SLOVENSKI STANDARD
SIST EN 1216:1999/A1:2004

01-januar-2004

Prenosniki toplote ï Hladilniki in grelniki zraka s prisilno konvekcijo ï Postopki preskuğanja za ugotavljanje tehniļnih karakteristik - Dopolnilo A1

Heat exchangers - Forced circulation air-cooling and air-heating coils - Test procedures for establishing the performance

Wärmeaustauscher - Luftkühler und Lufterhitzer für erzwungene Konvektion - Prüfverfahren zur Leistungsfeststellung

Echangeurs thermiques - Batteries à ailettes à circulation forcée - Procédures d'essai pour la détermination des performances

Ta slovenski standard je istoveten z: **EN 1216:1998/A1:2002**

ICS:

27.060.30	Grelniki vode in prenosniki toplote	Boilers and heat exchangers

SIST EN 1216:1999/A1:2004 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1216:1998/A1

October 2002

ICS 27.060.30

English version

Heat exchangers - Forced circulation air-cooling and air-heating coils - Test procedures for establishing the performance

Echangeurs thermiques - Batteries à ailettes à circulation forcée - Procédures d'essai pour la détermination des performances

Wärmeaustauscher - Luftkühler und Lufterhitzer für erzwungene Konvektion - Prüfverfahren zur Leistungsfeststellung

This amendment A1 modifies the European Standard EN 1216:1998; it was approved by CEN on 14 September 2002.

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

This amendment 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 1216:1998/A1:2002 E

Contents

page

Foreword **3**
3 Definitions **3**
4 Symbols **5**
5 Standard capacity **6**
7 Measurements **6**
8 Testing methods and equipment **6**

Foreword

This document (EN 1216:1998/A1:2002) has been prepared by Technical Committee CEN /TC 110 "Heat exchangers", the secretariat of which is held by BSI.

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 April 2003, and conflicting national standards shall be withdrawn at the latest by April 2003.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

This amendment is introduced to accommodate newly available refrigerants such as R404A, R407C and R410A.

3 Definitions

Add the following after definition 3.3.2.2:

3.4 pressures

NOTE All pressures are average values ascertained over the test duration, and are absolute pressures.

3.4.1 ***condensing pressure:*** The pressure of the refrigerant at the inlet connection of the condenser.

3.4.2 ***evaporating pressure:*** The pressure of the refrigerant at the outlet connection of the calorimeter (applicable only to low pressure calorimeter method).

Amend the sub-clause numbers 3.4 to 3.4.2.2 as follows [the content of these clauses is to be retained]:

3.5 temperature

3.5.1 ***air temperature***

3.5.1.1 *air inlet temperature:*

3.5.1.2 *air outlet temperature:*

3.5.2 ***liquid temperature***

3.5.2.1 *liquid inlet temperature:*

3.5.2.2 *liquid outlet temperature:*

Amend the sub-clause numbers and text as follows:

3.5.3 ***refrigerant temperature***

3.5.3.1 *evaporating temperature:* Dew point temperature of the refrigerant, corresponding to the evaporating pressure.

3.5.3.2 *condensing temperature:* Dew point temperature of the refrigerant corresponding to the condensing pressure.

Amend the sub-clause numbers 3.4.3.3 and 3.4.3.4 as follows [the content of these clauses is to be retained]:

3.5.3.3 *superheated vapour temperature:*

3.5.3.4 *subcooled refrigerant temperature:*

Add the following definition after 3.5.3.4:

3.5.3.5 *bubble point temperature:* Temperature corresponding to the absolute pressure of the refrigerant at the outlet connection of the condenser.

Amend the sub-clause numbers 3.5 to 3.5.1.2 as follows [the content of these clauses is to be retained]:

3.6 temperature difference

3.6.1 ***operation with refrigerant***

3.6.1.1 *inlet temperature difference:*

3.6.1.2 *superheating:*

Amend the sub-clause number and text as follows:

3.6.1.3 *subcooling:* Difference between the bubble point temperature and the subcooled refrigerant temperature:

a) in the case of an air-cooling coil at the inlet of the expansion device;

b) in the case of an air-heating coil at the outlet connection of the coil.

