# SLOVENSKI STANDARD
# SIST EN 14825:2022

**01-september-2022**

**Nadomešča:**
**SIST EN 14825:2019**

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**Klimatske naprave, enote za hlajenje kapljevine ter toplotne črpalke za ogrevanje in hlajenje prostora z električnimi kompresorji, profesionalno in procesno 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, commercial and process 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 jahreszeitbedingten Leistungszahl

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 14825:2022**

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

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July 2022

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# Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling, commercial and process cooling - Testing and rating at part load conditions and calculation of seasonal performance

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

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## European foreword

This document (EN 14825:2022) 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 January 2023, and conflicting national standards shall be withdrawn at the latest by January 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 14825:2018.

The revision was necessary in order to harmonize this European standard with 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 and to harmonize this European Standard with 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 and Commission's standardization request M/495 and Amendment N° 1, and Commission's standardization request M/560.

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

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For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, Annex ZB, Annex ZC, Annex ZD, Annex ZE and Annex ZF, which are integral parts of this document.

The main changes with respect to requirements for *forthcoming regulations* are:

a) modification of the title to include commercial cooling and process cooling;

b) modification of Table 4 to include exhaust air dry bulb temperatures;

c) new requirements for hybrid heat pumps in Clause 8;

d) new structure to separate requirements for calculation methods for seasonal space heating efficiency of heat pumps (Clause 7) and requirements for test methods for hybrid heat pumps (Clause 8);

e) update of uncertainties of measurement for the air enthalpy method;

f) removal of Annex E and the void Annex I, and renumbering of the following Annexes;

g) addition a new Annex M about testing and rating of individual indoor units;

h) new informative Annex ZB, Relationship between this European Standard and the requirements of Commission Regulation (EU) No 626/2011 of 4 May 2011; and renumbered the following annexes;

i) new informative Annex ZF, Relationship between this European Standard and the requirements of Commission Regulation (EU) 2016/2281 of 30 November 2016;

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j) new numbering of annexes.

| EN 14825:2018 | EN 14825:2022 |
|---|---|
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| Annex F | Annex E |
| Annex G | Annex F |
| Annex H | Annex G |
| Annex I | |
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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.

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# Introduction

Heat pumps, air conditioners and liquid chilling packages can be selected and compared at standard rating conditions. These conditions do not represent the usual operating conditions of the equipment over a season. Better comparison for equipment can be assessed by determining Seasonal Energy Efficiency Ratio, Seasonal Coefficient of Performance and Seasonal Energy Performance Ratio that enable to take into account more representative operating conditions and performance for several part loads.

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 document also applies to hybrid units as defined in this standard.

This document provides part load conditions and calculation methods for calculating the Seasonal Energy Efficiency Ratio ($SEER_{on}$), the seasonal energy performance ratio (*SEPR*) and Seasonal Coefficient of Performance ($SCOP_{on}$ and $SCOP_{net}$) of such units when they are used to fulfil the cooling and heating demands.

This document provides methods for calculating the seasonal space cooling energy efficiency $\eta_{s,c}$ and seasonal space heating energy efficiency $\eta_{s,h}$.

Other electric 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 *SEER* and *SCOP*.

This document also considers Seasonal Energy Performance Ratio of process chillers (*SEPR*) which is representative of variations in loads throughout a complete year. Test conditions and test method are described to calculate this *SEPR*.

*SEER*/$SEER_{on}$, *SCOP*/$SCOP_{on}$, $SCOP_{net}$ and *SEPR* calculations are based on calculated or measured values. In case of measured values, this document gives the methods for testing heat pumps, air conditioners and liquid chilling packages at part load conditions.

The standard rating conditions and test methods are given in EN 14511-2, EN 14511-3 and EN 15879-1.

The standard provides test procedures for the rating of individual indoor units, as part of multi-split systems having a system capacity > 12 kW.

Although this document was prepared in the frame of the 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, 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.

This document was prepared in the frame of the 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. This European standard also aims at showing compliance with the requirements of the European Directive 2010/30/EU and Commission Delegated Regulation (EU) No 811/2013.

This document was prepared in the frame of the 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.

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This document was prepared in the frame of the 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.

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# 1 Scope

This document is applicable to air conditioners, heat pumps and liquid chilling packages, including comfort and process chillers. It applies to factory made units defined in EN 14511-1, except single duct, double duct, control cabinet and close control units. It also covers direct exchange-to-water(brine) heat pumps (DX-to-water(brine)) as defined in EN 15879-1.

This document also applies to hybrid units as defined in this standard.

This document specifies the temperatures, part load conditions and the calculation methods for the determination of seasonal energy efficiency *SEER* and $SEER_{on}$, seasonal space cooling energy efficiency $\eta_{s,c}$, seasonal coefficient of performance *SCOP*, $SCOP_{on}$ and $SCOP_{net}$, seasonal space heating energy efficiency $\eta_{s,h}$ and seasonal energy performance ratio *SEPR*.

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

In case of measured values, this document specifies the test methods for determination of capacities, *EER* and *COP* values during active mode at part load conditions. It also establishes test methods for power input during thermostat-off mode, standby mode, off mode and crankcase heater mode.

