SLOVENSKI STANDARD
SIST EN 14825:2014

01-januar-2014

Nadomešča:
SIST EN 14825:2012

Klimatske naprave, enote za tekočinsko hlajenje in toplotne črpalke z električnimi kompresorji za ogrevanje in hlajenje prostora - Preskušanje in ocenitev ob delni obremenitvi ter izračun letnega učinka

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

Luftkonditionierer, Flüssigkeitskühlsätze und Wärmepumpen mit elektrisch angetriebenen Verdichtern zur Raumbeheizung und -kühlung - Prüfung und Leistungsbemessung unter Teillastbedingungen und Berechnung der saisonalen Arbeitszahl

Climatiseurs, groupes refroidisseurs de liquide et pompes à chaleur avec compresseur entraîné par moteur électrique pour le chauffage et la réfrigération des locaux - Essais et détermination des caractéristiques à charge partielle et calcul de performance saisonnière

Ta slovenski standard je istoveten z: **EN 14825:2013**

ICS:

23.120	Zračniki. Vetrniki. Klimatske naprave	Ventilators. Fans. Air-conditioners
27.080	Toplotne črpalke	Heat pumps
91.140.30	Prezračevalni in klimatski sistemi	Ventilation and air-conditioning

SIST EN 14825:2014 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14825

September 2013

ICS 27.080; 91.140.30

Supersedes EN 14825:2012

English Version

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

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This European Standard was approved by CEN on 18 July 2013.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 14825:2013) 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of an identical text or by endorsement, at the latest by March 2014, and conflicting national standards shall be withdrawn at the latest by March 2014.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 14825:2012.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

The main changes with respect to the previous edition are:

a) Clause 3 “Terms, definitions, symbols, abbreviated terms and units” has been modified in order to be harmonised with Commission Regulation (EC) No 206/2012;

b) modifications so that the text is aligned to the modified terms and definitions;

c) a new normative Annex A, Applicable climate bin hours and hours for active mode, thermostat-off, standby, off mode for air conditioners below and equal to 12 kW, which includes Tables 26 and 37 of the previous standard;

d) a new normative Annex G, Template for technical data sheet;

e) a new informative Annex ZA, Relationship between this European Standard and the requirements of Commission Regulation (EC) No 206/2012;

f) see the following cross references regarding structural changes:

EN 14825:2013	EN 14825:2012
6.1	-
6.2	6.2
6.3	6.1
6.4	6.3
6.5	6.4
7.1	7.1
7.2	7.2
7.3	7.1
7.4	7.3
7.5	7.4
Annex A	-
Annex B	Annex A
Annex C	Annex B
Annex D	Annex C
Annex E	Annex D
Annex F	Annex E
Annex G	-

Although this document be 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 may also be used to show compliance with the requirements of the European Directive 2010/30/EU and Commission Delegated Regulation (EU) No 626/2011.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Heat pumps, air conditioners and liquid chilling packages are, at present, selected and compared at a rated condition. This condition does not represent the usual operating conditions of the equipment over a season. This operating condition can be better assessed by comparing equipment at representative reduced capacities and determining the Seasonal Energy Efficiency Ratio and Seasonal Coefficient of Performance.

Fixed capacity heat pumps, air conditioners and liquid chilling packages deal with varying loads by varying the operation time. The efficiency of the system is dependent on the effectiveness of the controlling thermostats. Variable capacity air conditioners, liquid chilling packages and heat pumps, by continuous or step control of the compressor, can more closely match the varying load improving system efficiency.

This European Standard provides part load conditions and calculation methods for calculating the Seasonal Energy Efficiency Ratio (SEERon) and Seasonal Coefficient of Performance (SCOPon and SCOPnet) of such units when they are used to fulfil the cooling and heating demands.

Other energy consumptions can occur when the unit is not used to fulfil the cooling and heating demands such as those from a crankcase heater or when the unit is on standby. These consumptions are considered in the calculation methods for reference SEER and reference SCOP.

