BS EN 14511-1:2022

BSI Standards Publication

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

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National foreword

This British Standard is the UK implementation of EN 14511-1:2022. It supersedes BS EN 14511-1:2018, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RHE/17, Testing of air conditioning units.

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

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English Version

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

Climatiseurs, groupes refroidisseurs de liquide et pompes à chaleur pour le chauffage et le refroidissement des locaux et refroidisseurs industriels avec compresseur entraîné par moteur électrique - Partie 1 : Termes et définitions

Luftkonditionierer, Flüssigkeitskühlsätze und Wärmepumpen für die Raumbeheizung und -kühlung und Prozess-Kühler mit elektrisch angetriebenen Verdichtern - Teil 1: Begriffe

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

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European foreword

This document (EN 14511-1:2022) has been prepared by Technical Committee CEN/TC 113 "Heat pumps and air conditioning units", the secretariat of which is held by UNE.

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of an identical text or by endorsement, at the latest by March 2023, and conflicting national standards shall be withdrawn at the latest by March 2023.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 14511-1:2018.

The main changes compared with EN 14511-1:2018 are as follows:

— reorganization of definitions (in alphabetical order);

— deletion of Annex ZA on the relationship with Commission Regulation (EU) No 206/2012.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association.

This document has been prepared in the frame of:

— Commission Regulation (EU) No 206/2012 of 6 March 2012 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for air conditioners and comfort fans;

— Commission Delegated Regulation (EU) No 626/2011 of 4 May 2011 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of air conditioners;

— Commission Regulation (EU) No 813/2013 of 2 August 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for space heaters and combination heaters;

— Commission Delegated Regulation (EU) No 811/2013 of 18 February 2013 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to the energy labelling of space heaters, combination heaters, packages of space heater, temperature control and solar device and packages of combination heater, temperature control and solar device;

— Commission Regulation (EU) 2015/1095 of 5 May 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for professional refrigerated storage cabinets, blast cabinets, condensing units and process chillers;

— Commission Regulation (EU) 2016/2281 of 30 November 2016 implementing Directive 2009/125/EC of the European Parliament and of the Council establishing a framework for the setting of ecodesign requirements for energy-related products, with regard to ecodesign requirements for air heating products, cooling products, high temperature process chillers and fan coil units.

EN 14511, *Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors*, currently comprises the following parts:

— *Part 1: Terms and definitions*;

— *Part 2: Test conditions*;

— *Part 3: Test methods*;

— *Part 4: Requirements*.

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.

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1 Scope

This document specifies the terms and definitions for the rating and performance of air conditioners, liquid chilling packages and heat pumps using either air, water or brine as heat transfer media with electrically driven compressors when used for space heating and/or cooling.

It also specifies the terms and definitions for the rating and performance of process chillers.

This document does not apply to heat pumps for domestic hot water, although certain definitions can be applied to these.

This document applies to:

— factory-made units that can be ducted,

— factory-made liquid chilling packages with integral condensers or for use with remote condensers, and

— air-to-air air conditioners which can also evaporate the condensate on the condenser side.

Packaged units, single split and multisplit systems are covered by this document. Single duct and double duct units are covered by this document, as well.

In the case of units consisting of several parts, this document applies only to those designed and supplied as a complete package, except for liquid chilling packages with remote condenser.

This document is primarily intended for water and brine chilling packages but can be used for other liquid subject to agreement.

The units having their condenser cooled by air and by the evaporation of external additional water will have their performance in the cooling mode determined in accordance to EN 15218. For those which can also operate in the heating mode, the EN 14511 series applies for the determination of their performance in the heating mode.

NOTE 1 Part load testing of units is dealt with in EN 14825.

NOTE 2 All the symbols given in this text are used regardless of the language.

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 terminological 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
air conditioner
device capable of cooling or heating, or both, indoor air, using a vapour compression cycle driven by an electric compressor, including air conditioners that provide additional functionalities such as dehumidification, air purification, ventilation or supplemental air heating by means of electric resistance heating, as well as appliances that are using water (either condensate water that is formed on the evaporator side or externally added water) for evaporation on the condenser, provided that the device is also able to function without the use of additional water, using air only

NOTE Appliances using additional external water are rated according to EN 15218.

3.2
application rating condition
rating condition which provides additional information on the performance of the unit within its operating range, where applicable

3.3
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

NOTE Expressed in Pa.

