

<b>STN</b>	<b>Klimatizačné jednotky, jednotky na chladenie kvapalín a tepelné čerpadlá s elektricky poháňanými kompresormi na vykurovanie a chladenie. Skúšanie a hodnotenie pri podmienkach čiastočnej záťaže a výpočet sezónnej účinnosti.</b>	<b>STN EN 14825</b>  14 3003
------------	---	--

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

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 10/16

Obsahuje: EN 14825:2016

Oznámením tejto normy sa ruší  
STN EN 14825 (14 3003) z januára 2014

**123562**

---

Úrad pre normalizáciu, metrológiu a skúšobníctvo SR, 2016  
Podľa zákona č. 264/1999 Z. z. v znení neskorších predpisov sa môžu slovenské technické normy rozmnožovať a rozširovať iba so súhlasom Úradu pre normalizáciu, metrológiu a skúšobníctvo SR.

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 14825**

March 2016

ICS 27.080; 91.140.30

Supersedes EN 14825:2013

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**

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

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

This European Standard was approved by CEN on 20 December 2015.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.



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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## Contents

Page

European foreword.....	5
Introduction .....	8
1 Scope .....	9
2 Normative references .....	9
3 Terms, definitions, symbols, abbreviated terms and units .....	9
3.1 Terms and definitions .....	9
3.2 Symbols, abbreviated terms and units .....	21
4 Part load conditions in cooling mode .....	23
4.1 General .....	23
4.2 Air-to-air units .....	23
4.3 Water-to-air units and brine-to-air units .....	24
4.4 Air-to-water units .....	24
4.5 Water-to-water and brine-to-water units .....	25
5 Part load conditions in heating mode .....	26
5.1 General .....	26
5.2 Air-to-air units .....	27
5.3 Water-to-air and brine-to-air units .....	28
5.4 Air-to-water units .....	28
5.4.1 General .....	28
5.4.2 Low temperature application .....	29
5.4.3 Intermediate temperature application .....	30
5.4.4 Medium temperature application .....	31
5.4.5 High temperature application .....	32
5.5 Water-to-water and brine-to-water units .....	32
5.5.1 General .....	32
5.5.2 Low temperature application .....	33
5.5.3 Intermediate temperature application .....	34
5.5.4 Medium temperature application .....	35
5.5.5 High temperature application .....	36
6 Calculation methods for SEER and SEER <sub>on</sub> .....	36
6.1 General formula for calculation of SEER .....	36
6.2 Calculation of the reference annual cooling demand $Q_C$ .....	37
6.3 Calculation of the reference annual electricity consumption $Q_{CE}$ .....	37
6.4 Calculation of SEER <sub>on</sub> .....	37
6.5 Calculation procedure for determination of EER <sub>bin</sub> values at part load conditions B, C, D .....	38
6.5.1 General .....	38
6.5.2 Calculation procedure for fixed capacity units .....	38
6.5.3 Calculation procedure for staged and variable capacity units .....	39
7 Calculation methods for seasonal space heating efficiency $\eta_s$ , SCOP, SCOP <sub>on</sub> and SCOP <sub>net</sub> .....	40
7.1 Calculation of the seasonal space heating efficiency $\eta_s$ .....	40
7.2 General formula for calculation of SCOP .....	40
7.3 Calculation of the reference annual heating demand $Q_H$ .....	41