NOTE 1 The word “unit” is used instead of the full terms of the products.

NOTE 2 The word “heating” is used to refer to space heating.

# 2 Normative references

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The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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EN 304:2017, *Heating boilers — Test code for heating boilers for atomizing oil burners*

EN 14511-1:2018, *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*

EN 14511-2:2018, *Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors — Part 2: Test conditions*

EN 14511-3:2018, *Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors — Part 3: Test methods*

EN 15502-1:2012+A1:2015, *Gas-fired heating boilers — Part 1: General requirements and tests*

EN 15879-1:2011, *Testing and rating of direct exchange ground coupled heat pumps with electrically driven compressors for space heating and/or cooling — Part 1: Direct exchange-to-water heat pumps*

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# 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 and EN 15879-1 and the following 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/

### 3.1.1
**active mode**
mode corresponding to the hours with a space 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**
$SCOP_{on}$
average coefficient of performance of the unit in active mode for the designated heating season, determined from the part load, supplementary heating capacity (where required) and bin-specific coefficients of performance ($COP_{bin}(T_j)$) and weighted by the bin hours where the bin condition occurs

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Note 1 to entry: For calculation of $SCOP_{on}$, the energy consumption during thermostat-off mode, standby mode, off mode and crankcase heater mode are excluded. The energy consumption of a supplementary heater is added for the part load conditions where the declared capacity of the unit is lower than the heating load, regardless whether this supplementary heater is included in the unit or not included in the unit.

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Note 2 to entry: Expressed in kWh/kWh.

### 3.1.3
**active mode seasonal energy efficiency ratio**
$SEER_{on}$
average energy efficiency ratio of the unit in active mode for the space cooling function, determined from part load and bin-specific energy efficiency ratios ($EER_{bin}(T_j)$) and weighted by the bin hours where the bin condition occurs

Note 1 to entry: For calculation of $SEER_{on}$, the energy consumption during thermostat-off mode, standby mode, off mode and that of the crankcase heater is excluded.

Note 2 to entry: Expressed in kWh/kWh.

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**3.1.4**
**annual energy consumption for space cooling**
$Q_{CE}$
energy consumption required to meet the reference annual space cooling demand and calculated as the reference annual space cooling demand divided by the active mode seasonal energy efficiency ratio ($SEER_{on}$) and the energy consumption of the unit for thermostat-off-, standby-, off- and crankcase heater mode during the cooling season

Note 1 to entry: Expressed in kWh.

**3.1.5**
**annual energy consumption for heating**
$Q_{HE}$
energy consumption required to meet the reference annual heating demand for a designated heating season and calculated as the reference annual heating demand divided by the active mode seasonal coefficient of performance ($SCOP_{on}$) and the energy consumption of the unit for thermostat-off-, standby-, off- and crankcase heater mode during the heating season

Note 1 to entry: Expressed in kWh.

**3.1.6**
**average climate conditions**
temperature conditions characteristic for the city of Strasbourg for the heating season

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**3.1.7**
**bin**
outdoor temperature interval of 1 K

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**3.1.8**
**bin hours**
$h_j$
hours per season for which an outdoor temperature occurs for each bin $j$

**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 space cooling and space heating applications.

Note 2 to entry: There is no bin limit temperature for process cooling applications.

**3.1.10**
**bin-specific coefficient of performance**
$COP_{bin}(T_j)$
coefficient of performance specific for every bin $j$ with outdoor temperature $T_j$ in a season

Note 1 to entry: Expressed in kW/kW.

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**3.1.11**
**bin-specific energy efficiency ratio**
$EER_{bin}(T_j)$
energy efficiency ratio specific for every bin $j$ with outdoor temperature $T_j$ in a season

Note 1 to entry: Expressed in kW/kW.

**3.1.12**
**bin temperature**
$T_j$
outdoor air dry bulb temperature at bin $j$

Note 1 to entry: Expressed in °C.

Note 2 to entry: The relative humidity may be indicated by a corresponding wet bulb temperature.

**3.1.13**
**bivalent temperature**
$T_{biv}$
lowest outdoor bin temperature at which the unit is declared to have a capacity able to meet 100 % of the heating load without supplementary heater, whether it is integrated in the unit or not

Note 1 to entry: Below this temperature, the unit may still provide capacity, but additional supplementary heating is necessary to fulfil the full heating load.

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Note 2 to entry: Bivalent temperature does not apply to hybrid units.

Note 3 to entry: Expressed in °C.

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**3.1.14**
**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.

**3.1.15**
**capacity ratio**
*CR*
cooling (or heating) part load or full load divided by the declared cooling (or heating) capacity of the unit at the same temperature conditions

**3.1.16**
**climate conditions**
temperature conditions characteristic for a specific location

**3.1.17**
**coefficient of performance at declared capacity**
$COP_d$
declared heating capacity of the unit divided by the effective power input of the unit at specific temperature conditions, A, B, C, D, E, F and G, where applicable

Note 1 to entry: Expressed in kW/kW.