



**SLOVENSKI STANDARD**  
**oSIST prEN ISO 14903:2023**  
**01-november-2023**

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**Hladilni sistemi in toplotne črpalke - Ocena tesnosti sestavnih delov in spojev  
(ISO/DIS 14903:2023)**

Refrigerating systems and heat pumps - Qualification of tightness of components and joints (ISO/DIS 14903:2023)

Kälteanlagen und Wärmepumpen - Qualifizierung der Dichtheit der Bauteile und Verbindungen (ISO/DIS 14903:2023)

Systèmes de réfrigération et pompes à chaleur - Qualification de l'étanchéité des composants et des joints (ISO/DIS 14903:2023)

**Ta slovenski standard je istoveten z: prEN ISO 14903**

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**ICS:**

27.080	Toplotne črpalke	Heat pumps
27.200	Hladilna tehnologija	Refrigerating technology

**oSIST prEN ISO 14903:2023**

**en,fr,de**



# DRAFT INTERNATIONAL STANDARD

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## 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*

ICS: 27.080; 27.200

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## ISO/DIS 14903:2023(E)

### Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 182, Refrigerating systems, safety and environmental requirements, in collaboration with ISO Technical Committee TC 86, Refrigeration and air-conditioning, Subcommittee SC 1, Safety and environmental requirements for refrigerating systems, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 14903:2017), which has been technically revised.

The main changes are as follows:

- update of the test procedure (deletion of previous Method 1 and update of previous method 2);
- deletion of previous Annex B.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

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

## 1 Scope

This document provides 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 relevant parts of ISO 5149. 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 ISO 13971. Metal flexible piping are covered by this document.

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 characterize 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 document specifies additional requirements for mechanical joints that can be recognized as hermetically sealed joints.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 175, *Plastics — Methods of test for the determination of the effects of immersion in liquid chemicals*

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

ISO 5149-1, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 1: Definitions, classification and selection criteria*

ISO 5149-2, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, construction, testing, marking and documentation*

ISO 13971, *Refrigeration systems and heat pumps — Flexible pipe elements, vibration isolators, expansion joints and non-metallic tubes — Requirements and classification*

ISO 20485:2017, *Non-destructive testing — Leak testing — Tracer gas method*

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

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### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5149-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

#### 3.1

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

$Q_m$

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

Note 1 to entry: 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 1 to entry: The volume flow rate is expressed in Pascal cubic metres per second (Pa·m<sup>3</sup>/s).

#### 3.3

##### **product family**

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

#### 3.4

##### **closed joint**

joint other than hermetically-sealed joints where there is no movement between the sealing surfaces except for service purposes

EXAMPLE Flanged joints.

#### 3.5

##### **closed component**

component other than hermetically-sealed components where there is no movement between the sealing surfaces except for service purpose

EXAMPLE Stop valves, service ports, pressure-relief valves.

#### 3.6

##### **hermetically-sealed joint**

joint that are made tight by welding, brazing or a similar permanent connection

#### 3.7

##### **hermetically-sealed component**

component that are made tight by welding, brazing or a similar permanent connection

#### 3.8

##### **permanent joint**

joint which cannot be disconnected except by destructive methods

[SOURCE: Pressure Equipment Directive 2014/68/EU, modified]

#### 3.10

##### **reusable joint**

joint made without replacing the sealing material in general procedure

Note 1 to entry: In some cases, the tube is used as sealing material (e.g. flared joint).



### 3.11

#### same base material

material belonging to the same group

EXAMPLE Steel group, aluminium and aluminium alloy group or copper group.

Note 1 to entry: Subgroups of these material groups are considered to be same base materials (refer to EN 14276-2).

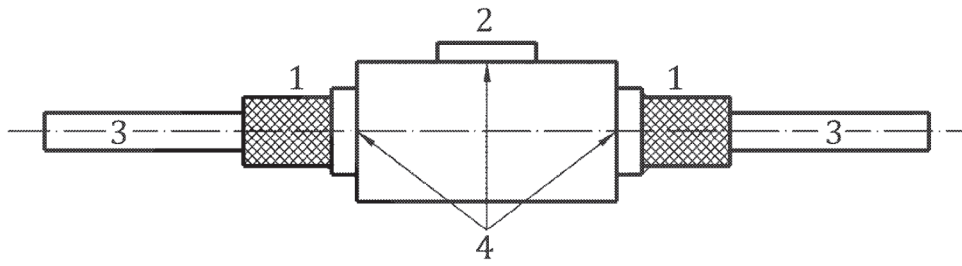
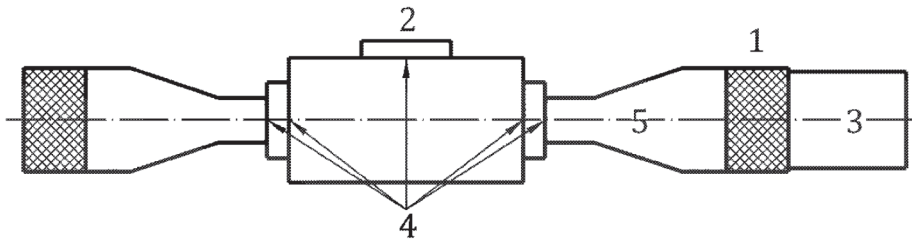
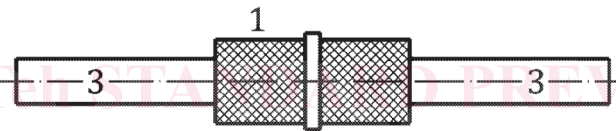
## 4 Symbols

