

Külmutussüsteemid ja soojuspumbad

Ohutus- ja keskkonnanõuded

**Osa 2: Kavandamine, valmistamine, katsetamine,
märgistamine ja dokumentatsioon**

Refrigerating systems and heat pumps

Safety and environmental requirements

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 378-2:2008+A2:2012 sisaldab Euroopa standardi EN 378-2:2008+A2:2012 ingliskeelset teksti.	This Estonian standard EVS-EN 378-2:2008+A2:2012 consists of the English text of the European standard EN 378-2:2008+A2:2012.
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English Version

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

Systèmes de réfrigération et pompes à chaleur - Exigences
de sécurité et d'environnement - Partie 2: Conception,
construction, essais, marquage et documentation

Kälteanlagen und Wärmepumpen - Sicherheitstechnische
und umweltrelevante Anforderungen - Teil 2: Konstruktion,
Herstellung, Prüfung, Kennzeichnung und Dokumentation

This European Standard was approved by CEN on 13 October 2007 and includes Amendment 1 approved by CEN on 14 March 2009 and Amendment 2 approved by CEN on 16 April 2012.

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Contents

Page

Foreword.....	3
Introduction.....	4
1 Scope	5
2 Normative references	6
3 Terms, definitions, designations, classification and abbreviations	9
3.1 Terms and definitions	9
3.2 Designations and classification	9
3.3 Abbreviations	9
4 Significant hazards	9
5 Safety requirements and/or measures	9
5.1 General safety and/or environmental requirements	9
5.2 Safety requirements for components and piping	10
5.3 Miscellaneous components	13
6 Requirements for assemblies	17
6.1 General	17
6.2 Design and construction	18
6.3 Testing	40
6.4 Marking and documentation	43
Annex A (normative) Additional requirements for refrigerating systems and heat pumps with R717	48
Annex B (normative) Determination of category for assemblies	49
Annex C (normative) Requirements for intrinsic safety test	54
Annex D (normative) List of significant hazards	56
Annex E (informative) Assessment of assemblies for compliance with directive 97/23/EC	57
Annex F (informative) Examples for arrangement of pressure relief devices in refrigerating systems	58
Annex G (informative) Checklist for external visual inspection of the installation	61
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC	62
Annex ZB (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC	63
Annex ZC (informative)  Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC 	65
Bibliography	67

Foreword

This document (EN 378-2:2008+A2:2012) has been prepared by 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 2009-03-14 and Amendment 2, approved by CEN on 2012-04-16.

This document supersedes ^{A2} EN 378-2:2008+A1:2009 ^{A2}.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ^{A1} ^{A1} and ^{A2} ^{A2}.

^{A1} 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 the EU Directive(s).



For relationship with EU Directive(s), see informative Annexes ZA, ZB and ZC, which are integral parts of this document. ^{A1}

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, installing, 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 the United Kingdom.

Introduction

The introduction of  EN 378-1:2008+A2:2012  is applicable.

This standard is a type C standard as stated in EN ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this standard.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

1 Scope

This European Standard is applicable to the design, construction and installing of refrigerating systems including piping, components and materials and including ancillary equipment directly associated with such systems. It also specifies requirements for testing, commissioning, marking and documentation. In case the heat transfer fluid is not gaseous at atmospheric pressure, the requirements for circuits for heat transfer fluids are excluded except for any safety devices associated with the refrigerating system. It is not applicable to refrigerating systems with air or water as refrigerant and does not cover the requirements for equipment to be used in a potentially explosive atmosphere.

The following ancillary equipment includes:

- fan and fan motor;
- electrical motor and transmission for open compressor systems.

This European Standard specifies the requirements relating to stationary and mobile refrigerating systems of all sizes, including heat pumps.

Systems using refrigerants other than those listed in Annex E of EN 378-1:2008+A2:2012 are not covered by this standard as long as a safety class is not assigned.

Basic safety requirements for refrigerating systems as defined in EN 378-1 are applicable for this standard.

Basic requirements for the installation site as defined in EN 378-3 apply.

