BS EN 12309-1:2023

BSI Standards Publication

Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70 kW

Part 1: Terms and definitions

bsi.

National foreword

This British Standard is the UK implementation of EN 12309-1:2023. It supersedes BS EN 12309-1:2014, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GSE/37, Gas fired sorption and laundering appliances.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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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 1: Terms and definitions

Appareils à sorption fonctionnant au gaz pour le chauffage et/ou le refroidissement de débit calorifique sur PCI inférieur ou égal à 70 kW - Partie 1 : Termes et définitions

Gasbefeuerte Sorptions-Geräte für Heizung und/oder Kühlung mit einer Nennwärmebelastung nicht über 70 kW - Teil 1: Begriffe

This European Standard was approved by CEN on 30 April 2023.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 12309-1:2023) 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 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of an identical text or by endorsement, at the latest by December 2023, and conflicting national standards shall be withdrawn at the latest by December 2023.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 12309-1:2014.

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

EN 12309-1:2023 gathers terms and definitions from all the other parts of EN 12309. Moreover, new terms and definitions used in the other parts have been added and existing terms and definitions have been updated consistently to the other parts of this standard.

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.

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, Türkiye and the United Kingdom.

1 Scope

1.1 Scope of EN 12309

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 C (according to EN 1749) 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).

In the case of packaged units (consisting of several parts), this standard 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 used regardless of the language used.

1.2 Scope of this Part 1 of EN 12309

This part of this document specifies the terms and definitions for gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70 kW.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Appliance types

3.1.1
appliance
assembly of various parts according to the installation instructions, if the appliance is supplied to the market in multiple parts

Note 1 to entry: Accessories provided optionally are not to be included.

Note 2 to entry: Appliance may be supplied to be marketed in one or more than one part.

3.1.2
absorption
process in which molecules of the refrigerant are dissolved into a liquid

3.1.3
adsorption
process in which molecules of the refrigerant are held at the surface of a solid (possibly porous) structure

3.1.4
air-conditioner
encased assembly or assemblies designed as an appliance to provide delivery of conditioned air to an enclosed space (room for instance) or zone

Note 1 to entry: The medium used for distribution of heating and/or cooling is exclusively air.

3.1.5
bivalent appliance
encased assembly or assemblies designed and packaged which is made up of components that can be tested separately

3.1.6
chiller
encased assembly or assemblies designed as an appliance, whose primary function is delivery of cooling only, and whose primary function is dependent on circulation of fluid (refrigerant and/or solution) within the absorption, adsorption or refrigerant circuit(s)

3.1.7
chiller/heater
encased assembly or assemblies, whose primary function is delivery of cooling and/or heating and whose primary function of cooling is dependent on circulation of fluid (refrigerant and/or solution) within the absorption, adsorption or refrigerant circuit(s)

Note 1 to entry: The primary function of heating only uses directly or indirectly the energy delivered by the combustion system.

3.1.8
closed system
system in which the fluid within the refrigerant circuit (e.g. water, ammonia, etc.) providing heating or cooling does not come into contact with the surrounding air or the heat transfer medium (e.g. water, brine, air)

3.1.9
condensing appliance
appliance in which, under normal operating conditions and at certain operating water temperatures, the water vapour in the combustion products is partially condensed in order to make use of the latent heat of this water vapour for heating and/or heat recovery purposes

3.1.10
continuous appliance
appliance where the four phases of the sorption cycle (i.e. sorption-desorption-condensation-evaporation) are processed continuously

Note 1 to entry: According to this definition, each phase of the sorption cycle is processed by a specific component.

Note 2 to entry: A continuous appliance operates in one or more of the following modes: steady-state, transient and on-off.

3.1.11
alternating appliance
appliance where sorption module(s) alternately process the sorption and the desorption phases leading to a cyclical operation

Note 1 to entry: According to this definition, the phases of the sorption cycle are shifted among the internal components of the appliance. This concept is valid at least for the sorption module.

Note 2 to entry: An alternating appliance operates in one or more of the following modes: steady-state, transient and on-off.

Note 3 to entry: The definition of alternating appliance applies to hybrid appliances with adsorption module and adsorption appliances.

3.1.12
flueless appliance
outdoor appliance which is not designed to be fitted with external ducts to transport combustion air to, or products of combustion away from, the appliance's casing

3.1.13
gas fired appliance
appliance which mainly consumes gas for implementation of the function or functions, the electrical power consumption being dedicated to auxiliaries needed for operation

3.1.14
heat pump
encased assembly or assemblies designed as an appliance whose primary function is delivery of heat and/or cooling

Note 1 to entry: The primary function is dependent on circulation of fluid (refrigerant and/or solution) within the absorption, adsorption or refrigerant circuit(s)).

3.1.15
hybrid appliance
encased assembly or assemblies utilizing at least two different technologies whose primary function is to generate heat, including overall control system that selects, according to predefined parameters, which technology (or combination thereof) satisfies the customers' requirements while minimizing energy costs, consumption and/or carbon emissions

Note 1 to entry: Hybrid appliances according to the scope of this standard are based on gas fired technologies.

