DRAFT AMENDMENT

ISO 14903:2017/DAM 1

ISO/TC **86**/SC **1** Secretariat: **ANSI**

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

AMENDMENT 1

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

AMENDEMENT 1

ICS: 27.080; 27.200

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

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

AMENDMENT 1

Clause 2

Replace the reference to EN 13185:2001 with the following:

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

Clause 3

Replace 3.3 with the following:

3.3
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

Clause 4

Proceed to the following changes in the table:

— delete the line with symbol *n*;

— in the line n_1, delete the texte "(method 2)".

Clause 6

Replace the Clause 6 with the following:

6 Requirements for sealed systems

Sealed systems shall be constructed with components which have their tightness control level qualified as A1 or A2 as per Table 3 or Table 4. These components and joints shall be submitted to the relevant tests as specified in Tables 1 and 2.

7.1

Replace the Figure 2 with the following:

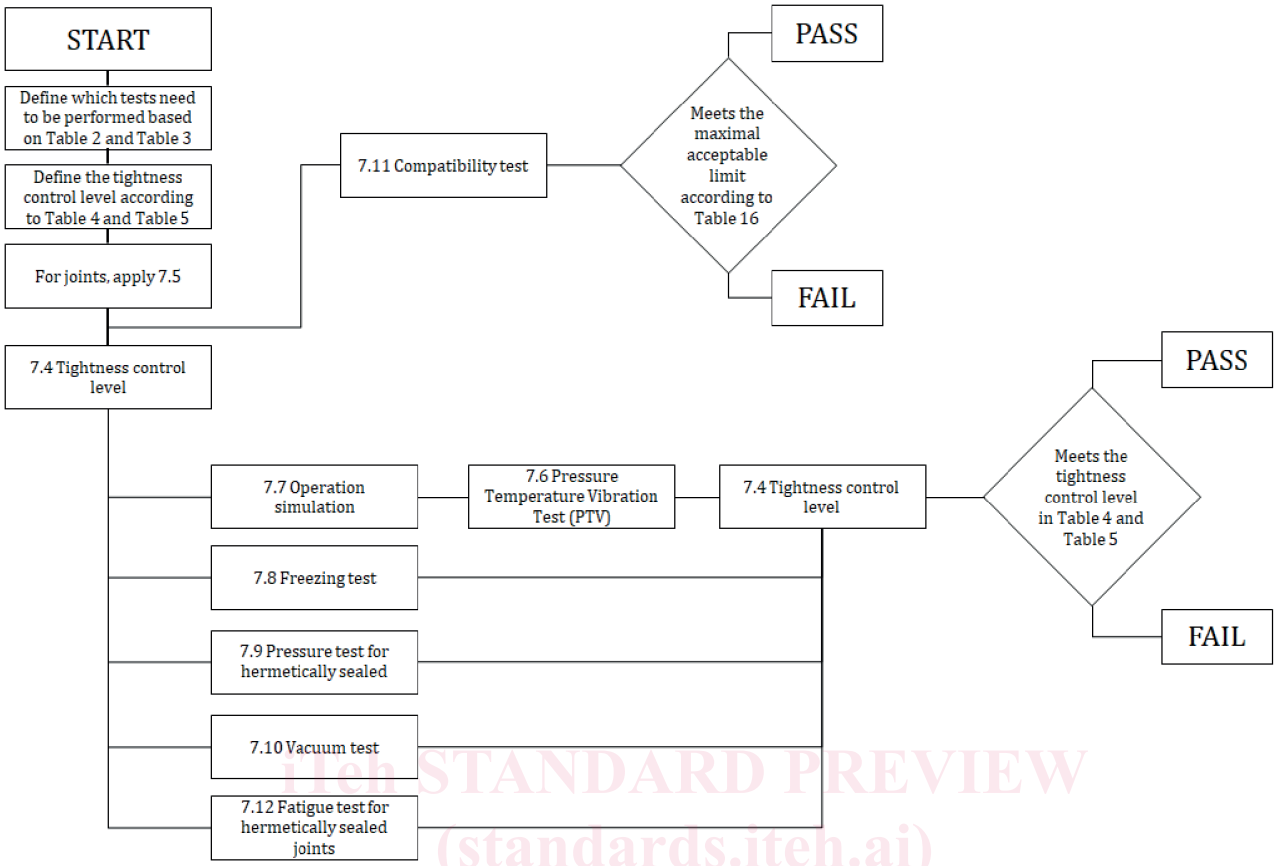


Figure 2 — Test procedure

7.4.2.1

Replace reference to "EN 13185:2001, Clause 10" with "ISO 20485, 9.8".

Replace reference to "EN 13185:2001, 9.1.1" with "ISO 20485, 8.2.1".

Replace reference to "EN 13185:2001, 9.2.6" with "ISO 20485, 8.3.7".

