
**Hladilni sistemi in toplotne pumpe - Naprave, ki označujejo nivo tekočine
Zahteve, preskušanje in označevanje**

Refrigerating systems and heat pumps - Liquid level indicating devices - Requirements, testing and marking

Kälteanlagen und Wärmepumpen - Flüssigkeitsstandanzeiger - Anforderungen, Prüfung und Kennzeichnung

Systemes de réfrigération et pompes à chaleur - Indicateurs de liquide - Exigences, essais et marquage

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English version

Refrigerating systems and heat pumps - Liquid level indicating devices - Requirements, testing and marking

Systèmes de réfrigération et pompes à chaleur -
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Kennzeichnung

This European Standard was approved by CEN on 3 November 2003.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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Foreword

This document (EN 12178:2003) has been prepared by 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of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

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 EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

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

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1 Scope

This European Standard specifies safety requirements, safety factors, test methods, test pressures and marking of liquid level indicating devices, referred to throughout this standard as "level indicators", for use in refrigerating systems and heat pumps.

It applies to devices connected to refrigerant vessels (e.g. on high-pressure liquid receivers, intercoolers and low-pressure separators) and to devices connected to other parts of a refrigerating system (e.g. oil-level sight glasses on a compressor).

This European Standard applies to those types of level indicators that are direct and indirect reading devices (e.g. sight glasses, frosting tubes), and includes electrical and pneumatic indicators.

This European Standard describes the procedure to be followed when designing (by calculation or by an experimental design method) level indicator parts subjected to pressure as well as the criteria to be used for the selection of materials.

This European Standard applies to the design of level indicators with respect to pressure containment and describes methods by which the reduced impact values at lower temperatures may be taken into account in a safe manner.

It also gives guidance on some aspects of application and installation.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

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

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

prEN 764-1, *Pressure equipment — Terminology — Part 1: Pressure, temperature, volume, nominal size.*

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

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*

EN ISO 6708:1995, *Pipework components — Definition and selection of DN [nominal size] (ISO 6708:1995).*

ISO 7268, *Pipe components - Definition of nominal pressure.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 378-1 and prEN 764-1 and the following apply.

3.1

min $t_{0\ 100}$

lowest temperature at which pressurized parts can be used at a load of up to 100 % of the allowable design stress at 20 °C, taking the safety factors according to Table A.2 of EN 12284:2003 into account

3.2

min $t_{0\ 75}$

lowest temperature at which pressurized parts can be used, if its load amounts to 75 % maximum of the allowable design stress at 20 °C, taking the safety factors according to Table A.2 of EN 12284:2003 into account

3.3

min $t_{0\ 25}$

lowest temperature at which pressurized parts can be used, if their load amounts to 25 % maximum of the allowable design stress at 20 °C, taking the safety factors according to Table A.2 of EN 12284:2003 into account

3.4

self-closing balls

self-closing shut-off arrangement

NOTE The arrangement comprises balls positioned in the connecting channel close to the sight glass in such a manner that the balls will not be affected at low flow rates. At high flow rates the balls will be carried forward with the flow and block the connections to the sight glass.

3.5

reflex glass

glasses having prismatic flutes on the inside, which will break up the incoming light

NOTE The liquid zone will absorb the light and will correspondingly appear dark. The gas/vapour zone will reflect the light and will correspondingly appear bright.

3.6

direct reading level indicator

level indicator where it is possible to see the liquid level

3.7

indirect reading level indicator

level indicator where the liquid level is not visible

NOTE The level is indicated by auxiliary means; electrically, magnetically or by observing the frost on a tube.

3.8

self-contained unit

level indicator which is assembled and tested by the manufacturer

3.9

add-on unit

level indicator delivered in parts from the manufacturer for mounting directly onto the system and which can only be tested after assembly and connection on site

3.10

level indicator with magnetically operated indication

device which transfers the measured value at any particular moment to an indicating device by means of a float with a built-in permanent magnet system

3.11

sight glass

direct reading level indicator consisting of a glass plate and holder to enable viewing of the liquid surface

NOTE The shape of the glass plate can be either circular or oblong. The glass can be smooth or provided with flutes to break up incoming light which will make the liquid-filled part darker than the vapour-filled part. A sight glass can be a self-contained or add-on unit.

3.12

frosting tube

device, the principle of which is based on the frosting of the humidity of the surrounding air, and which consists of a corrosion protected tube arranged vertically outside the vessel and connected to the vessel at top and bottom. It is especially suitable for refrigerant temperatures below -3°C and ambient temperature above freezing point. The top level of the frosting on the tube will indicate the liquid level in the vessel

3.13

auxiliary powered level indicator

device which operates electrically or pneumatically to indicate the level by means such as the following:

- a) differential pressure transducer;
- b) capacitive transducer;
- c) inductive transducer;
- d) ultrasonic transducer;
- e) displacement principle with a displacement float.

3.14

operating range

temperature and pressure conditions at which the liquid level can be safely operated

3.15

nominal size [DN]

alpha-numeric designation of size for components of a pipework system [see EN ISO 6708:1995]

3.16

Nominal pressure (PN)

value of a pressure in the range of the maximum allowable pressure for planning a plant or a component [see ISO 7268]

4 List of Symbols

For symbols see EN 12284:2003, clause 4 (Table 1).

5 General requirements

5.1 Installation and operation

Level indicators shall be designed for installation and operation in accordance with EN 378-1, EN 378-2 and EN 378-4.

5.2 Components under pressure

All parts of the level indicator shall be designed and manufactured to remain leakproof and withstand the pressures which may occur during operation, standstill and transportation, taking into account the thermal, physical and chemical stresses to be expected.

5.3 Excessive mechanical stress

After installation, level indicators, especially in systems where hot gas defrosting is used, shall not be under excessive mechanical stress from fitting of the pipe or from temperature variations during operation.

NOTE Hot gas defrosting can produce hydraulic shocks resulting in transient pressures in excess of PS . Further information can be obtained from EN 378 (all Parts).

5.4 Leakage

See 5.4 of EN 12284:2003.

6 Materials

6.1 Material properties

Materials, including welding filler metals, solders, braze, sealant and glass, shall allow for the thermal, chemical and mechanical stresses arising in system operation. The material shall be resistant to the refrigerants, solvents (in absorption systems) and refrigerant-oil mixtures used in each particular case.

6.2 New materials

New materials shall be tested in accordance with annex A to annex D of EN 12284:2003.

6.3 Using non-metallic materials (standards.iteh.ai)

See 6.1.2 of EN 12284:2003.

6.4 Requirements for materials to be used for pressurized parts

See 6.2 of EN 12284:2003.

6.5 Compatibility of connections

Materials, which are to be physically linked, shall be suitable for an effective connection, depending on the particular materials used and on the dimensions of piping specified.

6.6 Ductility

Materials which are to be considerably deformed shall be sufficiently ductile and capable of being heat treated where necessary.

6.7 Brittle fracture

Level indicators shall be designed and constructed so that they are not subject to brittle fracture at the minimum operating temperature (min t_0) using the method specified in annex D of EN 12284: 2003.

6.8 Ageing

Materials for pressurized parts shall not be significantly affected by ageing.

6.9 Castings

Castings shall exhibit a low residual stress level. If they are not subjected to stress relief heat treatment, controlled cooling shall be ensured after the casting process and after any heat treatment that may have been applied.