This European Standard is not applicable to refrigeration systems and heat pumps which are manufactured before the date of its publication as EN.

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 294:1992, *Safety of machinery — Safety distance to prevent danger zones being reached by the upper limbs*

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 378-3:2008+A1:2012, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 3: Installation site and personal protection*

EN 378-4:2008+A1:2012, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 4: Operation, maintenance, repair and recovery*

EN 809:1998, *Pumps and pump units for liquids — Common safety requirements*

EN 837-1:1996, *Pressure gauges — Part 1: Bourdon tube pressure gauges — Dimensions, metrology, requirements and testing*

EN 837-2:1997, *Pressure gauges — Part 2: Selection and installation recommendations for pressure gauges*

EN 837-3:1996, *Pressure gauges — Part 3: Diaphragm and capsule pressure gauges — Dimensions, metrology, requirements and testing*

EN 953:1997, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 1050:1996, *Safety of machinery — Principles for risk assessment*

EN 1290:1998, *Non-destructive examination of welds — Magnetic particle examination of welds*

EN 1435:1997, *Non-destructive examination of welds — Radiographic examination of welded joints*

EN 1714:1997, *Non-destructive examination of welds — Ultrasonic examination of welded joints*

EN 1736:2000, *Refrigerating systems and heat pumps — Flexible pipe elements, vibration isolators and expansion joints — Requirements, design and installation*

EN 1779:1999, *Non-destructive testing — Leak testing — Criteria for method and technique selection*

EN 1861:1998, *Refrigerating systems and heat pumps — System flow diagrams and piping and instrument diagrams — Layout and symbols*

EN 12178:2003, *Refrigerating systems and heat pumps — Liquid level indicating devices — Requirements, testing and marking*

EN 12263:1998, *Refrigerating systems and heat pumps — Safety switching devices for limiting the pressure — Requirements and tests*

EN 12284:2003, *Refrigerating systems and heat pumps — Valves — Requirements, testing and marking*

EN 12517-1:2006, *Non-destructive examination of welds — Part 1: Evaluation of welded joints in steel, nickel, titanium and their alloys by radiography — Acceptance levels*

prEN 12517-2:2006, *Non destructive testing of welds — Part 2: Evaluation of welded joints in aluminium and its alloys by radiography — Acceptance levels*

prEN 12693:2006, *Refrigerating systems and heat pumps — Safety and environmental requirements — Positive displacement refrigerant compressors*

EN 12735-1:2001, *Copper and copper alloys — Seamless, round copper tubes for air conditioning and refrigeration — Part 1: Tubes for piping systems*

EN 12735-2:2001, *Copper and copper alloys — Seamless, round copper tubes for air conditioning and refrigeration — Part 2: Tubes for equipment*

EN 12799:2000, *Brazing — Non destructive examination of brazed joints*

EN 13136:2001, *Refrigerating systems and heat pumps — Pressure relief devices and their associated piping — Methods for calculation*

EN 13313:2001, *Refrigerating systems and heat pumps — Competence of personnel*

EN 13445-1:2002, *Unfired pressure vessels — Part 1: General*

EN 13445-2:2002, *Unfired pressure vessels — Part 2: Materials*

EN 13445-3:2002, *Unfired pressure vessels — Part 3: Design*

EN 13445-4:2002, *Unfired pressure vessels — Part 4: Fabrication*

EN 13445-5:2002, *Unfired pressure vessels — Part 5: Inspection and testing*

EN 13445-6:2002, *Unfired pressure vessels — Part 6: Requirements for the design and fabrication of pressure vessels and pressure parts constructed from spheroidal graphite cast iron*

EN 13445-8:2006, *Unfired pressure vessels — Part 8: Additional requirements for pressure vessels of aluminium and aluminium alloys*

EN 13480-1:2002, *Metallic industrial piping — Part 1: General*

EN 13480-2:2002, *Metallic industrial piping — Part 2: Materials*

EN 13480-3:2002, *Metallic industrial piping — Part 3: Design and calculation*

EN 13480-4:2002, *Metallic industrial piping — Part 4: Fabrication and installation*

