Külmutussüsteemid ja soojuspumbad Ohutus- ja keskkonnanõuded Osa 1: Põhinõuded, määratlused, klassifikatsioon ja valiku kriteeriumid

Refrigerating systems and heat pumps
Safety and environmental requirements
Part 1: Basic requirements, definitions, classification and selection criteria
CONSOLIDATED TEXT

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 378-1:2008+A2:2012 sisaldab Euroopa standardi EN 378-1:2008+A2:2012 ingliskeelset teksti.	This Estonian standard EVS-EN 378-1:2008+A2:2012 consists of the English text of the European standard EN 378-1:2008+A2:2012.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 23.05.2012.	Date of Availability of the European standard is 23.05.2012.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 01.040.27, 27.080, 27.200

EUROPEAN STANDARD

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EN 378-1:2008+A2

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ICS 27.080; 27.200; 01.040.27

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English Version

Refrigerating systems and heat pumps - Safety and environmental requirements - Part 1: Basic requirements, definitions, classification and selection criteria

Systèmes de réfrigération et pompes à chaleur - Exigences de sécurité et d'environnement - Partie 1: Exigences de base, définitions, classification et critères de choix

Kälteanlagen und Wärmepumpen - Sicherheitstechnische und umweltrelevante Anforderungen - Teil 1: Grundlegende Anforderungen, Begriffe, Klassifikationen und Auswahlkriterien

This European Standard was approved by CEN on 13 October 2007 and includes Amendment 1 approved by CEN on 13 November 2010 and Amendment 2 approved by CEN on 23 January 2012.

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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.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 378-1:2008+A2:2012) has been prepared by the CEN Technical Committee CEN/TC 182 "Refrigerating systems, safety and environmental requirements", the secretariat of which is held by DIN.

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 November 2012, and conflicting national standards shall be withdrawn at the latest by November 2012.

This document includes Amendment 1, approved by CEN on 2010-11-13 and Amendment 2, approved by CEN on 2012-01-23.

This document supersedes [A2] EN 378-1:2008+A1:2010 [/A2].

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1] [/A1] and [A2] [/A2].

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.

EN 378 consists of the following parts under the general title *Refrigerating systems and heat pumps — Safety and environmental requirements:*

— *Part 1: Basic requirements, definitions, classification and selection criteria*

— *Part 2: Design, construction, testing, marking and documentation*

— *Part 3: Installation site and personal protection*

— *Part 4: Operation, maintenance, repair and recovery*

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, 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.

Introduction

This European Standard relates to safety and environmental requirements in the design, manufacture, construction, installation, operation, maintenance, repair and disposal of refrigerating systems and appliances in respect to the local and global environments, but not to the final destruction of the refrigerants.

The term "refrigerating system" used in this European Standard includes heat pumps.

The extent to which hazards are covered is indicated below. In addition, machinery should comply as appropriate with EN ISO 12100-1 and EN ISO 12100-2 for hazards which are not covered by this European Standard.

It is intended to minimize possible hazards to persons, property and the environment from refrigerating systems and refrigerants. These hazards are associated essentially with the physical and chemical characteristics of refrigerants as well as the pressures and temperatures occurring in refrigeration cycles.

Inadequate precautions may result in:

— component rupture or explosion, with risk of projectiles;

— escape of refrigerant with the risk of environmental damage or toxicity due to a fracture, a leakage caused by bad design, incorrect operation, and inadequate maintenance, repair, charging or disposal;

— burning or combustion of escaping refrigerant with consequent risk of fire including the risk of toxic products of combustion from non-flammable refrigerants.

Refrigerants, their mixtures and combinations with oils, water or other materials, which are present in the refrigerating system, intended or unintended, affect the internal surrounding materials chemically and physically for example due to pressure and temperature. They can, if they have detrimental properties, endanger persons, property and the environment directly or indirectly due to global long term effects (ODP,GWP) when escaping from the refrigerating system. Refrigerants shall be selected with due regard to their potential influence on the global environment as well as their possible effects on the local environment. Evaluation of the environmental performance however requires a life cycle approach. With regard to global climate change the **T**otal **E**quivalent **W**arming **I**mpact approach is generally used as the basis (see Annex B). Reference should be made to the EN ISO 14040 series to address other environmental aspects. Many factors influence environmental impacts such as:

— location of the system;

— energy efficiency of the system;

— type of refrigerant;

— service frequency;

— refrigerant leaks;

— sensitivity of charge on efficiency;

— minimisation of heat load;

— control methods.