3.4
brine
heat transfer medium that has a freezing point lower than the freezing point of water

3.5
close control air conditioner
air conditioner to satisfy the requirements of the process carried out in the air conditioned room

3.6
coefficient of performance

COP

ratio of the heating capacity to the effective power input of the unit

NOTE Expressed in kW/kW.

3.7
comfort chiller
liquid chilling package whose indoor heat exchanger extracts heat from a water-based cooling system designed to operate at leaving chilled water temperatures greater than or equal to 2° C

3.8
control cabinet air conditioner
air conditioner to satisfy the requirements of the control cabinet

3.9
cooling capacity

P_c

heat given off from the heat transfer medium to the unit per unit of time, corrected from any fan or pump heat where applicable

Note 1 to entry: Expressed in kW.

Note 2 to entry: For air to air and water(brine) to air units, cooling capacity is the total cooling capacity i.e. sum of latent and sensible cooling capacities.

3.10
defrost mode
state of the unit in the heating mode where the operation is modified in order to defrost the outdoor air heat exchanger

3.11
defrost period
time for which the unit is in the defrost mode

3.12
double-duct air conditioner
air conditioner in which, during cooling (or heating), the condenser (or evaporator) intake air is introduced from the outdoor environment to the unit by a duct and rejected to the outdoor environment by a second duct, and which is placed wholly inside the space to be conditioned

3.13
dry motor pump
pump with a motor which is cooled by the ambient air

3.14
effective power input

P
E

average electrical power input of the unit within the defined interval of time, obtained from:— power input for operation of the compressor and any power input for defrosting;— power input for all control and safety devices of the unit;— proportional power input of the conveying devices (e.g. fans, pumps) for ensuring the transport of the heat transfer media inside the unit

NOTE Expressed in kW.

3.15
energy efficiency ratio

EER

ratio of the total cooling capacity to the effective power input of the unit

NOTE Expressed in kW/kW.

3.16
exhaust air
air from the air conditioned space entering the outdoor heat exchanger

3.17
glandless circulator
circulator with the rotor directly coupled to the impeller and the rotor immersed in the pumped medium

3.18
glide
difference between dew point temperature and bubble point temperature at a given pressure

NOTE Expressed in K.

3.19
heat pump
encased assembly or assemblies designed as a unit, using a vapour compression cycle driven by an electric compressor, to provide delivery of heat

NOTE It can have means for cleaning and dehumidifying the air, circulating and cooling. The cooling is by means of reversing the refrigerating cycle.

3.20
heat recovery
recovery of heat rejected by the unit whose primary control is in the cooling mode by means of either an additional heat exchanger (e.g. a liquid chiller with an additional condenser) or by transferring the heat through the refrigerating system for use to unit whose primary control remains in the heating mode (e.g. variable refrigerant flow)

3.21
heat recovery capacity

P_{HR}

heat removed by the heat transfer medium of the heat recovery heat exchanger per unit of time, corrected from any fan or pump heat where applicable

Note 1 to entry: This applies only to heat recovery liquid chilling packages.

Note 2 to entry: Expressed in kW.

3.22
heat recovery efficiency

HRE

ratio of the total capacity of the system (heating plus cooling capacity) to the effective power input when operating in the heat recovery mode

NOTE Expressed in kW/kW.

3.23
heat recovery heat exchanger
heat exchanger assembly which is designed to transfer heat to the heat recovery medium

3.24
heat recovery liquid chilling package
factory-made liquid chilling package designed for the purpose of chilling liquid and recovering of heat

3.25
heat rejection capacity
heat removed by the heat transfer medium of the condenser per unit of time, corrected from any fan or pump heat where applicable

Note 1 to entry: This applies only to heat recovery liquid chilling packages.

Note 2 to entry: Expressed in kW.

3.26
heat transfer medium
fluid (water, brine, air...) used for the transfer of the heat without change of state

EXAMPLE Examples are cooled liquid circulating in the evaporator; cooling medium circulating in the condenser; heat recovery medium circulating in the heat recovery heat exchanger.

3.27
heating capacity

P_H

heat given off by the unit to the heat transfer medium per unit of time, corrected from any fan or pump heat where applicable

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

Note 2 to entry: Expressed in kW.