3.1.16
monovalent appliance
encased assembly or assemblies whose primary and secondary functions are dependent on circulation of fluid (refrigerant and/or solution) within the absorption, adsorption or refrigerant circuit(s)

3.1.17
open system
system in which the fluid within the refrigerant circuit (e.g. water, etc.) providing heating or cooling comes into direct contact with the heat transfer medium (e.g. water, air, etc.) which is to be heated or cooled

3.1.18
primary function
main purpose for which the sorption appliance is designed

Note 1 to entry: In the case of chiller, the main purpose is the cooling function; in the case of a heat pump this is the heating function.

3.1.19
packaged unit
factory assembly of components of heat pump, chiller or chiller/heater fixed on a common mounting to form a discrete unit

3.1.20
sorption
physical and chemical process by which one substance becomes attached to another, that can be absorption or adsorption

3.1.21
sorption appliance
appliance which use the physical and chemical process by which one substance becomes attached to another to generate heat and/or cooling

Note 1 to entry: The medium used for distribution of heating and/or cooling is liquid.

3.2 Appliance components

3.2.1
aeration adjuster
device enabling the air to be set at the desired value according to the supply conditions

3.2.2
brine
liquid that has a freezing point depressed relative to water

3.2.3
gas circuit
part of the appliance that conveys or contains the gas between the appliance gas inlet connection and the burner(s)

3.2.4
gas inlet connection
part of the appliance intended to be connected to the gas supply

3.2.5
gas rate adjuster
component allowing an authorized person to set the gas rate of the burner to a predetermined value according to the supply conditions

Note 1 to entry: Adjustment may be progressive (screw adjuster) or in discrete steps (by changing restrictors).

Note 2 to entry: The adjusting screw of an adjustable pressure regulator is regarded as a rate adjuster.

3.2.6
heat recovery
collecting the energy rejected by the appliance whose primary control is in the cooling mode by means of an additional heat exchanger (e.g. a chiller with an additional condenser or absorber)

3.2.7
heat transfer medium
any medium (e.g. air, water, brine, etc.) used for the transfer of heat to or from refrigerant-containing parts of the appliance

Note 1 to entry: The medium may be

— the cooling medium circulating in the evaporator,

— the cooling medium circulating in the condenser and/or absorber and/or flue gas heat exchanger,

— the heat recovery medium circulating in the heat recovery heat exchanger.

3.2.8
ignition burner
burner whose flame is intended to ignite another burner

3.2.9
ignition device
means (flame, electrical ignition device or other device) used to ignite the gas at the ignition burner or at the main burner

Note 1 to entry: This device can operate intermittently or permanently.

3.2.10
indoor heat exchanger
heat exchanger which is designed to transfer heat to the indoor part of the building or to the indoor hot water supplies or to remove heat from these

Note 1 to entry: In the case of heat pumps operating in cooling mode, this is the evaporator. In the case of heat pumps operating in heating mode, this is the condenser.

3.2.11
injector
component that admits the gas into a burner

3.2.12
main burner
burner that is intended to assure the thermal function of the appliance and is generally called “the burner”

3.2.13
mechanical joint
means of assuring the soundness of an assembly of several (generally metallic) parts without the use of liquids, pastes, tapes, etc.

Note 1 to entry: The means are, for example:

— metal to metal joints;

— conical joints;

— toroidal sealing rings (“O” rings);

— flat joints.

3.2.14
outdoor heat exchanger
heat exchanger which is designed to remove heat from the outdoor ambient environment, or any other available heat source, or to transfer heat to it

Note 1 to entry: In the case of heat pumps operating in cooling mode, this is the condenser. In the case of heat pumps operating in heating mode, this is the evaporator.

Note 2 to entry: Both the heating and cooling functions of the sorption appliance may be classed as primary functions if they satisfy the rational use of energy requirements for those functions.

3.2.15
out of service
procedure by which a control, adjuster or regulator (temperature, pressure, etc.) is put out of action and sealed in this position

3.2.16
restrictor
part with an orifice, which is placed in the gas circuit so as to create a pressure drop and thus reduce the gas pressure at the burner to a predetermined value for a given supply pressure and rate

3.2.17
sealing an adjuster
procedure by which an adjuster is set so that changing the setting of the adjuster breaks the sealing material and makes the interference with the adjuster apparent

Note 1 to entry: A factory sealed adjuster is considered to be non-existent.

Note 2 to entry: A regulator is considered to be non-existent if it has been factory sealed in the fully opened position.

