ILNAS

Institut luxembourgeois de la normalisation
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des produits et services

ILNAS-EN 16084:2011

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

Kälteanlangen und Wärmepumpen - Qualifizierung der Dichtheit der Bauteile und Verbindungen

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

04/2011

National Foreword

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 16084

April 2011

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

Kälteanlangen und Wärmepumpen - Qualifizierung der Dichtheit der Bauteile und Verbindungen

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Ref. No. EN 16084:2011: E

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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of an identical text or by endorsement, at the latest by October 2011, and conflicting national standards shall be withdrawn at the latest by October 2011.

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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 (Pa·m³/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).

4 Symbols

Symbols used in this standard are given in Table 1.

Table 1 — Symbols

Symbol	Denomination	Unit
DK_{rel}	Percentage deviation of the minimum and maximum torque from the average of the minimum and maximum torque, $(K_{max} - K_{min})/(K_{min} + K_{max})$	
f	Frequency of vibrations	Hz
K_{ave}	Average torques of the respective joint standard	Nm
K_{max}	Required maximum torques of the respective joint standard, if specified. Otherwise, the maximum torque values supplied by the manufacturer.	Nm
K_{min}	Required minimum torques of the respective joint standard, if specified. Otherwise, the minimum torque values supplied by the manufacturer.	Nm
L	Length of tube	mm
n	Number of cycles in temperature and in pressure (method 1)	
n_1	Number of cycles in temperature and in pressure (method 2)	
n_2	Number of cycles in pressure	
n_3	Number of cycles in vibration	
n_{total}	Total number of cycles in temperature and in pressure	
N	Number of samples	
P	Tightness test pressure	bar
P_{max}	Maximal pressure of cycle	bar
P_{min}	Minimal pressure of cycle	bar
PS	Maximal allowable pressure	bar
P_{set}	Nominal set pressure of the device	bar
Q	Volume flow rate	Pa·m^3/s
Q_m	Mass flow rate	g/yr
s	Vibration displacement (peak to peak value)	mm
T_{max}	Maximal temperature of cycle	°C
T_{min}	Minimal temperature of cycle	°C