wobbe index. Families and groups of gas used in this standard are in accordance with those of the EN 437:2021.

4.3 Classification of appliances

4.3.1 Classification according to the mode of air supply and evacuation of the combustion products

The types of appliances as defined in EN 1749:2020 apply.

4.3.2 Classification according to denomination

Appliances are denominated in such a way that the heat transfer medium for the outdoor heat exchanger is indicated first, followed by the heat transfer medium for the indoor heat exchanger. Examples of such appliances are given in Table 1.

Table 1 — Examples of denomination of appliances

Heat transfer medium		Denomination
Outdoor heat exchanger	Indoor heat exchanger	
Air	Water [a]	Air Cooled Liquid Chiller Air Cooled Liquid Chiller/Heater Air/Water Heat pump
Water [a]	Water [a]	Water Cooled Liquid Chiller Water Cooled Liquid Chiller/Heater Water/Water Heat pump
Brine	Water [a]	Brine Cooled Liquid Chiller Brine Cooled Liquid Chiller/Heater Brine/Water Heat pump

[a] This description also applies where the water contains additives to prevent corrosion as specified in the appliances instructions.

4.3.3 Classification according to the temperatures of the heat transfer media

The classification according to the temperatures of the heat transfer media is formed in such a way that the heat transfer media are indicated together with their temperatures (in °C). A short classification is formed in such a way that a characteristic letter is used for the heat transfer medium: A for air, W for water and B for brine.

Both for heating and for cooling appliances, the value indicated in the first place refer to the outdoor heat exchanger temperature and the value in the second place to the indoor heat exchanger temperature.

Temperatures for the outdoor heat exchanger are inlet temperatures. Temperatures for the indoor heat exchanger are outlet temperatures.

EXAMPLE 1: In cooling mode, A27W7 means an inlet temperature of air for the outdoor heat exchanger of 27 °C and an outlet temperature of water for the indoor heat exchanger of 7 °C.

EXAMPLE 2: In heating mode, B0W50 means an inlet temperature of brine for the outdoor heat exchanger of 0 °C and an outlet temperature of water for the indoor heat exchanger of 50 °C.

5 Testing conditions

5.1 Environmental conditions and electrical power supply

The tests to check the requirements shall be carried out under the environmental conditions and electrical power supply requirements specified in Tables 2 and 3 depending on the location of the appliance.

Table 2 — Environmental conditions and electrical power supply requirements for appliances designed for indoor installations

Type	Measured quantities	Test conditions
Water-to-water and brine-to-water appliances[a]	Ambient temperature (Dry bulb temperature)	20 °C ± 5 °C
Air-to-water appliances with duct connection on the air inlet and outlet side	Ambient temperature (Dry bulb temperature)	20 °C ± 5 °C
Air-to-water appliances without duct connection on the air inlet side	Air inlet temperature (Dry/Wet bulb temperature)	According to Tables 4, 5, 8, 9, 10
All appliances	Voltage	Nominal voltage
All appliances	Frequency	Nominal frequency
[a] Test conditions for water to water or brine to water appliances can be extended to water to brine and brine to brine appliances respectively (e.g. for reversible applications).		

Table 3 — Environmental conditions and electrical power supply requirements for appliances designed for outdoor installation

Type	Measured quantities	Test conditions
Water-to-water and brine-to-water appliances in cooling mode[a]	Ambient temperature (Dry bulb temperature)	25 °C to 35 °C
Water-to-water and brine-to-water appliances in heating mode	Ambient temperature (Dry bulb temperature)	0 °C to 7 °C
Air-to-water appliances	Air inlet temperature (Dry/Wet bulb temperature)	According to Tables 4, 5, 8, 9, 10
All appliances	Voltage	Nominal voltage
All appliances	Frequency	Nominal frequency
[a] Test conditions for water to water or brine to water appliances can be extended to water to brine and brine to brine appliances respectively (e.g. for reversible applications).		

For all appliances, electrical power voltage and frequency shall be stated in the appliance's technical documentation.

5.2 Test conditions

The appropriate test conditions shall be applied in accordance with:

— Table 4 for water-to-water, water-to-brine, air-to-water and air-to-brine appliances in cooling mode, when the scope of testing is establishing standard GUE, rated cooling capacity and sound power level (LWA);

— Table 5 for air-to-water and air-to-brine appliances in cooling mode with heat recovery, when the scope of testing is establishing standard GUE, rated cooling capacity and sound power level (LWA);

— Table 6 for water-to-water and brine-to-water appliances in heating mode, when the scope of testing is establishing rated GUE (GUE_{rated}), rated PER (PER_{rated}) and rated heat capacity ($P_{rated,h}$);

— Table 7 for water-to-water and brine-to-water appliances in heating mode, when the scope of testing is establishing establishing sound power level (LWA);

— Table 8 for air-to-water appliances in heating mode, when the scope of testing is establishing rated GUE (GUE_{rated}), rated PER (PER_{rated}) and standard heat capacity ($P_{std,h}$);

— Table 9 for air-to-water appliances in heating mode, when the scope of testing is establishing rated heat capacity ($P_{rated,h}$);

— Table 10 for air-to-water appliances in heating mode, when the scope of testing is establishing sound power level (LWA);

The prescribed test conditions shall be applied at full load of tested appliances, unless differently specified in the above listed Tables.