7.4.2.2

Replace reference to "EN 13185:2001, 10.4.1" with "ISO 20485, 9.5.2".

7.6.1

Replace the subclause with the following:

7.6.1 General

In order to qualify the tightness level, joints and components shall be submitted to the pressure-temperature and vibration tests as described below.

7.6.3

Replace the title with the following:

7.6.3 Test equipment and arrangements

7.6.3.2

Replace the reference to "Annex B" with "Figure 7".

7.6.4

Delete the whole subclause.

7.6.5

Replace the subclause with the following:

7.6.4 Method: Combined pressure-temperature cycle test with a separate vibration test

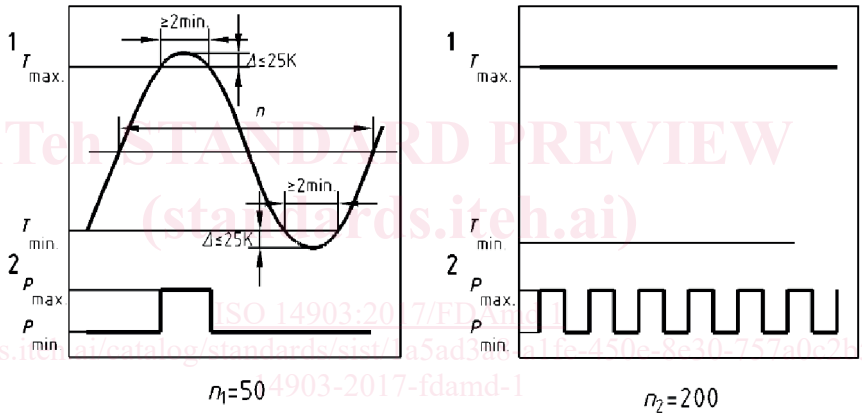
7.6.4.1 Requirements for the combined pressure-temperature cycle test

The samples shall be submitted to a defined number n_1 of cycles of temperature and pressure, between maximal values (t_{max}, P_{max}) and minimal values (t_{min}, P_{min}), and n_2 cycles of pressure between maximum value (P_{max}) and minimum value (P_{min}) with fixed temperature value (t_{max}).

The test characteristics to be applied to the components are defined in Table 8.

A typical temperature-pressure cycle is given in Figure 5.

NOTE The shape of the curve is theoretical.



Key

1 temperature

2 pressure

Figure 5 — Temperature-pressure cycle test with a separate vibration test

Table 8 — Test parameters

Parameters	Value
n_1	50
n_2	200
t_{min}	Minimum temperature as specified by the manufacturer or −40 °C if this is not specified
t_{max}	Maximum temperature as specified by the manufacturer or +140 °C if this is not specified
P_{min}	Atmospheric pressure
P_{max}	For safety valves, $P_{max} = 0{,}85 \times P_{set}$
	For others components $1{,}0 \times PS$[a]
[a] 1,0 × *PS* is proposed because of safety issue for test on big component. In method 2, the number of cycles and the level of vibration are extended to compensate for the reduced pressure.	

The test fluid shall not be a liquid.

7.6.4.2 Procedure

The following procedure shall be followed:

— Fit the test items on a test-bed in accordance with the instructions of the manufacturer.

— Fix the test parameters (n_1, n_2, t_{max}, t_{min}, P_{max}, P_{min}) in accordance with Table 8.

— Submit the test items to the test pressure according to Table 8.

— Check the tightness of the joints in order to detect leaks before test.

— Tighten again the joints which leak according to the instructions of the manufacturer.

— Execute the operation simulation according to 7.7.

— Place the joints in the climatic enclosure and submit them to n_1 and n_2 pressure and temperature cycles in accordance with Figure 5 and Table 8.

7.6.4.3 Vibration test

7.6.4.3.1 General

The component and joints shall be submitted to a vibration test.

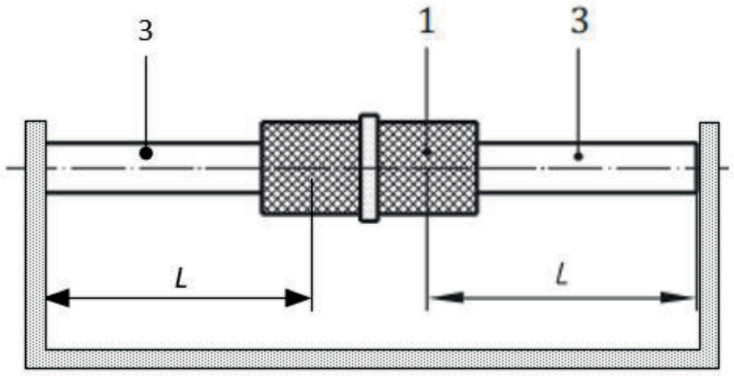
7.6.4.3.2 Vibration test specification

The joint and components samples shall be submitted to the specifications as given in Table 9 and Table 10.