Reference SEER/SEERon and reference SCOP/SCOPon/SCOPnet calculations may be based on calculated or tested values. In case of tested values, this European Standard gives the methods for testing heat pumps, air conditioners and liquid chilling packages at part load conditions.

The rating conditions and test methods of units operating at rated and application capacities are given in EN 14511-2 and EN 14511-3.

The methods for calculation of system energy efficiencies for specific heat pump systems in buildings are given in EN 15316-4-2.

1 Scope

This European Standard covers air conditioners, heat pumps and liquid chilling packages. It applies to factory made units defined in EN 14511-1, except single duct, control cabinet and close control units.

This European Standard gives the calculation methods for the determination of reference seasonal energy efficiency SEER and SEERon and reference seasonal coefficient of performance SCOP, SCOPon and SCOPnet.

Such calculation methods may be based on calculated or measured values.

In case of measured values, this European Standard covers the test methods for determination of capacities, EER and COP values during active mode at part load conditions. It also covers test methods for electric power consumption during thermostat-off mode, standby mode, off-mode and crankcase heater mode.

This European Standard serves as an input for the calculation of the system energy efficiency in heating mode of specific heat pump systems in buildings, as stipulated in the standard EN 15316-4-2.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

EN 14511-3:2011, *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling — Part 3: Test methods*

EN 14511-4, *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling — Part 4: Operating requirements, marking and instructions*

3 Terms, definitions, symbols, abbreviated terms and units

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14511-1 (unless otherwise stated) and the following apply.

3.1.1
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 unit is activated

Note 1 to entry: This condition may involve on/off-cycling of the unit in order to reach or maintain a required indoor air temperature.

3.1.2
active mode seasonal coefficient of performance
SCOPon
average coefficient of performance of the unit in active mode for the designated heating season, constructed from the part load, electric back up heating capacity (where required) and bin-specific coefficients of performance (COPbin(Tj) and weighted by the bin hours the bin condition occurs

Note 1 to entry: For calculation of SCOPon, the power consumption during thermostat-off mode, standby mode, off mode or that of the crankcase heater are excluded. The power consumption of an electric back up heater is added for the part load conditions where the declared capacity of the unit is lower than the heating load, regardless whether this back up heater is included in the unit or not.

Note 2 to entry: Expressed in kWh/kWh.

3.1.3
active mode seasonal energy efficiency ratio
SEERon
average energy efficiency ratio of the unit in active mode for the cooling function, constructed from part load and bin-specific energy efficiency ratio's (EERbin(Tj)) and weighted by the bin hours the bin condition occurs

Note 1 to entry: For calculation of SEERon, power consumption during thermostat-off mode, standby mode or that of the crankcase heater are excluded.

Note 2 to entry: Expressed in kWh/kWh.

3.1.4
annual electricity consumption for cooling
Q_{CE}
electricity consumption [kWh/a] required to meet the reference annual cooling demand and calculated as the reference annual cooling demand divided by the active mode seasonal energy efficiency ratio (SEERon) and the electricity consumption of the unit for thermostat-off-, standby-, off- and crankcase heater-mode during the cooling season

3.1.5
annual electricity consumption for heating
Q_{HE}
electricity consumption [kWh/a] which is required to meet the indicated reference annual heating demand, which pertains to a designated heating season and which is calculated as the Reference annual heating demand divided by the active mode seasonal coefficient of performance (SCOPon) and the electricity consumption of the unit for thermostat-off-, standby-, off- and crankcase heater-mode during the heating season

3.1.6
application SCOP, application SCOPon and SCOPnet
SCOP and SCOPon/SCOPnet that takes into account the specific application and the specific location of the unit, which are different from the ones used for determining the reference SCOP and reference SCOPon/SCOPnet given in this European Standard

Note 1 to entry: The calculation procedures used to determine the application SCOPon/SCOPnet, if required, are those in this European Standard for reference SCOPon/SCOPnet. However, the heating bins used in the calculations will be those of the actual location of the building. The heating loads as well as the hours of use will be those of the actual building.