EN 13480-5:2002, *Metallic industrial piping — Part 5: Inspection and testing*

EN 13480-6:2004, *Metallic industrial piping — Part 6: Additional requirements for buried piping*

EN 13480-8:2007, *Metallic industrial piping — Part 8: Additional requirements for aluminium and aluminium alloy piping*

EN 14276-1:2006+A1:2011, *Pressure equipment for refrigerating systems and heat pumps — Part 1: Vessels — General requirements*

EN 14276-2:2007+A1:2011, *Pressure equipment for refrigerating systems and heat pumps — Part 2: Piping — General requirements*

EN 16084, *Refrigerating systems and heat pumps — qualification of tightness of components and joints*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 60335-1:2002, *Household and similar electrical appliances — Safety — Part 1: General requirements (IEC 60335-1:2001, modified)*

EN 60335-2-24:2003, *Household and similar electrical appliances — Part 2-24: Particular requirements for refrigerating appliances, ice-cream appliances and ice-makers (IEC 60335-2-24:2002)*

EN 60335-2-34:2002, *Household and similar electrical appliances — Safety — Part 2-34: Particular requirements for motor-compressors (IEC 60335-2-34:2002)*

EN 60335-2-40:2003, *Household and similar electrical appliances — Safety — Part 2-40: Particular requirements for electrical heatpumps, air-conditioners and dehumidifiers (IEC 60335-2-40:2002, modified)*

EN 60335-2-89:2002, *Household and similar electrical appliances — Safety — Part 2-89: Particular requirements for commercial refrigerating appliances with an incorporated or remote refrigerant condensing unit or compressor (IEC 60335-2-89:2002)*

EN 61000-6-1:2007, *Electromagnetic compatibility (EMC) — Part 6-1: Generic standards — Immunity for residential, commercial and light-industrial environments (IEC 61000-6-1:2005)*

EN 61000-6-2:2005, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments (IEC 61000-6-2:2005)*

EN 61000-6-3:2007, *Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3:2006)*

EN 61000-6-4:2007, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments (IEC 61000-6-4:2006)*

EN ISO 3744:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994)*

EN ISO 3746:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:1995)*

EN ISO 4126-1:2004, *Safety devices for protection against excessive pressure — Part 1: Safety valves (ISO 4126-1:2003)*

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

EN ISO 4871:1996, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 11202:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Survey method in situ (ISO 11202:1995)*

EN ISO 11688-1:1998, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO TR 11688-1:1995)*

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

EN ISO 13732-1:2006, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 13849-1:2006, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO/DIS 13849-1:2006)*

EN ISO 13850:2006, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

ISO 817:2005, *Refrigerants — Designation system*

ASTM D 4728:2006, *Standard Test Method for Random Vibration Testing of Shipping Containers*

3 Terms, definitions, designations, classification and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in [EN 378-1:2008+A2:2012](#) apply.

3.2 Designations and classification

Designation and classification of the refrigerant such as:

- refrigerant number, e.g. R 717 and
- safety groups A1, A2, A3, B1, B2, B3

are specified in [EN 378-1:2008+A2:2012](#), Annex E.

3.3 Abbreviations

DN	Nominal size (see EN 378-1:2008+A2:2012 , 3.5.17)
PS	Maximum allowable pressure in bar (1 bar = 0,1 MPa) (see EN 378-1:2008+A2:2012 , 3.3.2)
LFL	Lower flammability limit in kg/m ³

4 Significant hazards

The list of significant hazards related to the Machinery Directive is given in Annex D.

5 Safety requirements and/or measures

5.1 General safety and/or environmental requirements

5.1.1 General

Safety and environmental requirements are specified in 5.2 and Clause 6.

Refrigerating appliances complying with the product standards such as

- EN 60335-2-40 for electrical heat pumps, air-conditioners and dehumidifiers,
- EN 60335-2-24 for refrigerating appliances, ice-cream appliances and ice-makers and