SIST

SLOVENSKI STANDARD
SIST EN 13215:2017

01-februar-2017

Nadomešča:
SIST EN 13215:2001

Kondenzacijske enote za hladilne naprave - Ocenjevalni pogoji, tolerance in predstavitev podatkov o lastnostih, ki jih navede proizvajalec

Condensing units for refrigeration - Rating conditions, tolerances and presentation of manufacturer's performance data

Verflüssigungssätze für die Kälteanwendung - Nennbedingungen, Toleranzen und Darstellung von Leistungsdaten des Herstellers

Unités de condensation pour la réfrigération - Détermination des caractéristiques, tolérances et présentation des performances du fabricant

Ta slovenski standard je istoveten z: EN 13215:2016

ICS:

27.200 Hladilna tehnologija Refrigerating technology

SIST EN 13215:2017 en,fr,de

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13215

November 2016

ICS 27.200

Supersedes EN 13215:2000

English Version

Condensing units for refrigeration - Rating conditions, tolerances and presentation of manufacturer's performance data

Unités de condensation pour la réfrigération - Détermination des caractéristiques, tolérances et présentation des performances du fabricant

Verflüssigungssätze für die Kälteanwendung - Nennbedingungen, Toleranzen und Darstellung von Leistungsdaten des Herstellers

This European Standard was approved by CEN on 24 September 2016.

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

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Ref. No. EN 13215:2016 E

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European foreword

This document (EN 13215:2016) 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of an identical text or by endorsement, at the latest by May 2017, and conflicting national standards shall be withdrawn at the latest by May 2017.

This document supersedes EN 13215:2000.

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 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 listed below:

a) part load conditions according to M/495 “Standardisation mandate to CEN, CENELEC and ETSI under Directive 2009/125/EC relating to harmonised standards in the field of Ecodesign” are taken into account;

b) inclusion of the calculation of seasonal energy performance ratio (*SEPR*).

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, 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.

1 Scope

This European Standard specifies the rating conditions, tolerances and presentation of manufacturer's performance data for condensing units for refrigeration with compressors of the positive-displacement type. These include single stage compressors and single and two stage compressors having an integrated means of fluid sub cooling. This is required so that a comparison of different condensing units can be made. The data relate to the refrigerating capacity and power absorbed and include requirements for part-load performance where applicable.

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 378-1:2008+A2:2012, *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 1: Basic requirements, definitions, classification and selection criteria*

EN 13771-2, *Compressors and condensing units for refrigeration - Performance testing and test methods - Part 2: Condensing units*

ISO 817, *Refrigerants — Designation and safety classification*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 378-1:2008+A2:2012 and the following apply.

3.1
condensing unit
combination of one or more compressors, condensers/gas coolers and, where applicable, liquid receivers and the regularly furnished accessories

3.2
refrigerating capacity
Q
product of the mass flow of refrigerant through the condensing unit and the difference between the specific enthalpy of the refrigerant at the condensing unit inlet, the refrigerant being superheated above the suction dew point temperature to the appropriate value (see Table 3), and the specific enthalpy of the liquid refrigerant at the condensing unit outlet

3.3
sub-cooling
difference between the bubble point temperature of the refrigerant corresponding to the pressure at the condensing unit outlet and the temperature of the liquid refrigerant at the condensing unit outlet

3.4
superheat
difference between the dew point temperature of the refrigerant corresponding to the pressure at the condensing unit inlet and the temperature of the refrigerant vapour at the condensing unit inlet

3.5
power absorbed
P
power demand to drive the condensing unit

3.6
coefficient of performance
COP
refrigerating capacity to the power absorbed

3.7
seasonal energy performance ratio
SEPR
reference annual refrigeration demand divided by the annual electrical energy demand

4 Symbols and abbreviations

Table 1 — Symbols and abbreviations

Symbol	Designation	Unit
LT	Low evaporating temperature	-
MT	Medium evaporating temperature	-
HT	High evaporating temperature	-
COP	Coefficient of performance	-
CR	Capacity ratio	-
d	Duration	h
E	Annual electrical energy demand	kWh
P	Power	W
q	Refrigeration demand ratio	-
Q	Refrigerating capacity	W
SEPR	Seasonal energy performance ratio	-
t	Temperature	°C

Table 2 — Indices

Index	Designation
LT	Low evaporating temperature
MT	Medium evaporating temperature
amb	ambient
cor	corrected
dm	demand
low	low
A, B, C and D	Rating conditions
j	bin-number
R	rated

5 Parameters for the presentation of performance data

The parameters as shown in Table 3 shall be used for the presentation of the performance data.