3.28
high temperature process chiller
process chiller that is capable of delivering its rated cooling capacity at an indoor heat exchanger outlet chilled water temperature of 15 °C, at standard rating conditions

3.29
indoor heat exchanger
heat exchanger which is designed to transfer heat between the refrigerant and the indoor heat transfer medium

NOTE In the case of an air conditioner or heat pump operating in the cooling mode, this is the evaporator. In the case of an air conditioner or heat pump operating in the heating mode, this is the condenser.

3.30
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

NOTE Expressed in Pa.

3.31
latent cooling capacity

P_L

capacity of the unit for removing latent heat from the evaporator intake air

NOTE Expressed in kW.

3.32
liquid chilling package
factory-made unit designed to cool liquid, using an evaporator, a refrigerant compressor, an integral or remote condenser and appropriate controls

NOTE It can have means for heating which can be reversing the thermodynamic cycle such as a heat pump.

3.33
low temperature process chiller
process chiller that is capable of delivering its rated cooling capacity at an indoor heat exchanger outlet temperature of −25 °C, at standard rating conditions

3.34
medium temperature process chiller
process chiller that is capable of delivering its rated cooling capacity at an indoor heat exchanger outlet temperature of −8 °C, at standard rating conditions

3.35
modular heat recovery multisplit system
split system air conditioner or heat pump incorporating a single refrigerant circuit providing variable capacity with three or more steps, multiple indoor units, each capable of being individually controlled and one or more outdoor units

Note 1 to entry: This system is capable of operating as a heat pump where recovered heat from the indoor units operating in the cooling mode can be transferred to one or more units operating in the heating mode.

Note 2 to entry: This can be achieved by a gas/liquid separator or a third line in the refrigeration circuit.

3.36
multisplit system
split system incorporating more than one indoor units, one or more refrigerant circuits, one or more compressors, and one or more outdoor units

NOTE The indoor units can be individually controlled or not.

3.37
off mode
mode wherein the unit is completely switched off and cannot be reactivated by a control device, by an external signal or by a timer

NOTE Off mode means a condition in which the equipment is connected to the mains power source and is not providing any function. The following can also be considered as off mode: conditions providing only an indication of off mode condition; conditions providing only functionalities intended to ensure electromagnetic compatibility.

3.38
operating cycle with defrost
cycle consisting of a heating period and a defrost period

3.39
operating range
range indicated by the manufacturer and limited by the upper and lower limits of use (e.g. temperatures, air humidity, voltage) within which the unit is deemed to be fit for use and has the characteristics published by the manufacturer

3.40
outdoor air
air from the outdoor environment

3.41
outdoor heat exchanger
heat exchanger which is designed to transfer heat between any available heat source and the refrigerant

NOTE In the case of an air conditioner or heat pump operating in the cooling mode, this is the condenser. In the case of an air conditioner or heat pump operating in the heating mode, this is the evaporator.

3.42
packaged unit
factory assembly of components of refrigeration system fixed on a common mounting to form a discrete unit

3.43
process chiller
factory-made product integrating at least one compressor and one evaporator, capable of cooling down and continuously maintaining the temperature of a liquid in order to provide cooling to a refrigerated appliance or to a process cooling system

NOTE It may or may not integrate the condenser, the coolant circuit hardware and other ancillary equipment.

3.44
rated capacity

P_{rated}

cooling or heating capacity of the vapour compression cycle of the unit at standard rating conditions

NOTE Expressed in kW.

3.45
rated coefficient of performance

COP_{rated}

declared capacity for heating divided by the rated power input for heating of a unit when providing heating at standard rating conditions

NOTE Expressed in kW/kW.

3.46
rated power input

P_{EER}, P_{COP}

cooling or heating effective power input of the vapour compression cycle of the unit at standard rating conditions

NOTE Expressed in kW.

3.47
rated energy efficiency ratio

EER_{rated}

declared capacity for cooling divided by the rated power input for cooling of a unit when providing cooling at standard rating conditions

NOTE Expressed in kW/kW.

3.48
rating conditions
standardized conditions provided for the determination of data which are characteristic for the unit, especially:— heating capacity, power input, *COP* in heating mode;— cooling capacity, power input, *EER*, *SHR* in cooling mode

3.49
recycled air
air from the air conditioned space entering the indoor heat exchanger

3.50
reverse cycle unit
unit capable of both cooling and heating

3.51
sensible cooling capacity

P
S

capacity of the unit for removing sensible heat from the evaporator intake air

NOTE Expressed in kW.

