BS EN 14511-1:2013

BSI Standards Publication

Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling

Part 1: Terms, definitions and classification

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National foreword

This British Standard is the UK implementation of EN 14511-1:2013. It supersedes BS EN 14511-1:2011 which is withdrawn.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 secretary.

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English Version

Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling - Part 1: Terms, definitions and classification

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

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

This European Standard was approved by CEN on 30 May 2013.

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Foreword

This document (EN 14511-1:2013) has been prepared by Technical Committee CEN/TC 113 “Heat pumps and air conditioning units”, the secretariat of which is held by AENOR.

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of an identical text or by endorsement, at the latest by March 2014 and conflicting national standards shall be withdrawn at the latest by March 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14511-1:2011.

The main change with respect to the previous edition is the addition of terms and definitions.

Although this document has been prepared in the frame of the commission regulation (EU) No 206/2012 implementing Directive 2009/125/EC with regard to ecodesign requirements for air conditioners and comfort fans, it is also intended to support the essential requirements of the European Directive 2010/30/CE.

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

— *Part 1: Terms, definitions and classification*,

— *Part 2: Test conditions*,

— *Part 3: Test methods*,

— *Part 4: Operating requirements, marking and instructions.*

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1 Scope

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

This European Standard applies to:

— factory-made units that can be ducted,

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

— factory-made units of either fixed capacity or variable capacity by any means, 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 standard. Single duct and double duct units are covered by the standard.

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

This European Standard 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 should have their performance in the cooling mode determined in accordance to EN 15218. For those which can also operate in the heating mode, EN 14511 applies for the determination of their performance in the heating mode.

Installations used for heating and/or cooling of industrial processes are not within the scope of this standard.

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 used.

2 Terms and definitions

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

2.1
air conditioner
a 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 may use 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 1 to entry: Appliances using additional external water are rated according to EN 15218.

2.2
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 1 to entry: It can have means for cooling, circulating, cleaning and dehumidifying the air. The cooling is by means of reversing the refrigerating cycle.

Note 2 to entry: Also known as a reverse cycle air conditioner, when cooling and heating air.

2.3
comfort air conditioner or heat pump
air conditioner or heat pump to satisfy the comfort requirements of the occupants of the air conditioned room

2.4
close control air conditioner
air conditioner to satisfy the requirements of the process carried out in the air conditioned room

2.5
control cabinet air conditioner
air conditioner to satisfy the requirements of the control cabinet

2.6
packaged unit
factory assembly of components of refrigeration system fixed on a common mounting to form a discrete unit

2.7
single split unit
factory assembly of components of refrigeration system fixed on two mountings to form a discrete matched functional unit

2.8
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

2.9
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, near a wall

2.10
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 1 to entry: It may have means for heating which can be reversing the refrigerating cycle, such as a heat pump.

2.11
heat recovery liquid chilling package
factory-made liquid chilling package designed for the purpose of chilling liquid and recovering of heat

2.12
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)

2.13
indoor heat exchanger
heat exchanger which is designed to transfer heat between the refrigerant and the indoor heat transfer medium

Note 1 to entry: 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.

2.14
outdoor heat exchanger
heat exchanger which is designed to transfer heat between any available heat source and the refrigerant

Note 1 to entry: 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.

2.15
heat recovery heat exchanger
heat exchanger assembly which is designed to transfer heat to the heat recovery medium

2.16
heat transfer medium
medium (water, air...) used for the transfer of the heat without change of state

EXAMPLES Cooled liquid circulating in the evaporator; cooling medium circulating in the condenser; heat recovery medium circulating in the heat recovery heat exchanger.

2.17
exhaust air
air from the air conditioned space entering the outdoor heat exchanger

2.18
recycled air
air from the air conditioned space entering the indoor heat exchanger

2.19
outdoor air
air from the outdoor environment

2.20
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

2.21
total cooling capacity
P_C
heat given off from the heat transfer medium to the unit per unit of time, expressed in Watt

2.22
latent cooling capacity
P_L
capacity of the unit for removing latent heat from the evaporator intake air, expressed in Watt

2.23
sensible cooling capacity
P_S
capacity of the unit for removing sensible heat from the evaporator intake air, expressed in Watt

2.24
heating capacity
P_H
heat given off by the unit to the heat transfer medium per unit of time, expressed in Watt