3.2.18
secondary function
optional function of the sorption appliance, such as heating or cooling, which is not expected to satisfy the rational use of energy requirements of a primary function

3.2.19
setting an adjuster
procedure by which an adjuster is immobilized in a position by some means (e.g. screw)

3.3 Combustion products circuit

3.3.1
combustion chamber
enclosure inside which combustion of the air/gas mixture takes place

3.3.2
draught diverter
device placed in the combustion products circuit to reduce the influence of flue pull and prevent down draught affecting the burner performance and combustion

3.3.3
flue outlet
part of the appliance that connects with a duct to evacuate the products of combustion

3.3.4
flue terminal
device fitted at the end of the duct system that enables the discharge of flue gases and may, at the same time, allow entry of combustion air

3.4 Adjusting, control and safety devices

3.4.1
adjustable pressure regulator
regulator provided with means for changing the outlet pressure setting

3.4.2
automatic burner control system
system comprising at least a programming unit and all the elements of a flame detector device

3.4.3
automatic shut-off valve
device that automatically opens, closes or varies the gas rate on a signal from the control circuit and/or the safety circuit

3.4.4
control thermostat
device controlling the operation of the appliance by on/off, high/low or modulating control and enabling the temperature to be kept automatically, within a given tolerance, at a predetermined value

3.4.5
fan delay control
control that starts and/or stops the air delivery fan when the temperature of the delivered air reaches a certain predetermined value

3.4.6
flame detector device
device by which the presence of a flame is detected and signalled

3.4.7
flame signal
signal given by the flame detector device, normally when the flame sensor senses a flame

3.4.8
flame simulation
condition that occurs when the flame signal indicates the presence of a flame when in reality no flame is present

3.4.9
flame supervision device
device that, in response to a signal from the flame detector, keeps the gas supply open and shuts it off in the absence of the supervised flame

3.4.10
high/low control
automatic system that permits an appliance to operate either at the nominal heat input or at a fixed reduced heat input

3.4.11
modulating control
automatic system by which the heat input of the appliance is adjusted continuously between the nominal heat input and a minimum value

3.4.12
overheat control device
component that shuts off and locks out the gas supply before the appliance is damaged and/or before safety is put into question, and that automatically resets

3.4.13
overheat cut-off device
component that shuts off and locks out the gas supply before the appliance is damaged and/or before safety is put into question, and that requires manual intervention to restore the gas supply

3.4.14
pressure regulator
device that maintains the outlet pressure constant independent on the variations in inlet pressure and/or flow rate within defined limits

Note 1 to entry: The term “regulator” is used in this case for a volume regulator.

3.4.15
program
sequence of control operations determined by the programming unit involving switching on, starting up, supervising and switching off the burner

3.4.16
programming unit
unit which reacts to signals from control and safety devices, gives control commands, controls the start-up sequence, supervises the burner operation and causes controlled shut-down and, if necessary, safety shut-down and lock-out

Note 1 to entry: The programming unit follows a predetermined sequence of actions and always operates in conjunction with a flame detector device.

3.4.17
range rating device
component in the appliance intended to be used to adjust the heat input of the appliance, within a range of heat inputs stated in the operating instructions, to suit the actual heat requirements of the installation

Note 1 to entry: This adjustment may be progressive (e.g. by use of a screw adjuster) or in discrete steps (e.g. by changing restrictors).

3.4.18
spillage monitoring system
system which contains a device that automatically shuts off the gas supply to the main burner, and perhaps the ignition burner, when there is a release of combustion products from the appliance

3.4.19
temperature sensor
component that detects the temperature of the environment to be supervised or controlled

3.5 Operation of the appliance

3.5.1
automatic burner system
process by which, when starting from the completely shut-down condition, the gas is ignited and the flame is detected and proved without manual intervention

3.5.2
automatic recycling
process by which, following loss of flame signal during the running condition or accidental interruption of the operation of the appliance, the gas supply is interrupted and the complete start sequence is automatically re initiated

Note 1 to entry: This process ends with the restoration of the running condition or, if there is no flame signal at the end of the safety time, or if the cause of the accidental interruption has not disappeared, with volatile lock out or non-volatile lock out.

3.5.3
controlled shut-down
process by which the power to the gas shut off valve(s) is removed immediately, e.g. as a result of the action of a controlling function

3.5.4
cyclical operation
mode of operation leading to a cyclic shutdown of the burner due to the variation of the heating or cooling demand

Note 1 to entry: According to this definition, a transient operation is not considered as a cyclical operation.

Note 2 to entry: A cyclical operation can include or exclude a defrost period. A non-cyclical operation can also include a defrost period.

3.5.5
defrost mode
state of the appliance in the heating mode where the operation is modified or reversed to de-ice the outdoor heat exchanger

3.5.6
extinction safety time
interval between extinction of the supervised flame and the gas supply being shut off:

— to the main burner; and/or

— to the ignition burner

3.5.7
first safety time
interval between the ignition burner gas valve, start gas valve or main gas valve, as applicable, being energized and that valve being de-energized if the flame detector signals the absence of a flame at the end of this interval

3.5.8
flame stability
characteristic of flames that remain on the burner ports or in the flame reception zone intended by the construction

3.5.9
flame lift
total or partial lifting of the base of the flame away from the burner port or the flame reception zone provided by the design

Note 1 to entry: Flame lift may cause the flame to blow out, i.e. extinction of the air gas mixture.

