SLOVENSKI STANDARD
SIST EN 13136:2002/A1:2005

01-november-2005

Hladilni sistemi in toplotne črpalke - Tlačne varnostne naprave in njihove napeljave - Metode za izračun

Refrigerating systems and heat pumps - Pressure relief devices and their associated piping - Method for calculation

Kälteanlagen und Wärmepumpen - Druckentlastungseinrichtungen und zugehörige Leitungen - Berechnungsverfahren

Systemes de réfrigeration et pompes a chaleur - Dispositifs de pression et tuyauteries associees - Methodes de calcul

Ta slovenski standard je istoveten z: **EN 13136:2001/A1:2005**

ICS:

27.080	Toplotne črpalke	Heat pumps
27.200	Hladilna tehnologija	Refrigerating technology

SIST EN 13136:2002/A1:2005 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13136:2001/A1

June 2005

ICS 27.080; 27.200

English version

Refrigerating systems and heat pumps - Pressure relief devices and their associated piping - Method for calculation

Systèmes de réfrigeration et pompes à chaleur - Dispositifs de pression et tuyauteries associées - Methodes de calcul

Kälteanlagen und Wärmepumpen - Druckentlastungseinrichtungen und zugehörige Leitungen - Berechnungsverfahren

This amendment A1 modifies the European Standard EN 13136:2001; it was approved by CEN on 12 May 2005.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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Contents

Foreword

This document (EN 13136:2001/A1:2005) has been prepared by the Technical Committee CEN/TC 182 “Refrigerating systems, safety and environmental requirements” the Secretariat of which is held by DIN.

This Amendment to the European Standard EN 13136:2001 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2005, and conflicting national standards shall be withdrawn at the latest by December 2005.

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

1 Modification to the Introduction

Amend the introduction as follows:

This European Standard is based on applicable parts of EN ISO 4126-1:2004, EN ISO 4126-2:2003 and EN 12284.

It is suited to the specific requirements, and includes the data, of refrigerating systems. It provides means of satisfying the pressure relief devices requirements of EN 378-2.

2 Modification of Clause 1 Scope

Amend subclause 1.3 as follows:

1.3 This European Standard specifies the requirements for selection of pressure relief devices to prevent excessive pressure due to internal and external heat sources, the sources of increasing pressure (e.g. compressor, heaters, etc.) and thermal expansion of trapped liquid.

Add the following subclause after 1.4:

1.5 This European Standard refers to other relevant standards in clause *5 General*.

3 Modification of Clause 2 Normative references

The cited drafts will be replaced by the following standards.

EN ISO 4126-1, *Safety devices for protection against excessive pressure — Part 1: Safety valves (ISO 4126-1:2004).*

EN ISO 4126-2, *Safety devices for protection against excessive pressure — Part 2: Bursting disc safety devices (ISO 4126-2:2003).*

EN 12284, *Refrigerating systems and heat pumps — Valves — Requirements, testing and marking.*

EN 764 will be replaced by:

EN 764-1, *Pressure equipment - Part 1: Terminology - Pressure, temperature, volume, nominal size*

EN 764-2*, Pressure equipment - Part 2: Quantities, symbols and units*

4 Modification of Clause 3 Terms and definitions

Amend first sentence as follows:

For the purposes of this European Standard the definitions given in EN 378-1, EN 12284, EN ISO 4126-1, EN 4126-2 and EN 764-1 apply.

5 Modification of Clause 4 Symbols

Amend the designation of K_d and Q_m:

Symbol	Designation	Unit
K_d	Certified coefficient of discharge taking into account the backpressure ratio p_b/p_o and the possibly reduced stroke of the pressure relief valve	—
Q_m	Calculated mass flow rate of refrigerant of the pressure relief device	kg/h

Add the following symbols:

s Thickness of insulation [m]

φ_{red} Reduced density of heat flow rate [kW/m^2]

6 Modification of Clause 5 General

Amend the first sentence as follows:

Requirements for protection against excessive pressure in refrigeration systems and heat pumps are given in EN 378-2:2000.

Add the following sentences after the note:

For design and manufacturing of bodies, bonnets and bolts for pressure relief devices — safety valves and bursting discs — with view of strength pressure test EN 12284 applies. For other aspects the requirements of EN ISO 4126-1:2004 Safety Valves, clauses *3 Terms and definitions, 5 Design, 7 Type tests and 10 Marking and sealing* and EN ISO 4126-2:2003 Bursting Disc Safety Devices, clauses *17 Marking, 17.2 Bursting discs/bursting disc assemblies* and *17.3 Bursting disc holders* apply.