Amend the sub-clause numbers 3.6.2 to 3.6.2.3 as follows [the content of these clauses is to be retained]:

3.6.2 ***operation with liquid***

3.6.2.1 *inlet temperature difference:*

3.6.2.2 *liquid temperature difference:*

3.6.2.3 *air temperature difference:*

Add the following after definition 3.6.3:

3.7 high glide: Refrigerant where the difference between the condensing and bubble point temperatures at a condensing temperature of 40 °C is greater than 3K

Amend the sub-clause numbers 3.6. to 3.8 as follows [the content of these clauses is to be retained]:

3.8 air flow/velocity

3.8.1 ***air face velocity:***

3.8.2 ***air mass flux:***

3.9 pressure drop

3.9.1 ***air side pressure drop:***

3.9.2 ***fluid side pressure drop:***

3.10 specific enthalpy

3.10.1 ***air specific enthalpy:***

3.10.2 ***liquid specific enthalpy:***

3.10.3 ***refrigerant specific enthalpy***

Amend the sub-clause numbers and text as follows:

3.10.3.1 *refrigerant inlet specific enthalpy:* Specific enthalpy is the specific enthalpy of the refrigerant at the inlet connection of the coil,

– for air heating coils defined as the specific enthalpy of the refrigerant corresponding to the condensing pressure and the superheated vapour temperature;

– for air cooling coils defined as the specific enthalpy of the liquid refrigerant at the inlet of the expansion device corresponding to the subcooled refrigerant temperature.

Amend the sub-clause numbers 3.8.3.2 to 3.9 as follows [the content of these clauses is to be retained]:

3.10.3.2 *refrigerant outlet specific enthalpy:*

3.11 specific enthalpy difference:

4 Symbols

4.1 Letters

Last five entries to read as follows:

Δt_1	inlet temperature difference	K
Δt_2	difference between air inlet wet bulb temperature and liquid inlet or evaporating temperature	K
Δt_L	liquid temperature difference	K
Δt_{sub}	subcooling	K
Δt_{sup}	superheating	K

5 Standard capacity

Table 1 to be amended as follows:

Table 1 - Standard conditions for comparison purposes

			Cooling			Heating	
Air side conditions		Temperature:					
		Dry bulb(°C)	27	27	20	20	35
		Wet bulb (°C)	24	19	10		
		Mass flux (kg/(s.m^2))	2,93	2,92	2,91	4,80	4,54
Fluid side conditions	Liquid	Liquid type = water:					
		Inlet temperature (°C)	7	7	7	50	
		Outlet temperature (°C)	12	12	12	40	
	Refrigerant	Evaporating temperature (°C)	8	8	8		
		Condensing temperature (°C)				40	55
		Superheating (K)	8	8	8	[a]	[a]
		Subcooled liquid temperature (°C)	30	30	30	≤ 3	≤ 3
		Subcooling (K)				≤ 1 %	≤ 1 %
		Oil content	≤ 1 %	≤ 1 %	≤ 1 %		

[a] Superheating temperature, Δt_{sup} for common refrigerants shall be determined according to:

R134A	25K
NH3	50K
R404A	25K
R407C	35K
R410A	40K

7 Measurements

Table 2 – Uncertainty of measurements

Add to table:

Measurements	Uncertainty of measurements
Refrigerant mixture	± 1 % by mass for each refrigerant component

7.2 Measurement criteria

Add further sub-clause 7.2.10

7.2.10 *Non-azeotropic refrigerant*

For high glide refrigerants the refrigerant mixture shall be measured unless it can be guaranteed that the mass fraction varies by less than 2 % from the refrigerant manufacturer's data.

8 Testing methods and equipment

8.1.1 *General*

Add the following text after existing:

Care shall be taken with non-azeotropic refrigerants, that there are no liquid refrigerant accumulations in the refrigerant cycle. While testing non-azeotropic refrigerants, the concentration of the individual refrigerants within the mixture circulating through the unit cooler shall remain identical to the concentration with which it was originally filled.

NOTE Non-azeotropic refrigerants are mixtures of more than one refrigerant with different individual boiling temperatures. If the mixture is separated at a two phase state e.g., in a vessel, one of the two phases can accumulate effecting the concentration of each refrigerant within the rest of the system.