3.5.10
full load
operation state providing maximum useful capacity under given conditions

3.5.11
ignition interlock
part that prevents the operation of the igniter as long as the main gasway is open

3.5.12
ignition opening time
interval between ignition of the supervised flame and the moment when the valve is held open

3.5.13
ignition safety time
interval between the order to open and the order to close the gas supply to the burner in the event of ignition

3.5.14
light-back
entry of a flame into the body of the burner

3.5.15
non-volatile lock-out
safety shut-down condition of the system, such that a restart is only accomplished by a manual reset of the system and by no other means

3.5.16
re-start interlock
mechanism which prevents the re-opening of the gasway to the main burner or the main burner and the ignition burner until the armature plate has separated from the magnetic element

3.5.17
safety shut-down
process which is effected immediately following the response of a safety limiter or sensor or the detection of a fault in the burner control system and which puts the burner out of operation by immediately removing the power to the gas shut-off valve(s) and the ignition device

3.5.18
second safety time
interval between the main gas valve being energized and the main gas valve being de-energized if the flame detector signals the absence of a flame at the end of this interval

Note 1 to entry: It occurs where there is a first safety time applicable to either an ignition burner or start gas flame only.

3.5.19
sooting
phenomenon appearing during incomplete combustion and characterized by deposits of soot on the surfaces or parts in contact with the combustion products or with the flame

3.5.20
spark restoration
process by which, after disappearance of the flame signal in the running condition, the ignition device is energized again without the gas supply having been totally interrupted

Note 1 to entry: This process ends with the restoration of the running condition or, if there is no flame signal at the end of the safety time, with volatile or non-volatile lock out.

3.5.21
steady state operation
for non cyclical operation, period of operation where all measured quantities remain constant according to allowed deviations without having to alter the set values

Note 1 to entry: For alternating appliances this could mean a wide value range to allow for the cyclic nature of the output.

3.5.22
transient operation
mode of operation of air to liquid (e.g. water, brine, etc.) heat pump leading to disrespect the permissible deviation required for steady state operation due to icing of the evaporator

3.5.23
ignition flame
flame established at the ignition rate either at the main burner or at a separate ignition burner

3.5.24
volatile lock-out
safety shut down condition of the system, such that a restart is only accomplished either by the manual reset of the system, or by an interruption of the electrical supply and its subsequent restoration

3.5.25
yellow tipping
colour change of the tip of the blue cone of an aerated flame

3.6 Gases

3.6.1
calorific value
quantity of heat produced by combustion at a constant pressure equal to 1 013,25 mbar, of a unit volume or mass of gas, the constituents of the combustible mixture being taken at reference conditions and the products of combustion being brought to the same conditions

Note 1 to entry: A distinction is made between:

— the gross calorific value H_S or GCV in which the water produced by combustion is assumed to be condensed;

— the net calorific value H_i or NCV in which the water produced by combustion is assumed to be in the vapour state.

Note 2 to entry: The calorific value is expressed

— either in megajoules per cubic metre of dry gas at the reference conditions (MJ/m^3),

— or in megajoules per kilogram of dry gas (MJ/kg).

3.6.2
gas pressure
p
static pressure, relative to the atmospheric pressure, measured at right angles to the direction of flow of the gas

3.6.3
limit gases
test gases representative of the extreme variations in the characteristics of the gases for which appliances have been designed

3.6.4
limit pressures
pressures representative of the extreme variations in the appliance supply conditions

Note 1 to entry: The maximum and minimum pressures are abbreviated p_{max} and p_{min} respectively.

3.6.5
normal pressure
p_n
pressure under which the appliances operate in normal conditions, when they are supplied with the corresponding reference gas

3.6.6
pressure couple
combination of two distinct gas distribution pressures applied by reason of the significant difference existing between the Wobbe indices within a single family or group in which the higher pressure corresponds only to gases of low Wobbe index and the lower pressure corresponds to gases of high Wobbe index

3.6.7
relative density
d
ratio of the masses of equal volumes of dry gas and dry air, under the same conditions of temperature and pressure: 15 °C and 1 013,25 mbar

3.6.8
reference conditions
(for calorific values) temperature conditions of 15 °C; (for gas and air volumes) dry conditions, brought to 15 °C and to an absolute pressure of 1 013,25 mbar

3.6.9
reference gases
test gases with which appliances operate under nominal conditions when they are supplied at the corresponding normal pressure

3.6.10
test gases
gases consisting of reference gases and limit gases, intended for the verification of the operational characteristics of appliances

3.6.11
test pressures
gas pressures, consisting of normal and limit pressures, used to verify the operational characteristics of appliances

3.6.12
Wobbe index
ratio of the calorific value of a gas per unit volume and the square root of its relative density under the same reference conditions

Note 1 to entry: The Wobbe index is said to be gross (W_S) or net (W_i) according to whether the calorific value used is the gross or net calorific value.

Note 2 to entry: The Wobbe index is expressed

— either in megajoules per cubic metre of dry gas at the reference conditions (MJ/m^3),

— or in megajoules per kilogram of dry gas (MJ/kg).