7 Modification of Subclause 6.2.1 External heat sources

Amend the 1st and 2nd sentence as follows:

Where necessary the minimum required discharge capacity of the pressure relief device for pressure vessels shall be determined by the following:

$$Q_{md} = \frac{3\,600 * \varphi * A_{surf}}{h_{rap}} \text{ [hg/h]}$$

For those pressure vessels in this standard the density of heat flow rate is assumed to be

$\varphi = 10$ kW/m2

but a higher value shall be used if necessary.

Add the following text:

For pressure vessels the total external surface area of the vessel shall be taken as $A_{surf.}$ For fin and tube heat exchangers the sum of the face areas of all sides shall be taken as A_{surf}.

NOTE 1 Higher values for density of heat flow rate than 10 kW/m^2 may be assumed where in case of fire full engulfment for the pressure vessel is to except and/or in the case the pressure vessel is insulated a flammable insulation is used.

NOTE 2 Where pressure vessels of a refrigerating system are protected against excessive pressure according to prEN 378-2:2003, clause 7.2 and monitored according to prEN 378-3:2003, clause 7 and installed in machinery rooms as specified in prEN 378-3:2003, clause 5, none external heat sources for sizing the pressure relief devices used for those vessels themselves may be considered. But, nevertheless, for the sizing of those pressure relief devices on the low pressure side of the refrigerating system all connected pressure vessels, compressors and pumps should be taken into account (prEN 378-2:2003, clause 6.2.6.3).

NOTE 3 Combustion heat potential of insulations in case of fire is none part of calculations in this standard. Care should be taken at welding activities near insulated vessels and pipes. Electric equipment inside of the flammable insulation should be carried out according to EN 60204-1.

NOTE 4 Where the thickness of the insulation of the pressure vessel is bigger than s= 0,04 m and the insulation is tested according to reaction of fire as described in EN 13501-1 and classified better than class C a reduced density of heat flow rate can be used and determined as follows:

$$\varphi_{red} = \varphi * \frac{0{,}04}{s} \text{ [kW/m}^2\text{]}$$

8 Modification of Subclause 6.4 Liquid expansion

Add the following text after the first paragraph before the note:

It is to take into account the backpressure ratio p_b/p_o and the possibly reduced stroke of the pressure relief valve.

9 Modification of Subclause 7.1 General

Delete reference to ISO/DIS 4126-1:1995.

10 Modification of Subclause 7.2.2 Critical and sub-critical flow

Delete reference to ISO/DIS 4126-1:1995.

11 Modification of Subclause 7.2.5.1 General

Amend the last sentence as follows:

For valves where the lift is a function of back pressure, the manufacturer shall announce the maximum permissible back pressure ration p_b/p_o and the relating certified coefficient of discharge taking into account the possibly reduced stroke of the pressure relief valve.

12 Modification of Subclause 7.2.5.2 Calculation of the mass flow

Delete the last sentence:

It is not recommended to use an extremely oversized pressure relief valve (Q_m much higher than Q_{md}) because the diameter of the up- and downstream lines then unintended has to be much increased in order to prevent unacceptable pressure drops.

13 Modification of Subclause 7.4.3 Pressure loss in the upstream line

In the equation (17) symbol A will be replaced by A_c.

14 Modification of Subclause 7.4.4 Pressure loss in the downstream line

In the equation (20) the symbol A will be replaced by A_c.

15 Modification of Subclause B.1.1

Delete reference ISO/DIS 4126-1:1995.

16 Modification of Subclause B.2.1

Amend the last sentence as follows:

The values of the kinematic viscosity v (see EN ISO 3104) are taken from technical literature.

17 Modification of Annex C

Add the subclauses C.1.1, C.2.1 and amend clause C.3.

17.1 Modification of Subclause C.1.1 Assumptions for the calculation example

Backpressure compensating overflow valve relieving from a LPS surge drum no1 to a LPS surge drum no 2

Refrigerant	R717
Set pressure of surge drum no1	p_{set} = 12,0 bar Actual relieving pressurep_0 = 1,1* p_{set} + p_{atm} = 14,2 bar
Heat of vaporization (at 14,2 bar)	h_{vap} = 1116 kJ/kg
Length of vessel	l = 5,0 m
Diameter of vessel	d = 1,5 m
Vessel fire resistant insulated	
Thickness of insulation	s = 0,14 m
Density of heat flow rate	$\varphi_{red} = 10 * \frac{0,04}{0,14} = 2,86$ kW/m²
Set pressure of surge drum no2	p_{set} = 10,0 bar
Actual relieving pressure = back pressure at outlet capacity, Q_{md} pressure relief device surge drum no1	p_b = 1,1* p_{set} + p_{atm} = 12,1 bar