For appliances with brine, the test shall be carried out with the brine specified in the technical documentation, see Clause 6.

Table 4 — Standard rating conditions or reference design conditions for establishing standard GUE, rated cooling capacity and sound power level (L_{WA}) for water-to-water, water-to-brine, air-to-water and air-to-brine appliances in cooling mode

Type of appliance / Application	Outdoor heat exchanger		Indoor heat exchanger		NOTES
	Inlet temperature °C	Outlet temperature °C	Inlet temperature °C	Outlet temperature °C	
Water-to-water[a]	30	35[d]	12	7	W30W7
Water-to-brine[a]	30	35[d]	0	−5	W30B-5
Air-to-water[b] / Low temperature	35[c]	/	12	7	A35W7
Air-to-water[b] / Medium temperature	35[c]	/	23	18	A35W18
Air-to-brine[b]	35[c]	/	0	−5	A35B-5

NOTE The supplementary heater of a reversible unit (chiller/heater unit) is not operated during the test. In addition, for an appliance with a recovery heat exchanger, no heat recovery medium is circulated during the test

[a] Test conditions for water-to-water or water-to-brine appliances can be extended to brine-to-water and brine-to-brine appliances respectively (e.g. for reversible applications).

[b] The water shall contain any additive specified in technical documentation, but the test conditions remain the same as for water.

[c] Dry bulb temperature.

[d] Flow rate shall remain inside the range given by the manufacturer; in the opposite case keep the inlet temperature .

Table 5 — Standard rating conditions or reference design conditions for establishing standard GUE, rated cooling capacity and sound power level (L_{WA}) for air-to-water and air-to-brine appliances in cooling mode with heat recovery

Type of appliance / Application	Outdoor heat exchanger		Indoor heat exchanger		Recovery heat exchanger	
	Inlet temperature °C	Outlet temperature °C	Inlet temperature °C	Outlet temperature °C	Inlet temperature °C	Outlet temperature °C
Air-to-water[b] / Low temperature	35[c]	/	[a]	7	40	50
Air-to-water[b] / Medium temperature	35[c]	/	[a]	18	40	50
Air-to-brine[b]	35[c]	/	[a]	−5	40	50

[a] With the flow rate as determined during the test with no circulation of heat recovery medium (see Table 4).

[b] If the air cooled condenser is ducted, then the test shall be carried out at the minimum flow rate specified in technical documentation.

[c] Dry bulb temperature.

Table 6 — Standard rating conditions for establishing rated GUE (GUE_{rated}), rated PER (PER_{rated}) and rated heat capacity ($P_{rated,h}$) for water-to-water and brine-to-water appliances in heating mode

Application	Outdoor heat exchanger		Indoor heat exchanger		NOTES
	Inlet temperature °C	Outlet temperature °C	Inlet temperature °C	Outlet temperature °C	
Water-to-water[a]					
Low temperature	10	7	30	35	W10W35
Medium temperature	10	7	47	55	W10W55
Brine-to-water[a]					
Low temperature	0	−3	30	35	B0W35
Medium temperature	0	−3	47	55	B0W55

[a] Test conditions for water-to-water or brine-to-water appliances can be extended to water-to-brine and brine-to-brine appliances respectively (e.g. for reversible applications).

Table 7 — Standard rating conditions for establishing sound power level (L_{WA}) for water-to-water and brine-to-water appliances in heating mode

Application	Outdoor heat exchanger		Indoor heat exchanger		Heat capacity	NOTES
	Inlet temperature °C	Outlet temperature °C	Inlet temperature °C	Outlet temperature °C		
Water-to-water[a], fixed capacity appliances						
Low temperature	10	7	30	35	Full capacity	W10W35
Medium temperature	10	7	47	55	Full capacity	W10W55
Water-to-water[a], variable capacity appliances						
Low temperature	10	7	30[d]	35	35 %[b] of $P_{rated,h}$	W10W35
Medium temperature	10	7	47[d]	55	35 %[c] of $P_{rated,h}$	W10W55
Brine-to-water[a], fixed capacity appliances						
Low temperature	0	−3	30	35	Full capacity	B0W35
Medium temperature	0	−3	47	55	Full capacity	B0W55
Brine-to-water[a], variable capacity appliances						
Low temperature	0	−3	30[d]	35	35 %[b] of $P_{rated,h}$	B0W35
Medium temperature	0	−3	47[d]	55	35 %[c] of $P_{rated,h}$	B0W55

[a] Test conditions for water-to-water or brine-to-water appliances can be extended to water-to-brine and brine-to-brine appliances respectively (e.g. for reversible applications).

[b] With the target capacity of point C in Table 17 of EN 12309-6:2014 with a maximum deviation of ± 5 %. If the settings are such that this is not possible, then the operating conditions and/or settings of the unit within its boundary limits shall be such that at least the capacity and the leaving water temperature requirements are fulfilled.

[c] With the target capacity of point C in Table 23 of EN 12309-6:2014, with a maximum deviation of ± 5 %. If the settings are such that this is not possible, then the operating conditions and/or settings of the unit within its boundary limits shall be such that at least the capacity and the leaving water temperature requirements are fulfilled.

[d] If requested heat capacity is not matched within a maximum deviation of ± 5 %, this value is adjusted.