3.7 Conditions of operation, measurement and calculations

3.7.1
active mode
mode corresponding to the hours with a cooling or heating load of the building and whereby the cooling or heating function of the appliance is switched on

3.7.2
aperture area
A
area of the applied solar collectors as an environmental heat source

Note 1 to entry: The aperture area A is expressed in m^2.

3.7.3
application rating condition
condition which provides additional information on the performance of the appliance within its operating range when applicable

3.7.4
auxiliary Energy Factor in cooling mode, declared capacity
$\boldsymbol{AEFc_{DC}}$
effective cooling declared capacity to electrical power input ratio

Note 1 to entry: $AEFc_{\mathrm{DC}}$ is expressed in kW/kW.

3.7.5
auxiliary Energy Factor in cooling mode, part load
$\boldsymbol{AEFc_{PL}}$
effective cooling part load capacity to electrical power input ratio

Note 1 to entry: $AEFc_{\mathrm{PL}}$ is expressed in kW/kW.

3.7.6
auxiliary Energy Factor in heating mode, declared capacity
$\boldsymbol{AEFh_{DC}}$
effective heating declared capacity to electrical power input ratio

Note 1 to entry: $AEFh_{\mathrm{DC}}$ is expressed in kW/kW.

3.7.7
auxiliary Energy Factor in heating mode, part load
$\boldsymbol{AEFh_{PL}}$
effective heating part load capacity to electrical power input ratio

Note 1 to entry: $AEFh_{\mathrm{DC}}$ is expressed in kW/kW.

3.7.8
available external static pressure difference
Δp_e
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

3.7.9
internal static pressure difference
Δp_i
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

3.7.10
balance point temperature or heating limit temperature
T_{BP}
outdoor temperature, below which the heating appliance starts to supply heat to the building

Note 1 to entry: T_{BP} is expressed in °C.

3.7.11
bin hours
h_j
sum of all hours occurring in a year at a given outdoor temperature for a specific location

Note 1 to entry: h_j is expressed in hours.

3.7.12
bivalent temperature
$T_{bivalent}$
lowest outdoor temperature at which the heating load is equal to the appliance declared capacity

Note 1 to entry: $T_{bivalent}$ is expressed in °C.

3.7.13
capacity ratio
CR
cooling (or heating) part load or full load divided by the declared cooling (or heating) capacity of the appliance at the same temperature conditions

Note 1 to entry: *CR* is expressed in kW/kW.

3.7.14
cold condition
condition of the appliance required for some tests and obtained by allowing the unlit appliance to attain thermal equilibrium at room temperature

3.7.15
cooling capacity
usable heat given off by the heat transfer medium to the refrigerant integrated over and divided by a defined interval of time

3.7.16
declared capacity
DC
full load (maximum) heating or cooling capacity that the appliance delivers at any given temperature condition declared

Note 1 to entry: *DC* is expressed in kW.

3.7.17
defrost period
time for which the appliance is in the mode de-icing

3.7.18
design heating fluid temperature
$T_{HF\text{-}d}$
mean fluid temperature corresponding to the design outdoor temperature

3.7.19
design inlet temperature
$T_{in\text{-}d}$
inlet temperature of the outdoor or indoor heat exchanger corresponding to the design outdoor temperature

3.7.20
design load for cooling
$P_{designc}$
cooling load of the building at the reference design conditions for cooling

Note 1 to entry: $P_{designc}$ is expressed in kW.

3.7.21
design load for heating
$P_{designh}$
heating load of the building at the reference design conditions for heating

Note 1 to entry: $P_{designh}$ is expressed in kW.

3.7.22
design supply temperature
$T_{out\text{-}d}$
outlet temperature of the indoor or outdoor heat exchanger corresponding to the design outdoor temperature

3.7.23
effective electrical power input
P_E
electrical power input of the appliance within the defined interval of time including share of electrical power input of the conveying devices (e.g. fans, pumps) for ensuring the transport of the heat transfer media inside the appliance

Note 1 to entry: P_E is expressed in kW.

3.7.24
effective heating, cooling or heat recovery capacity
P_{Eh}, P_{Ec}, P_{Ehr}
heating, cooling or heat recovery capacity including correction capacity due to the pump(s)

Note 1 to entry: P_{Eh}, P_{Ec}, P_{Ehr} are expressed in kW.

3.7.25
equivalent resistance
resistance to flow in millibar, measured at the outlet of the appliance, which is equivalent to that of the actual flue/duct

3.7.26
efficiency of the external supplementary gas-fired heating system
η_{Aux}
efficiency, expressed in GCV, of the external supplementary gas boiler

Note 1 to entry: η_{Aux} is expressed in kW/kW.

3.7.27
gas heat input
Q_g
quantity of gas energy used within the defined interval of time corresponding to the gas volume or mass flow rates, the gas calorific value to be used being the net or gross calorific value

Note 1 to entry: Q_g is expressed in kW.

3.7.28
gas utilization efficiency ratio in cooling mode, declared capacity
$GUEc_{DC}$
declared effective cooling capacity to gas input ratio

Note 1 to entry: Gas input is expressed in GCV; $GUEc_{DC}$ is expressed in kW/kW.