Table 3 — Parameters for the presentation of performance data

Parameters refrigerant	Suction temperature (°C) or superheat (K) at the condensing unit inlet	Condensing unit application
Halocarbons and hydrocarbons including refrigerant blends	32 °C	Household and similar refrigerators/freezers
	20 °C or 10 K	Other applications
R717	5 K	Any application using ammonia
R744	32 °C	Household and similar
	10 K	Other application using CO_2

6 General requirements

The performance data of a condensing unit for refrigeration shall be presented in either tabular or graphical form as shown in 7.3. Data outside the allowable working range of the condensing unit shall not be included.

The performance of the condensing unit at the standard reference points in Table 4 shall also be reported.

To calculate the performance at other suction temperatures/superheat and at other compressor speeds, correction factors shall be given as shown in Clause 10.

Refrigerants shall be designated in accordance with ISO 817. The source from which the thermodynamic properties are taken shall be stated.

It is recommended that an example illustrating the use of the performance data and the correction factors should be given.

Other data such as the swept volume, number of cylinders and speed range may also be shown.

7 Performance data

7.1 General

Published performance shall be based on data obtained from tests performed in accordance with EN 13771-2.

The performance data shall be presented as stated in Clause 8 and for:

— open compressors at the rated speed;

— motor compressors at the rated voltage and frequency.

7.2 Part load performance data

The performance data with capacity control shall be presented for:

— all capacity control steps for condensing units with 2 to 4 control steps, e.g. blocked suction, condensing units with more than one compressor or multi-speed compressor motors;

— condensing units with more than 4 steps or other variable capacity (e.g. variable speed or quasi stepless) at maximum, minimum and at least one additional control step inside the control range.

In the case of nonlinear performance behaviour between published values, the interpolation method, necessary to keep within the tolerances, is to be stated.

Part load data for *SEPR* calculation according to Annex A shall be declared in addition.

7.3 Tabular or graphical form

The performance data to be given, in either tabular or graphical form, shall comprise:

a) the refrigerating capacity, in values able to be read to an accuracy of ± 2 %;

b) the power absorbed, in values able to be read to an accuracy of ± 2 %;

c) the evaporating temperature/suction dew point temperature, at intervals not greater than 5 K.

7.4 Determination of the power absorbed by the condensing unit

7.4.1 Condensing units including the compressor motor

Power absorbed consists of the electrical power input to the compressor motor and the power of the fan(s) and other electrical auxiliaries.

7.4.2 Motors with a specific factory assembled or factory specified means for variable speed

The motor power is the electrical power input at the terminals of the frequency inverter or other means for variable speed.

7.4.3 Externally driven compressors without motor

Power absorbed consists of the power at the compressor shaft and the power of the fan(s) and other electrical auxiliaries.

8 Rating conditions

8.1 General

A rating condition consists of a reference point of Table 4 and an ambient temperature from 8.3 for air cooled condensing unit respectively a condensing temperature from 8.4 for water cooled condensing units.

The following data shall be given:

— refrigerating capacity;

— value of subcooling at the condensing unit outlet;

— power absorbed, including fan motors and factory supplied accessories;

— *COP*.

The following further information shall be available upon request:

— application limits related to air or water temperature (minimum-maximum);

— for air cooled condensing units: air flow;

— for water cooled condensing units: water flow and pressure drop.

8.2 Standard reference points

The standard reference points shall be in accordance with Table 4.

Table 4 — Standard reference points

Condensing unit applications **Reference points**	**Low evaporating temperature (LT)**	**Medium evaporating temperature (MT)**	**High evaporating temperature (HT)**	**Household and similar**
Evaporating temperature (°C) **— suction dew point**	−35	−10	+5	−25
Suction temperature (°C) or superheat (K)	+20 10 or 5 [a]	+20 10 or 5 [a]	+20 10 or 5 [a]	+32
Applicable for evaporating temperatures (°C)	≤ −20	−20 < t < −5	≥ −5	n.a.
Ambient temperature for air cooled condensing units	see 8.3			
Condensing temperature for water cooled units (°C)	see 8.4			

[a] For R717.