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

2.25
heat rejection capacity
heat removed by the heat transfer medium of the condenser per unit of time, expressed in Watt

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

2.26
heat recovery capacity
heat removed by the heat transfer medium of the heat recovery heat exchanger, per unit of time, expressed in Watt

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

2.27
total power input
P_T
power input of all components of the unit, expressed in Watt

2.28
effective power input
P_E
average electrical power input of the unit within the defined interval of time, expressed in Watt, 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

2.29
energy efficiency ratio
EER
ratio of the total cooling capacity to the effective power input of the unit, expressed in Watt/Watt

2.30
rated energy efficiency ratio
EER_{rated}
declared capacity for cooling [kW] divided by the rated power input for cooling [kW] of a unit when providing cooling at standard rating conditions

2.31
sensible heat ratio
SHR
ratio of the sensible cooling capacity to the total cooling capacity, expressed in Watt/Watt

2.32
coefficient of performance
COP
ratio of the heating capacity to the effective power input of the unit, expressed in Watt/Watt

2.33
rated coefficient of performance
COP_{rated}
declared capacity for heating [kW] divided by the rated power input for heating [kW] of a unit when providing heating at standard rating conditions

2.34
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

2.35
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

2.36
defrost mode
state of the unit in the heating mode where the operation is modified or reversed to defrost the outdoor heat exchanger

2.37
defrost period
time for which the unit is in the defrost mode

2.38
operating cycle with defrost
cycle consisting of a heating period and a defrost period

2.39
temperature of saturated vapour at the discharge of the compressor
temperature of saturated vapour/bubble point of the refrigerant corresponding to the discharge pressure of the compressor, measured at the compressor/piping connection

2.40
temperature of the liquid refrigerant
temperature of the refrigerant measured at the inlet of the expansion device

2.41
glide
difference between dew point temperature and bubble point temperature at a given pressure

2.42
brine
heat transfer medium that has a freezing point lower than the freezing point of water

2.43
sound power level
L_W
ten times the logarithm to the base 10 of the ratio of the given sound power to the reference sound power which is 1 pW (10^{-12} W), and expressed in decibels

2.44
standard rating conditions
operating conditions while establishing the rated capacity, sound power level, rated air flow rate [and/or rated liquid flow rate], rated energy efficiency ratio (EER_{rated}) and/or rated coefficient of performance (COP_{rated})

2.45
application rating condition
rating condition which provides additional information on the performance of the unit within its operating range, where applicable

2.46
multi-split 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 1 to entry: The indoor units can be individually controlled or not.

2.47
modular heat recovery multi-split system
split system air conditioner or heat pump incorporating a single refrigerant circuit, at least one variable-speed compressor or an alternate compressor combination for varying the capacity of the system by 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 may be achieved by a gas/liquid separator or a third line in the refrigeration circuit.

2.48
rated capacity
P_{rated}
cooling or heating capacity of the vapour compression cycle of the unit a standard rating conditions

2.49
system capacity
capacity of the system when all outdoor and indoor units are operating in the same mode

2.50
system reduced capacity
capacity of the system when some of the indoor units are disconnected

2.51
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

2.52
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

2.53
standard air
dry air at 20 °C and at standard barometric pressure of 101,325 kPa, having a mass density of 1,204 kg/m³

2.54
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

2.55
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

2.56
reversible air conditioner
air conditioner capable of both cooling and heating

Note 1 to entry: also known as reverse cycle heat pump

2.57
rated power input
P_{EER}, P_{COP}
cooling or heating power input of the vapour compression cycle of the unit a standard rating conditions

2.58
standby mode
mode wherein the unit is switched off partially and can be reactivated by a control device or timer

Note 1 to entry: The unit is connected to the mains power source, 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.

2.59
off mode
mode wherein the unit is completely switched off and can be reactivated neither by control device nor by 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. 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 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 1).

Table 1 — Most common types of units

Heat transfer medium		Classification
Outdoor heat exchanger	**Indoor heat exchanger**	
Air	Air	Air/air heat pump or air cooled air conditioner
Water	Air	Water/air heat pump or water cooled air conditioner
Brine	Air	Brine/air heat pump or brine cooled air conditioner
Air	Water	Air/water heat pump or air cooled liquid chilling package
Water	Water	Water/water heat pump or water cooled liquid chilling package
Brine	Water	Brine/water heat pump or brine cooled chilling package

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[1] 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*

[2] 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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