3.7.29
gas utilization efficiency ratio in cooling mode
***GUE*c**
effective cooling capacity to gas input ratio

Note 1 to entry: Gas input is expressed in GCV; $GUEc_{PL}$ is expressed in kW/kW.

3.7.30
gas utilization efficiency ratio in heating mode, declared capacity
$GUEh_{DC}$
declared effective heating capacity to gas input ratio

Note 1 to entry: Gas input is expressed in GCV; $GUEh_{DC}$ is expressed in kW/kW.

3.7.31
gas utilization efficiency ratio in heating mode
***GUE*h**
effective heating capacity to gas input ratio

Note 1 to entry: Gas input is expressed in GCV; $GUE\eta_{PL}$ is expressed in kW/kW.

3.7.32
ground heat source
GHS
borehole heat exchanger, which is mounted underground (beneath the surface of the earth) and has the main function to deliver environmental heat to the evaporator of the appliance

3.7.33
heat recovery capacity
usable heat given off in cooling mode from the appliance to the heat transfer medium integrated over and divided by a defined interval of time

3.7.34
heating capacity
usable heat given off in heating mode from the appliance to the heat transfer medium integrated over and divided by a defined interval of time

Note 1 to entry: If heat is removed from the indoor heat exchanger(s) for defrosting, it is taken into account as appropriate.

3.7.35
heating fluid temperature
$T_{HF}(T_{outdoor})$
heating fluid mean temperature corresponding to the outdoor temperature

3.7.36
heating power of the external supplementary gas-fired heating system
P_{Sup}
heating power provided by the supplementary gas boiler in order to cover the difference between building load and declared capacity of the heat pump appliance

Note 1 to entry: P_{Sup} is expressed in kW.

3.7.37
heating surface exponent
n
exponent of the relationship between the part load ratio and the ratio between the temperature gradient between the heating fluid average temperature and the design room temperature at any given outdoor temperature to the design temperature gradient

Note 1 to entry: The heating surface exponent is determined experimentally.

3.7.38
hot condition
condition of the appliance required for some tests and obtained by heating to thermal equilibrium at the nominal heat input specified

3.7.39
indoor installation
installation in an enclosed space protected from the direct or indirect action of wind and precipitation

3.7.40
indoor temperature
T_{indoor}
design indoor temperature

3.7.41
load
range of useful capacity from 0 to full load

Note 1 to entry: The load is expressed in kW.

3.7.42
maximum Temperature Difference
ΔT_{max}
largest temperature range allowed across the indoor heat exchanger of the appliance operating in heating mode

3.7.43
measured heating, cooling or heat recovery capacity
Q_h, Q_c, Q_{hr}
heating, cooling or heat recovery capacity measured during the test

Note 1 to entry: Q_h, Q_c, Q_{hr} are expressed in kW.

3.7.44
minimal heat input
lowest heat input leading to a permanent operation of the burner

3.7.45
nominal condition
unique "standard rating condition" used for CE marking and selected within the standard rating conditions

Note 1 to entry: Only one nominal condition is defined for each appliance.

3.7.46
nominal air flow rate
value of air flow rate declared at the standard air conditions

3.7.47
nominal heating, cooling or heat recovery capacity
P_{Nh}, P_{Nc}, P_{Nhr}
rated heating or cooling or heat recovery capacity corrected to "standard rating conditions" and at full load

Note 1 to entry: These conditions included the reference gas at 15 °C and 1 013,25 mbar.

Note 2 to entry: P_{Nh}, P_{Nc}, P_{Nhr} are expressed in kW.

3.7.48
nominal heating, cooling or heat recovery gas input
Q_{gNh}, Q_{gNc}, Q_{gNhr}
rated heating or cooling or heat recovery heat input at "standard rating conditions" and at full load

Note 1 to entry: These conditions included the use of the reference gas at 15 °C and 1 013,25 mbar.

Note 2 to entry: Q_{gNh}, Q_{gNc}, Q_{gNhr} are expressed in kW.

3.7.49
nominal voltage
voltage or range of voltages stated at which the appliance can operate normally

3.7.50
nominal water flow rate
water flow rate declared at the "standard rating conditions"

3.7.51
off mode
OFF
mode where the appliance is completely switched off and cannot be reactivated by either control device or timer

Note 1 to entry: Off mode means a condition in which the equipment is connected to the mains power source and is not providing any function.

Note 2 to entry: The following are also considered as off mode: conditions providing only an indication of off mode condition; conditions providing only functionalities intended to ensure electromagnetic compatibility.