3.52
sensible heat ratio

SHR

ratio of the sensible cooling capacity to the total cooling capacity

NOTE Expressed in kW/kW.

3.53
single-duct air conditioner
air conditioner in which, during cooling (or heating), the condenser (or evaporator) intake air is introduced from the space containing the unit and discharged outside this space

3.54
single split unit
factory assembly of components of refrigeration system fixed on two mountings to form a discrete matched functional unit

3.55
standard air
dry air at 20 °C and at standard barometric pressure of 101,325 kPa, having a density of 1,204 kg/m^3

3.56
standard rating conditions
operating conditions while establishing the rated capacity (P_{rated}), rated air flow rate [and/or rated liquid flow rate], rated energy efficiency ratio (EER_{rated}) and/or rated coefficient of performance (COP_{rated})

3.57
standby mode
mode wherein the unit is switched off partially and can be reactivated by a control device (such as a remote control), an external signal or a timer

NOTE The unit is connected to the mains power source, depends on energy input to work as intended and provides only the following functions, which can persist for an indefinite time: reactivation function, or reactivation function and only an indication of enabled reactivation function, and/or information or status display.

3.58
system capacity ratio
ratio of the total stated cooling (heating) capacity of all operating indoor units to the stated cooling (heating) capacity of the outdoor unit(s) at the rating conditions

3.59
temperature of saturated liquid
temperature of liquid at the bubble point of the refrigerant corresponding to the discharge pressure of the compressor, measured at the outlet piping connection of the unit

NOTE Expressed in °C.

3.60
temperature of the liquid refrigerant
temperature of the refrigerant measured at the inlet of the expansion device

NOTE Expressed in °C.

3.61
total power input

P
T

power input of all components of the unit

NOTE Expressed in kW.

3.62
water loop
closed circuit of water maintained within a temperature range on which the units in cooling mode reject heat and the units in heating mode take heat

4 Symbols, abbreviated terms and units

For the purposes of this document, the symbols, abbreviated terms and units in Table 1 apply.

Table 1 — Symbols, abbreviated terms and units

Symbol and abbreviated terms	Denomination	Units
P_C	cooling capacity	kW
P_L	latent cooling capacity	kW
P_S	sensible cooling capacity	kW
P_H	heating capacity	kW
P_{HR}	heat recovery capacity	kW
P_T	total power input	kW
P_E	effective power input	kW
EER	energy efficiency ratio	kW/kW
EER_{rated}	rated energy efficiency ratio	kW/kW
SHR	sensible heat ratio	kW/kW
COP	coefficient of performance	kW/kW
COP_{rated}	rated coefficient of performance	kW/kW
P_{rated}	rated capacity	kW
HRE	heat recovery efficiency	kW/kW
Δp_e	available external static pressure difference	Pa
Δp_i	internal static pressure difference	Pa
P_{EER}, P_{COP}	rated power input	kW

5 Denomination

The units 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 (see Table 2).

Table 2 — Most common types of units

Heat transfer medium		Classification
Outdoor heat exchanger	**Indoor heat exchanger**	
Air	Air	Air-to-air heat pump or air cooled air conditioner
Water	Air	Water-to-air heat pump or water cooled air conditioner
Brine	Air	Brine-to-air heat pump or brine cooled air conditioner
Air	Water	Air-to-water heat pump or air cooled comfort chiller or air-cooled process chiller
Water	Water	Water-to-water heat pump or water cooled comfort chiller or water-cooled process chiller
Brine	Water	Brine-to-water heat pump or brine cooled comfort chiller or brine cooled process chiller
Air	Brine	Air-to-brine heat pump or air cooled comfort chiller or air-cooled process chiller
Water	Brine	Water-to-brine heat pump or water cooled comfort chiller or water-cooled process chiller
Brine	Brine	Brine-to-brine heat pump or brine cooled comfort chiller or brine cooled process chiller

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Bibliography

[1] EN 14511-2:2022, *Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors — Part 2: Test conditions*

[2] EN 14511-3:2022, *Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors — Part 3: Test methods*

[3] EN 14511-4:2022, *Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors — Part 4: Requirements*

[4] EN 14825, *Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling — Testing and rating at part load conditions and calculation of seasonal performance*

[5] EN 15218, *Air conditioners and liquid chilling packages with evaporatively cooled condenser and with electrically driven compressors for space cooling — Terms, definitions, test conditions, test methods and requirements*

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