3.1.7
application SEER and application SEERon
SEER and SEERon that takes into account the specific application and the specific location of the unit, which are different from the ones used for determining the reference SEER and reference SEERon given in this European Standard

Note 1 to entry: The calculation procedures used to determine the application SEERon, if required, are those in this European Standard for reference SEERon. However, the cooling bins used in the calculations will be those of the actual location of the building. The cooling loads as well as the hours of use will be those of the actual building.

3.1.8
bin hours
h_j
sum of all hours occurring at a given temperature for a specific location

Note 1 to entry: The number is rounded to a whole number and is derived from representative weather data over the 1982-1999 period.

Note 2 to entry: For the reference heating seasons the specific locations are Strasbourg (average), Helsinki (colder) and Athens (warmer).

3.1.9
bin limit temperature
temperature in the bin for which no more heating or cooling is required

Note 1 to entry: The bin limit temperature equals 16 °C for all climates in cooling and heating applications.

3.1.10
bin-specific coefficient of performance
COPbin(Tj)
coefficient of performance specific for every bin j with outdoor temperature Tj in a season

3.1.11
bin-specific energy efficiency ratio
EERbin(Tj)

energy efficiency ratio specific for every bin j with outdoor temperature Tj in a season

3.1.12
bivalent temperature
Tbivalent
lowest outdoor temperature point at which the unit is declared to have a capacity able to meet 100 % of the heating load

Note 1 to entry: Below this point, the unit may still deliver capacity, but additional back up heating is necessary to fulfil the full heating load.

3.1.13
capacity control
ability of the unit to change its capacity by changing the volumetric flow rate of the refrigerant

Note 1 to entry: Units are indicated as '*fixed*' if the unit cannot change its volumetric flow rate, '*staged*' if the volumetric flow rate is changed or varied in series of not more than two steps, or '*variable*' if the volumetric flow rate is changed or varied in series of three or more steps.

3.1.14
capacity ratio
CRu
cooling (or heating) part load or full load divided by the declared cooling (or heating) capacity of the unit at the same temperature conditions

3.1.15
coefficient of performance at declared capacity
COPd
declared heating capacity of the unit divided by the effective power input of a unit at specific temperature conditions, A, B, C, D, E, F and G, where applicable

Note 1 to entry: Expressed in kW/kW.

3.1.16
coefficient of performance at part load
COP_{PL}
heating capacity at part load or full load divided by the effective power input of a unit at specific temperature conditions

Note 1 to entry: When the declared capacity of the unit is higher than the heating demand, the COP includes degradation losses. When the declared capacity of the unit is lower than the heating demand (i.e. below the bivalent temperature condition), the COP of the declared capacity is used.

Note 2 to entry: Expressed in kW/kW.

3.1.17
compensation load
heating or cooling load imposed by the test apparatus on the test object

3.1.18
crankcase heater mode operating hours
H_{CK}
annual number of hours the unit is considered to be in crankcase heater mode, the value of which depends on the designated season and function

Note 1 to entry: Expressed in h/annum.

3.1.19
crankcase heater mode power consumption

P_{CK}
power consumption of the unit while in crankcase heater operation mode

Note 1 to entry: Expressed in W.

3.1.20
crankcase heater operation mode
condition where the unit has activated a heating device to avoid the refrigerant migrating to the compressor in order to limit the refrigerant concentration in oil at compressor start

Note 1 to entry: The function of the crankcase heater is to avoid refrigerant to migrate to the compressor to limit refrigerant concentration in oil at compressor start.

3.1.21
cycling interval capacity for cooling
Pcycc
(time-weighted) average cooling capacity output over the cycling test interval (active + off mode)

Note 1 to entry: Expressed in kW.

3.1.22
cycling interval capacity for heating
Pcych
(time-weighted) average heating capacity output over the cycling test interval (active + off mode)

Note 1 to entry: Expressed in kW.