The cost of the system will have an indirect influence on the environmental performance. Additional investments may be directed towards reducing leaks, increasing energy efficiency or modifying the design in order to use a different refrigerant. Only a life cycle approach is capable of identifying where additional investments will have the most beneficial effects.

Hazards due to the states of pressure and temperature in refrigerating systems are essentially due to the simultaneous presence of the liquid and vapour phases. Furthermore, the state of the refrigerant and the stresses that it exerts on the various components do not depend solely on the processes and functions inside the plant, but also on external factors.

The following hazards are worthy of note:

a) from the direct effect of extreme temperature, for example:

- brittleness of materials at low temperatures;
- freezing of enclosed liquid (water, brine or similar);
- thermal stresses;
- changes of volume due to temperature changes;
- injurious effects to persons caused by low temperatures;
- touchable hot surfaces.

b) from excessive pressure due to, for example:

- increase in the pressure of condensation, caused by inadequate cooling or the partial pressure of non condensable gases or an accumulation of oil or liquid refrigerant;
- increase in the pressure of saturated vapour due to excessive external heating, for example of a liquid cooler, or when defrosting an air cooler or high ambient temperature when the plant is at a standstill;
- expansion of liquid refrigerant in a closed space without the presence of vapour, caused by a rise in external temperature;
- fire.

c) from the direct effect of the liquid phase, for example:

- excessive charge or flooding of equipment;
- presence of liquid in compressors, caused by syphoning, or condensation in the compressor;
- liquid hammer in piping;
- loss of lubrication due to dilution of oil;
- condensation-induced shock.

d) from the escape of refrigerants, for example:

- fire;
- explosion;
- toxicity including products of combustion;
- caustic effects;
- freezing of skin;

— asphyxiation;

— panic;

— depletion of the ozone layer;

— global warming.

e) from the moving parts of machinery, for example:

— injuries;

— hearing loss from excessive noise;

— damage due to vibration.

Attention is drawn to hazards common to all compression systems, such as excessive temperature at discharge, liquid slugging, erroneous operation and reduction in mechanical strength caused by corrosion, erosion, thermal stress, liquid hammer or vibration.

Corrosion, however, should have special consideration as conditions peculiar to refrigerating systems arise due to alternate frosting and defrosting or the covering of equipment by insulation.

The above analysis of the hazards applying to refrigerating systems explains the plan on which this European Standard has been based.

1 Scope

This European Standard specifies the requirements relating to safety of persons and property (but not goods in storage) and the local and global environment for:

a) stationary and mobile refrigerating systems of all sizes, including heat pumps;

b) secondary cooling or heating systems;

c) location of these refrigerating systems.

NOTE 1 For secondary heating or cooling systems charged with any refrigerants listed in Annex E the charge limitations of part 1 (Annex C) apply.

For refrigerating systems with a limited mass of refrigerant only some of the parts and clauses are applicable. The exceptions are defined in the scope and the clauses of each part of EN 378.

This European Standard is not applicable to refrigerating systems with air or water as refrigerant. Systems using refrigerants other than those listed in Annex E are not covered by this European Standard as long as a safety class is not assigned.

NOTE 2 For the safety classification of refrigerant fluids not included in Annex E, see Annex F.

This European Standard covers the hazards mentioned in the introduction.

This European Standard is applicable to new refrigerating systems and modification of existing refrigerating systems in case the type of refrigerant changed or pressure vessels are replaced. The part dealing with maintenance, repair, operation, recovery, reuse and disposal also applies to existing systems. Parties responsible for existing refrigerating systems should consider the safety and environmental aspects of this European Standard and implement the more stringent requirements so far as they are reasonably practicable.

Directive 94/9/EC concerning equipment and protective systems intended for use in potentially explosive atmospheres can be applicable to the type of machine or equipment covered by this European Standard. The present standard is not intended to provide means of complying with the essential health and safety requirements of Directive 94/9/EC.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 378-2, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, construction, testing, marking and documentation*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE See informative Annex A for equivalent terms in English, French and German.