3.7.52
operating cycle with defrost
cycle consisting of a heating period and a defrost period, from de-icing termination to de-icing termination

3.7.53
outdoor installation
installation in an open space unprotected from the direct or indirect action of wind and precipitation

3.7.54
part load ratio
PLR
building load divided by the design load at a certain outdoor temperature

3.7.55
primary energy conversion factor for electricity
***Prim*$_{\mathbf{elec}}$**
primary energy factor for electricity, value based on ErP Directive (2009/125/EC) or by default equal to 2,5

3.7.56
primary energy conversion factor for gas
***Prim*$_{\mathbf{gas}}$**
primary energy factor for gas, value based on ErP Directive (2009/125/EC) or by default equal to 1 on GCV

3.7.57
primary energy ratio in cooling mode
$\boldsymbol{PER_c}$
ratio of the effective cooling capacity to the total primary energy input of appliance within the same interval of time

3.7.58
primary energy ratio in heating mode
$\boldsymbol{PER_h}$
ratio of the effective heating capacity to the total primary energy input of appliance within the same interval of time

3.7.59
operation limit temperature
TOL
lowest outdoor temperature at which the heat pump can still deliver heating capacity

Note 1 to entry: TOL is expressed in °C.

3.7.60
rated conditions
conditions selected for each appliance among the "standard conditions" and/or the application conditions, in addition to nominal condition

Note 1 to entry: Rated conditions can be multiple.

Note 2 to entry: "Standard and application conditions" are defined in EN 12309-3 and in EN 12309-7.

3.7.61
rated air flow rate
air flow rate declared at given conditions different from "standard air conditions"

3.7.62
rated heating, cooling or heat recovery capacity
$\boldsymbol{P_{Rh}}$, $\boldsymbol{P_{Rc}}$, $\boldsymbol{P_{Rhr}}$
heating, cooling or heat recovery capacity at full load declared at given conditions different from the one selected as nominal heating, cooling or heat recovery capacity

Note 1 to entry: Q_{Rh}, Q_{Rc}, Q_{Rhr} are expressed in kW.

3.7.63
rated water flow rate
water flow rate declared at given conditions different from "standard rating conditions"

3.7.64
reduced capacity
capacity which is lower than the maximal capacity under the same given conditions

3.7.65
reference annual cooling demand
$\boldsymbol{Q_{refc}}$
representative annual cooling demand which is used for the calculation of reference seasonal performance in cooling mode

Note 1 to entry: Q_{refc} is expressed in kWh.

3.7.66
reference annual heating demand
Q_{refh}
representative annual heating demand which is used for the calculation of reference seasonal performance in heating mode

Note 1 to entry: Q_{refh} is expressed in kWh.

3.7.67
reference collector area
A_R
reference collector area for solar collector sourced sorption heat pump based hybrid heating appliances

Note 1 to entry: A_{R} is expressed in m^2.

3.7.68
reference cooling season
representative climate profile by bins for cooling corresponding to the reference design conditions for cooling

3.7.69
reference design conditions for cooling
temperature conditions at the design outdoor dry bulb temperature for cooling and the indoor design temperatures: dry bulb 27 °C, wet bulb 19 °C

Note 1 to entry: Reference design conditions for cooling are expressed in °C.

3.7.70
reference design conditions for heating
temperature conditions at the design outdoor dry bulb temperatures for heating and the indoor dry bulb design temperature of 20 °C

Note 1 to entry: Reference design conditions for heating are expressed in °C.

3.7.71
reference design outdoor temperature for cooling
T_{designc}
design outdoor dry bulb temperature for the reference cooling season: 35 °C

Note 1 to entry: T_{designc} is expressed in °C.

3.7.72
reference design outdoor temperature for heating
T_{designh}
design outdoor dry bulb temperature for the reference heating seasons: −10 °C (average), −22 °C (colder), +2 °C (warmer)

Note 1 to entry: T_{designh} is expressed in °C.

3.7.73
reference heating season
representative climate profile by bins for heating corresponding to the reference design conditions for heating season

3.7.74
reference Seasonal Auxiliary Energy Factor in Cooling mode
***SAEF*c**
seasonal Auxiliary Energy Factor of an appliance calculated for the reference annual cooling demand, including the energy consumption during active mode, thermostat off mode, standby mode and off mode

Note 1 to entry: *SAEF*c is expressed in kWh/kWh.

3.7.75
reference Seasonal Auxiliary Energy Factor in Cooling mode, on
***SAEF*c$_{on}$**
seasonal Auxiliary Energy Factor of an appliance calculated for the reference annual cooling demand, including the energy consumption during active mode

Note 1 to entry: *SAEF*c$_{on}$ is expressed in kWh/kWh.

3.7.76
reference Seasonal Auxiliary Energy Factor in Heating mode
***SAEF*h**
seasonal Auxiliary Energy Factor of an appliance calculated for the reference annual heating demands, including the energy consumption during active mode, thermostat off mode, standby mode and off mode

Note 1 to entry: *SAEF*h is expressed in kWh/kWh.

3.7.77
reference Seasonal Auxiliary Energy Factor in Heating mode, on
***SAEF*h$_{on}$**
seasonal Auxiliary Energy Factor of an appliance calculated for the reference annual heating demands, including the energy consumption during active mode

Note 1 to entry: *SAEF*h$_{on}$ is expressed in kWh/kWh.