3.1.23
cycling interval efficiency for cooling
EERcyc
average energy efficiency ratio over the cycling test interval (compressor switching on and off)

Note 1 to entry: The cycling interval efficiency for cooling is calculated as the integrated cooling capacity over the interval [kWh] divided by the integrated electric power input over that same interval [kWh].

3.1.24
cycling interval efficiency for heating
COPcyc
average coefficient of performance over the cycling test interval (compressor switching on and off)

Note 1 to entry: The cycling interval efficiency for heating calculated as the integrated heating capacity over the interval [kWh] divided by the integrated electric power input over that same interval [kWh].

3.1.25
declared capacity
Pd
cooling (Pdc) or heating (Pdh) capacity of the vapour compression cycle a unit can deliver at any temperature condition A, B, C, D, E, F or G, as declared by the manufacturer

Note 1 to entry: This is the capacity delivered by the refrigerant cycle of the unit without supplementary electric heaters, even if those are integrated in the unit.

Note 2 to entry: The temperature conditions for part load conditions A, B, C, D, E, F or G are explained in the tables.

3.1.26
degradation coefficient
Cc
measure of efficiency loss due to the cycling of air-to-water or water/brine-to-water units

3.1.27
degradation coefficient
Cd
measure of efficiency loss due to the cycling of air-to-air or water/brine-to-air units

Note 1 to entry: If the degradation coefficient is different for cooling and heating mode, then Cdc is used for cooling and Cdh is used for heating.

3.1.28
electric back up heater
supplementary electric heater, with a COP of 1, considered in the calculation of SCOP and SCOPon, regardless of whether this is supplied together with the unit

3.1.29
electric back up heater capacity
elbu
heating capacity of a real or assumed back up heater supplementing the declared capacity for heating when the capacity of the unit is lower than the heat demand

Note 1 to entry: Expressed in kW.

3.1.30
energy efficiency ratio at declared capacity
EERd
declared cooling capacity of the unit divided by the effective power input of a unit at specific temperature conditions A, B, C, D

Note 1 to entry: Expressed in kW/kW.

3.1.31
energy efficiency ratio at part load
EER_{PL}
cooling capacity at part load or full load conditions divided by the effective power input of a unit at specific temperature conditions

Note 1 to entry: The EER includes degradation losses when the declared capacity of the unit is higher than the cooling capacity demand.

Note 2 to entry: Expressed in kW/kW.

3.1.32
equivalent active mode hours for cooling
H_{CE}
assumed annual number of hours [h/year] while the unit is assumed to operate at the design load for cooling (Pdesignc) in order to satisfy the reference annual cooling demand

3.1.33
equivalent active mode hours for heating
H_{HE}
assumed annual number of hours [hrs/a] while the unit is assumed to operate at the design load for heating (Pdesignh) in order to satisfy the reference annual heating demand

3.1.34
fixed outlet
control of the heat pump has no means to vary the water flow temperature with the outdoor air temperature

3.1.35
forced convection air-cooled liquid cooler
“dry cooler”
self-contained system that cools a single-phase liquid by rejecting sensible heat via a heat exchanger to air that is mechanically circulated by integral fan(s)

3.1.36
full load
design load
Pdesign
cooling (Pdesignc) or heating (Pdesignh) load declared by the manufacturer at Tdesign conditions

Note 1 to entry: It is possible to calculate the SEER/SEERon or SCOP/SCOPon/SCOPnet of a unit for more than one Pdesign value.

Note 2 to entry: Expressed in kW.

3.1.37
information or status display
continuous function providing information or indicating the status of the equipment on a display, including clocks

3.1.38
net seasonal coefficient of performance
SCOPnet
seasonal efficiency of a unit in active heating mode without supplementary electric heaters which is determined from mandatory conditions given in this European Standard

Note 1 to entry: For calculation of SCOPnet, the electricity consumption during active mode is used. This excludes the power consumption during thermostat-off mode, standby mode, off mode or that of the crankcase heater. For the part load conditions where the declared capacity of the unit is lower than the heating load, the power consumption of a back up heater is not included.