

**Refrigerating systems and heat pumps - Qualification of tightness of components and joints**

This document is a preview generated by EVS

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 16084:2011 sisaldab Euroopa standardi EN 16084:2011 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 31.05.2011 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 20.04.2011.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 16084:2011 consists of the English text of the European standard EN 16084:2011.

This standard is ratified with the order of Estonian Centre for Standardisation dated 31.05.2011 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 20.04.2011.

The standard is available from Estonian standardisation organisation.

ICS 27.080, 27.200

### Standardite reprodutseerimis- ja levitamiseõigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:  
Aru 10 Tallinn 10317 Eesti; [www.evs.ee](http://www.evs.ee); Telefon: 605 5050; E-post: [info@evs.ee](mailto:info@evs.ee)

### Right to reproduce and distribute belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without permission in writing from Estonian Centre for Standardisation.

If you have any questions about standards copyright, please contact Estonian Centre for Standardisation:  
Aru str 10 Tallinn 10317 Estonia; [www.evs.ee](http://www.evs.ee); Phone: 605 5050; E-mail: [info@evs.ee](mailto:info@evs.ee)

ICS 27.080; 27.200

English Version

## Refrigerating systems and heat pumps - Qualification of tightness of components and joints

Systèmes de réfrigération et pompes à chaleur -  
Qualification de l'étanchéité des composants et des joints

Kälteanlagen und Wärmepumpen - Qualifizierung der  
Dichtheit der Bauteile und Verbindungen

This European Standard was approved by CEN on 20 February 2011.

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

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.

CEN members are the national standards bodies of 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 and United Kingdom.



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

**Management Centre: Avenue Marnix 17, B-1000 Brussels**

# Contents

Page

Foreword.....	3
1 Scope .....	4
2 Normative references .....	4
3 Terms and definitions .....	5
4 Symbols .....	6
5 Test requirements .....	7
6 Requirements for hermetically sealed systems .....	11
7 Test procedures .....	11
7.1 General.....	11
7.2 Sampling .....	11
7.3 Test temperature.....	11
7.4 Tightness test.....	12
7.4.1 General.....	12
7.4.2 Tightness control level.....	13
7.5 Requirements for joints .....	15
7.5.1 Test samples .....	15
7.5.2 Torque.....	15
7.5.3 Reusable joint .....	15
7.5.4 Requirements for hermetically sealed joints .....	15
7.6 Pressure-temperature vibration tests (PTV) .....	16
7.6.1 General.....	16
7.6.2 Samples .....	16
7.6.3 Test method.....	16
7.6.4 Method 1: Combined pressure-temperature cycle test with integrated vibration test.....	17
7.6.5 Method 2: Combined pressure-temperature cycle test with a separate vibration test .....	18
7.7 Operation simulation.....	24
7.8 Freezing test.....	25
7.9 Additional pressure test for hermetically sealed joints.....	26
7.10 Vacuum Test.....	26
7.11 Compatibility Screening Test .....	27
7.11.1 General.....	27
7.11.2 Test fluids .....	27
7.11.3 Test specimens .....	27
7.11.4 Test setup parameters .....	27
7.11.5 Test procedure .....	28
7.11.6 Pass/fail criteria for sealing elements .....	29
7.12 Fatigue test for hermetically sealed joints .....	30
8 Test report .....	30
9 Information to the user.....	30
Annex A (normative) Equivalent tightness control levels .....	31
A.1 Calculation models .....	31
A.2 From volumetric flow to mass flow.....	32
A.3 Tightness control level stated as bubbles of air in unit time .....	34
Annex B (informative) Test arrangements .....	37
Bibliography .....	38

## Foreword

This document (EN 16084:2011) 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 October 2011, and conflicting national standards shall be withdrawn at the latest by October 2011.

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.

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 and the United Kingdom.

## 1 Scope

This European Standard is intended to describe the qualification procedure for type approval of the tightness of hermetically sealed and closed components, joints and parts used in refrigerating systems and heat pumps as described in EN 378. The sealed and closed components, joints and parts concerned are, in particular, fittings, bursting discs, flanged or fitted assemblies. The tightness of flexible piping made from non-metallic materials is dealt with in EN 1736. Metal flexible piping are covered by this standard.

The requirements contained in this document are applicable to joints of maximum DN 50 and components of internal volume of maximum 5 l and maximum weight of 50 kg.

This document is intended to characterise their tightness stresses met during their operations, following the fitting procedure specified by the manufacturer, and to specify the minimal list of necessary information to be provided by the supplier of a component to the person in charge of carrying out this procedure.

It specifies the level of tightness of the component, as a whole, and its assembly as specified by its manufacturer.

It applies to the hermetically sealed and closed components, joints and parts used in the refrigerating installations, including those with seals, whatever their material and their design are.

This European Standard specifies additional requirements for mechanical joints that can be recognised as hermetically sealed joints.

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

EN 1330-8:1998, *Non-destructive testing — Terminology — Part 8: Terms used in leak tightness testing*

EN 1593, *Non-destructive testing — Leak testing — Bubble emission techniques*

EN 1736, *Refrigerating systems and heat pumps — Flexible pipe elements, vibration isolators, expansion joints and non-metallic tubes — Requirements, design and installation*

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

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

EN 13134, *Brazing — Procedure approval*

EN 13185:2001, *Non-destructive testing — Leak testing — Tracer gas method*

EN 60068-2-6, *Environmental testing — Part 2-6: Tests — Tests Fc: Vibration (sinusoidal) (IEC 60068-2-6:2007)*

EN 60068-2-64, *Environmental testing — Part 2-64: Tests — Test Fh: Vibration, broadband random and guidance (IEC 60068-2-64:2008)*

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

EN ISO 175, *Plastics — Methods of test for the determination of the effects of immersion in liquid chemicals (ISO 175:2010)*

ISO 1817, *Rubber, vulcanized — Determination of the effect of liquids*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1330-8:1998 and EN 378-1:2008 and the following apply.

#### 3.1

##### **mass flow rate**

$Q_m$

value of the leak mass flow rate at any point of the component

NOTE The mass flow rate is expressed in grams (g) per year.

#### 3.2

##### **volume flow rate**

$Q$

value of the leak volume flow rate at any point of the component

NOTE The volume flow rate is expressed in pascal cubic metres per second ( $\text{Pa}\cdot\text{m}^3/\text{s}$ ).

#### 3.3

##### **hermetically sealed system**

system in which all refrigerant containing parts are made tight by welding, brazing or a similar permanent connection which may include capped valves and capped service ports that allow proper repair or disposal and which have a tested tightness control level of less than 3 g per year under a pressure of at least a quarter of the maximum allowable pressure

NOTE Sealed systems as defined in EN 378-1:2008 equal hermetically sealed systems.

#### 3.4

##### **product family**

group of products that have the same function, same technology, and same material for each functional part and sealing materials

#### 3.5

##### **permanent joints**

means joints which cannot be disconnected except by destructive methods

[Adapted from the Pressure Equipment Directive 97/23/EC]

#### 3.6

##### **reusable joint**

joint made without replacing the sealing material in general procedure

NOTE In some cases the tube is used as sealing material (e.g. flared joint).

#### 3.7

##### **same base material**

material belonging to the same group as follows:

- steel group;
- aluminium and aluminium alloy group; or
- copper group

NOTE Subgroups of these material groups are considered to be same base materials (refer to EN 14276-2).