3.7.78
reference Seasonal Auxiliary Energy Factor in Heating mode, net
***SAEF*h$_{net}$**
seasonal Auxiliary Energy Factor of an appliance calculated for the reference annual heating demands, including the energy consumption in active mode of the heat pump appliance and excluding the power consumption of the auxiliary gas boiler

Note 1 to entry: The definition applies only to bivalent appliances.

Note 2 to entry: *SAEF*h$_{net}$ is expressed in kWh/kWh.

3.7.79
reference Seasonal Gas Utilization Efficiency Ratio in Cooling mode
***SGUE*c**
seasonal Gas Utilization Efficiency ratio, expressed in GCV, of an appliance calculated for the reference annual cooling demand

Note 1 to entry: *SGUEc* is expressed in kWh/kWh.

3.7.80
reference Seasonal Gas Utilization Efficiency Ratio in Heating mode
***SGUE*h**
seasonal Gas Utilization Efficiency ratio, expressed in GCV, of an appliance calculated for the reference annual heating demands

Note 1 to entry: *SGUE*h is expressed in kWh/kWh.

3.7.81
reference Seasonal Gas Utilization Efficiency Ratio in Heating mode, net
***SGUE*$\mathbf{h_{net}}$**
seasonal Gas Utilization Efficiency ratio, expressed in GCV, of an appliance excluding the contribution of the supplementary gas boiler and calculated for the reference annual heating demands

Note 1 to entry: *SGUE*h_{net} is expressed in kWh/kWh.

3.7.82
reference Seasonal Gas Utilization Efficiency Ratio in Heating mode, with solar contribution
***SGUE*$\mathbf{h_S}$**
seasonal Gas Utilization Efficiency ratio, expressed in GCV, of an hybrid appliance calculated for the reference annual heating demands with solar contribution

Note 1 to entry: *SGUE*h_S is expressed in kWh/kWh.

3.7.83
reference Seasonal Primary Energy Ratio in Heating mode
***SPER*h**
seasonal Primary Energy Ratio of an appliance calculated for the reference annual heating demands

Note 1 to entry: *SPER*h is expressed in kWh/kWh.

3.7.84
reference Seasonal Primary Energy Ratio in Heating mode, net
***SPER*$\mathbf{h_{net}}$**
seasonal Primary Energy Ratio of an appliance calculated for the reference annual heating demands, including the energy consumption in active mode of the heat pump appliance and excluding the energy consumption of the supplementary gas boiler

Note 1 to entry: The definition applies only to bivalent appliances.

Note 2 to entry: *SPER*h_{net} is expressed in kWh/kWh.

3.7.85
refrigeration system
components (e.g. generator, condenser, evaporator, ab or ad sorber, fan, solution pump, etc.) assembled to form an appliance designed to implement a refrigerating cycle

3.7.86
room temperature
$\boldsymbol{T_R}$
design room temperature

3.7.87
solar heat demand coverage fraction
X
ratio of heat demand covered by solar collectors in Solar-water sorption hybrid heat pump based heating appliances to the total building heat demand

3.7.88
solar heat source
heat exchanger with the main function is to deliver heat from the solar radiation to the evaporator of the appliance

3.7.89
specific electrical power input of the external supplementary gas-fired heating system
***e*Sup**
specific electrical power input per unit of thermal power output of the external supplementary gas boiler

Note 1 to entry: e_{Sup} is expressed in kW/kW.

3.7.90
standard air conditions
dry air at 20 °C and at standard barometric pressure of 1 013,25 mbar, having a mass density of 1,204 kg/m^3

3.7.91
standard rating condition
mandatory condition that is used for marking and for comparison or certification purposes

Note 1 to entry: For air/water, brine/water, water/water appliances, the water temperature level (low, medium and high) applicable to the heating mode is declared.

3.7.92
standby mode
SB
mode where the appliance is switched off partially and can be reactivated by a control device or timer

EXAMPLE Standby mode occurs when the end-user deactivates the regular heating mode (heating during vacation time to prevent freezing).

Note 1 to entry: The appliance is connected to the main power sources, depends on energy input to work as intended and provides only the following functions, which may persist for an indefinite time: reactivation function, or reactivation function and only an indication of enabled reactivation function, and/or information or status display.

3.7.93
thermostat off mode
TO
mode corresponding to the hours with no cooling or heating demand of the building, whereby the cooling or heating function of the appliance is switched on, but is not operational, as there is no cooling or heating demand

EXAMPLE Thermostat off mode occurs when outdoor temperature becomes higher than the balance temperature (16 °C) during the day within the heating season.

3.7.94
total electrical power input
P_T
electrical power input of all electrical devices of the appliance within the defined interval of time

Note 1 to entry: P_T is expressed in kW.

3.7.95
typical Heat Capacity
$P_{typ(35)}$; $P_{typ(55)}$
stated heat output of a heat pump space heater when providing space heating at A7W35 or A7W55

Note 1 to entry: Traditionally declared by manufacturers as “nominal”.

Note 2 to entry: Full-load heat capacity at A7W35 or A7W55.

Note 3 to entry: Generally used in literature and for application calculations.

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

[3] EN 12309-3, *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*

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