7.4	Calculation of the annual electricity consumption $Q_{HE}$ .....	41
7.5	Calculation of $SCOP_{on}$ and $SCOP_{net}$ .....	41
7.6	Calculation procedure for determination of $COP_{bin}$ values at part load conditions A to G .....	43
7.6.1	General .....	43
7.6.2	Air-to-air, brine-to-air and water-to-air units .....	43
7.6.3	Air-to-water, water-to-water and brine-to-water units .....	44
8	Test methods for testing capacities, $EER_{bin}$ and $COP_{bin}$ values during active mode at part load conditions .....	45
8.1	General .....	45
8.2	Basic principles .....	45
8.3	Uncertainties of measurement .....	46
8.4	Test procedures for units with fixed capacity .....	47
8.4.1	General .....	47
8.4.2	Air-to-air and water-to-air units – Determination of the degradation coefficients $C_{dc}$ and $C_{dh}$ .....	47
8.4.3	Air-to-water units and water-to-water units – Determination of the degradation factors $C_{dc}$ and $C_{dh}$ .....	49
8.5	Test procedure for staged and variable capacity units .....	49
8.5.1	Settings for the required capacity ratio .....	49
8.5.2	Compensation method .....	49
9	Test methods for electric power input during thermostat-off mode, standby mode and crankcase heater mode and off mode .....	50
9.1	Measurement of electric power consumption during thermostat-off mode .....	50
9.2	Measurement of the electric power consumption during standby mode .....	50
9.3	Measurement of the electric power consumption during crankcase heater mode .....	51
9.4	Measurement of the electric power consumption during off mode .....	51
10	Test report .....	51
11	Technical data sheet .....	51
Annex A	(normative) Applicable climate bin hours and hours for active mode, thermostat-off, standby, off mode and crankcase heater mode for air conditioners below and equal to 12 kW .....	53
A.1	Climate bins .....	53
A.1.1	Bin limit temperature .....	53
A.1.2	Cooling .....	53
A.1.3	Heating .....	53
A.2	Hours for active mode, thermostat-off, standby, off mode .....	55
A.2.1	Cooling .....	55
A.2.2	Heating .....	55
A.3	Hours used for crankcase heater mode .....	55
A.3.1	Cooling .....	55
A.3.2	Heating .....	55
Annex B	(normative) Applicable climate bin hours and hours for active, thermostat-off, standby, off and crankcase heater modes for space heaters, air to water and water/brine to water units, below or equal to 400kW .....	56

<b>B.1</b>	<b>Climate bins.....</b>	<b>56</b>
<b>B.1.1</b>	<b>Bin limit temperature.....</b>	<b>56</b>
<b>B.1.2</b>	<b>Heating.....</b>	<b>56</b>
<b>B.2</b>	<b>Hours for active, thermostat off, standby and off modes - Heating.....</b>	<b>57</b>
<b>B.3</b>	<b>Hours used for crankcase heater mode - Heating.....</b>	<b>57</b>
<b>Annex C (normative)</b>	<b>Template for technical data sheet .....</b>	<b>58</b>
<b>C.1</b>	<b>For air to air units below and equal to 12 kW .....</b>	<b>58</b>
<b>C.2</b>	<b>For space heaters, air-to-water and water/brine-to-water units below or equal to 400kW .....</b>	<b>61</b>
<b>Annex D (informative)</b>	<b>Adaption of water temperature for fixed capacity units.....</b>	<b>63</b>
<b>Annex E (informative)</b>	<b>Calculation example for SEER<sub>on</sub> and SEER – Application to a reversible air-to-air unit with variable capacity .....</b>	<b>66</b>
<b>E.1</b>	<b>Calculation of SEER<sub>on</sub>.....</b>	<b>66</b>
<b>E.2</b>	<b>Calculation of SEER.....</b>	<b>68</b>
<b>E.2.1</b>	<b>Calculation of reference annual cooling demand (Q<sub>C</sub>) according to Formula (2).....</b>	<b>68</b>
<b>E.2.2</b>	<b>Calculation of SEER according to Formula (1) .....</b>	<b>68</b>
<b>Annex F (informative)</b>	<b>Calculation example for SCOP<sub>on</sub> and SCOP<sub>net</sub> - Application to a fixed capacity air-to-water heat pump used for floor heating.....</b>	<b>69</b>
<b>Annex G (informative)</b>	<b>Calculation example for SCOP<sub>on</sub> and SCOP<sub>net</sub> – Application to a fixed capacity brine-to-water heat pump used for medium temperature application.....</b>	<b>73</b>
<b>Annex H (informative)</b>	<b>Compensation methods for air-to-water and water/brine-to-water units .....</b>	<b>78</b>
<b>H.1</b>	<b>General.....</b>	<b>78</b>
<b>H.2</b>	<b>Compensation system for reduced capacity test in cooling mode .....</b>	<b>78</b>
<b>H.3</b>	<b>Compensation system for reduced capacity test in heating mode.....</b>	<b>78</b>
<b>Annex ZA (informative)</b>	<b>Relationship between this European Standard and the requirements of Commission Regulation (EU) No 206/2012 .....</b>	<b>80</b>
<b>Annex ZB (informative)</b>	<b>Relationship between this European Standard and the requirements of Commission Regulation (EU) No 813/2013 and Commission Delegated Regulation (EU) No 811/2013 .....</b>	<b>82</b>
<b>Bibliography.....</b>		<b>85</b>

## European foreword

This document (EN 14825:2016) 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 September 2016, and conflicting national standards shall be withdrawn at the latest by September 2016.