Symbol	Denomination	Unit
$D_K$	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
$K_{\text{ave}}$	Average torques of the respective joint standard, if specified. Otherwise, average of $K_{\min}$ and $K_{\max}$	Nm
$K_{\text{test\_max}}$	Maximum torque used for testing a joint	Nm
$K_{\text{test\_min}}$	Minimum torque used for testing a joint	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
$n_1$	Number of cycles in temperature and in pressure	—
$n_2$	Number of cycles in pressure	—
$n_3$	Number of cycles in vibration	—
$n_{\text{total}}$	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
$P_{\text{set}}$	Nominal set pressure of the device	bar
$Q$	Volume flow leakage rate	mbar l/s
$Q_m$	Mass flow leakage rate	g/a
$s$	Vibration displacement (peak to peak value)	mm
$t_{\max}$	Maximal temperature of cycle	°C
$t_{\min}$	Minimal temperature of cycle	°C

## 5 Test requirements

The required tests to be applied to component bodies and joint used in refrigerating systems and heat pumps are given in [Table 1](#) and in [Table 2](#).

[Figure 1](#) illustrates the principle of a component and a joint and their corresponding requirements in [Table 1](#) or [Table 2](#).

a) According to [Table 1](#)b) According to [Table 1](#)c) According to [Table 2](#)**Key**

- 1 joint
- 2 component body
- 3 pipe
- 4 component body joint
- 5 extension pipe

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**Figure 1 — Principle: component body-joint**

All component types and joints types shall be tested.

When a component may be connected with different types of joints, one of these joints shall be tested with the component according to [Table 1](#). The other possible types of joints shall be tested independently according to [Table 2](#).

Table 1 — Requirements for component bodies

Components (including valves)	Requirements							
	Tightness test	PTV- test (pres- sure-temper- ature-vibra- tion)	Operation simulation	Freezing test	Chemical compatibility with mate- rials	Vacuum test	Additional test for hermeti- cally sealed	
							Pressure test	Fatigue test
<b>Subclause</b>	<a href="#">7.4</a>	<a href="#">7.6</a>	<a href="#">7.7</a>	<a href="#">7.8</a>	<a href="#">7.11</a>	<a href="#">7.10</a>	<a href="#">7.9</a>	<a href="#">7.12</a>
Component bodies having only permanent body joints: brazing and welding	YES	NO	NO	NO	NO	NO	NO	NO
Identical base materials	YES	YES <sup>a</sup>	NO	NO	NO	NO	NO	NO
Components having permanent body joints: brazing and welding	YES	YES	NO	YES if operating temperature below 0 °C	YES if non-metallic parts	YES	YES	YES
Different base materials	YES	YES	YES if any external stems, shaft seals or removable or replaceable parts	YES if operating temperature below 0 °C	YES if non-metallic parts	YES	Not applicable	Not applicable
Component bodies with non-permanent body joints	YES	YES	YES	YES if operating temperature below 0 °C	YES if non-metallic parts	YES	YES	YES
Capped valves and capped service ports for sealed systems	YES	YES	YES	YES if operating temperature below 0 °C	YES if non-metallic parts	YES	YES	YES

By exception, compressors that comply with the requirements of EN 12693 or IEC 60335-2-34 only need to be subjected to the following test:

- joints connecting to other parts of the refrigerating systems;
- chemical compatibility test for all gaskets (sight glass, etc.).

<sup>a</sup> PTV tests are not required if destructive and non-destructive tests of EN 13134 are carried out.

NOTE Other qualifications for this chemical compatibility done according to other standards are equivalent.

Table 1 (continued)

Components (including valves)	Requirements						Additional test for hermetically sealed	
	Tightness test	PTV- test (pressure-temperature-vibration)	Operation simulation	Freezing test	Chemical compatibility with materials	Vacuum test	Pressure test	Fatigue test
Subclause	<a href="#">7.4</a>	<a href="#">7.6</a>	<a href="#">7.7</a>	<a href="#">7.8</a>	<a href="#">7.11</a>	<a href="#">7.10</a>	<a href="#">7.9</a>	<a href="#">7.12</a>
Safety valves	YES	YES	NO	NO	YES if non-metallic parts	Not applicable	Not applicable	Not applicable
Flexible piping	Test according to ISO 13971							
By exception, compressors that comply with the requirements of EN 12693 or IEC 60335-2-34 only need to be subjected to the following test:								
— joints connecting to other parts of the refrigerating systems;								
— chemical compatibility test for all gaskets (sight glass, etc.).								
a PTV tests are not required if destructive and non-destructive tests of EN 13134 are carried out.								
NOTE Other qualifications for this chemical compatibility done according to other standards are equivalent.								