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 14825:2013.

The revision was necessary in order to harmonize this European standard with *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* and *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*.

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 Regulation(s), see informative Annex ZA and Annex ZB, which are integral parts of this document.

The technical content of the previous edition remains unchanged with the exception of the correction of some errors. The main changes with respect to requirements for *Commission Regulation (EU) No 813/2013 of 2 August 2013* and *Commission Delegated Regulation (EU) No 811/2013 of 18 February 2013* are:

- a) Clause 3 “Terms, definitions, symbols, abbreviated terms and units” has been modified in order to be harmonized with Commission Regulation (EU) No 813/2013;
- b) harmonization of the terms for temperature applications; introduction of low, intermediate, medium and high instead of low, medium, high and very high;
- c) modifications so that the text is aligned to the modified terms and definitions;

d) combination of tables for better readability:

EN 14825:2016	EN 14825:2013
Table 2	Table 2
Table 3	Table 3
Table 4	Table 4
Table 5	Table 5
Table 6	Table 6, Table 7, Table 8
Table 7	Table 9, Table 10, Table 11
Table 8	Table 12, Table 13, Table 14
Table 9	Table 15, Table 16, Table 17
Table 10	Table 18, Table 19, Table 20
Table 11	Table 21, Table 22, Table 23
Table 12	Table 24, Table 25, Table 26
Table 13	Table 27, Table 28, Table 29
Table 14	Table 30, Table 31, Table 32
Table 15	Table 33, Table 34, Table 35

- e) new 7.1 for the calculation of the seasonal space heating efficiency  $\eta_s$ ;
- f) new calculation for fossil fuel backup in 7.5;
- g) a new normative Annex B - Applicable climate bin hours and hours for active, thermostat-off, standby, off and crankcase heater modes for space heaters, air to water and water/brine to water units below or equal to 400 kW;
- h) a new normative C.2, Template for technical data sheet for space heaters, air to water and water/brine to water units below or equal to 400 kW;
- i) deletion of Annex E because it is not needed anymore; it is valid only for air conditioners < 12 kW. The tables of hours are given in Annex A;
- j) new informative Annex G with a calculation example for  $SCOP_{on}$  and  $SCOP_{net}$  for a brine-to-water heat pump;
- k) a new informative Annex ZB, Relationship between this European Standard and the requirements of Commission Regulation (EU) No 813/2013 of 02 August 2013 and the requirements of Commission Delegated Regulation (EU) No 811/2013 of 18 February 2013;

l) structural changes to the annexes in order to have normative annexes first:

EN 14825:2016	EN 14825:2013
Annex A	Annex A
Annex B	
Annex C	Annex G
Annex D	Annex D
Annex E	Annex B
Annex F	Annex C
Annex G	-
Annex H	Annex F
Annex ZA	Annex ZA
Annex ZB	
-	Annex E
Bibliography	Bibliography

Although this document was 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.

This standard was prepared in the frame of the Commission Regulation (EU) No 813/2013 implementing Directive 2009/125/EC 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.

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 can be selected and compared at standard rating conditions. 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 ( $SEER_{on}$ ) and Seasonal Coefficient of Performance ( $SCOP_{on}$  and  $SCOP_{net}$ ) 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 SEER and SCOP.

$SEER/SEER_{on}$  and  $SCOP/SCOP_{on}/SCOP_{net}$  calculations may be based on calculated or measured values. In case of measured values, this European Standard 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 and EN 14511-3.

## 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, double duct, control cabinet and close control units.

This European Standard gives the temperatures and part load conditions and the calculation methods for the determination of seasonal energy efficiency SEER and SEER<sub>on</sub>, seasonal coefficient of performance SCOP, SCOP<sub>on</sub> and SCOP<sub>net</sub>, and seasonal space heating energy efficiency  $\eta_s$ .

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.

NOTE The word "unit" is used instead of the full terms of the products.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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, definitions and classification*

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

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**