The frequency measurement shall be made on the component.

7.6.4.3.3 Examples of component and joint assembly

An example of vibration assembly for joint is given in Figure 6.

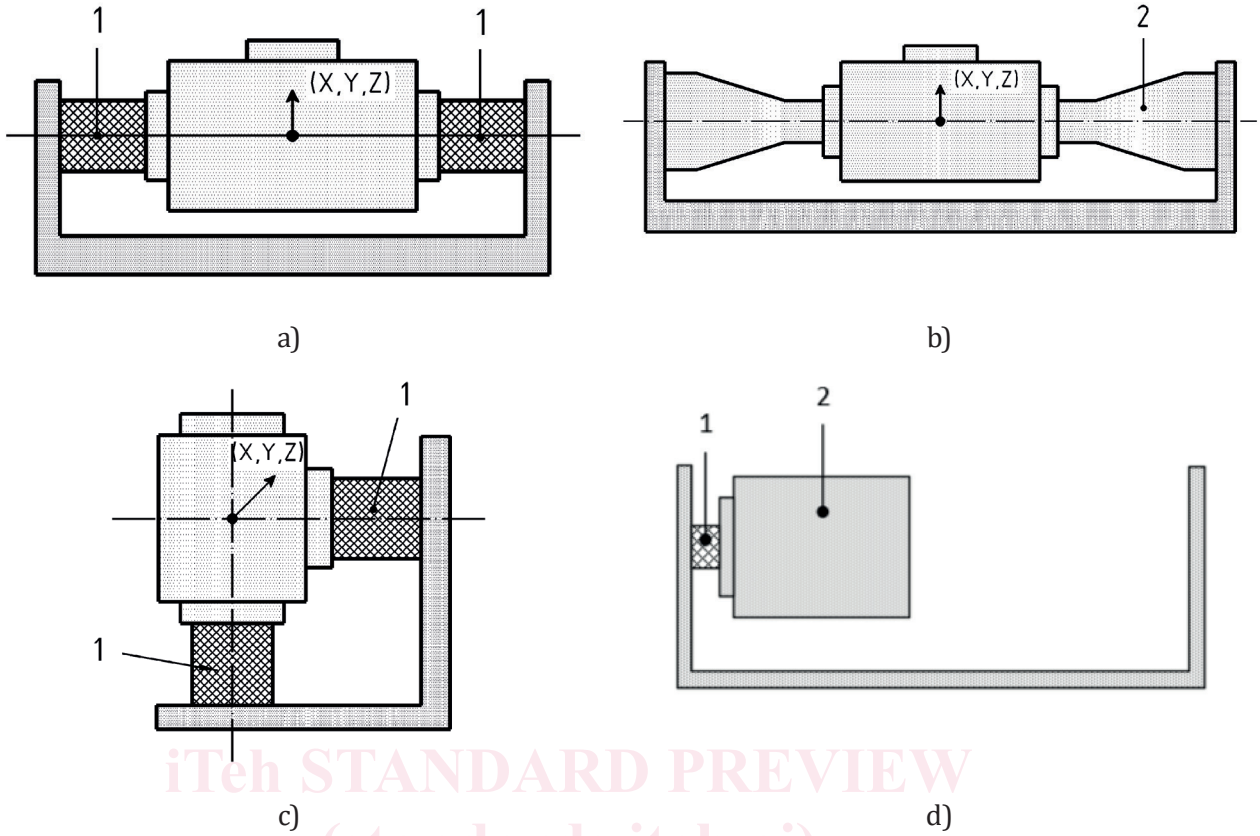


Key

1 joint
2 component
3 pipe
4 extension pipe
L length

Figure 6 — Vibration assembly for joint

Examples of vibration assembly for components are given in Figure 7.



Key

1 joint

2 extension pipe

Figure 7 — Vibration assembly for components

The samples are fixed according to the manufacturer's instructions. Otherwise, the main body of the sample should be fixed as close as possible to the joint.

7.6.4.3.4 Vibration test conditions

7.6.4.3.4.1 General

Perfom the sinusoidal and random vibration test on the same sample.

7.6.4.3.4.2 Sinusoidal loading

Sinusoidal testing based on requirements in accordance with IEC 60068-2-6.

The components shall be submitted to the specifications as given in Table 9.

Table 9 — Test parameters for sinusoidal vibration

Parameters	Value
Frequency range	10 Hz to 200 Hz
Acceleration	0,7 g
Sweep speed	1 octave/min
Number of excitation directions[a]	3 (x-y-z)
[a] Numbers of excitation directions can be reduced to two on symmetric shaped samples.	

Table 9 *(continued)*

Parameters	Value
Duration	2 h in each direction
[a] Numbers of excitation directions can be reduced to two on symmetric shaped samples.	

7.6.4.3.4.3 Random loading

Random testing requirement covers installations near the source of vibration.

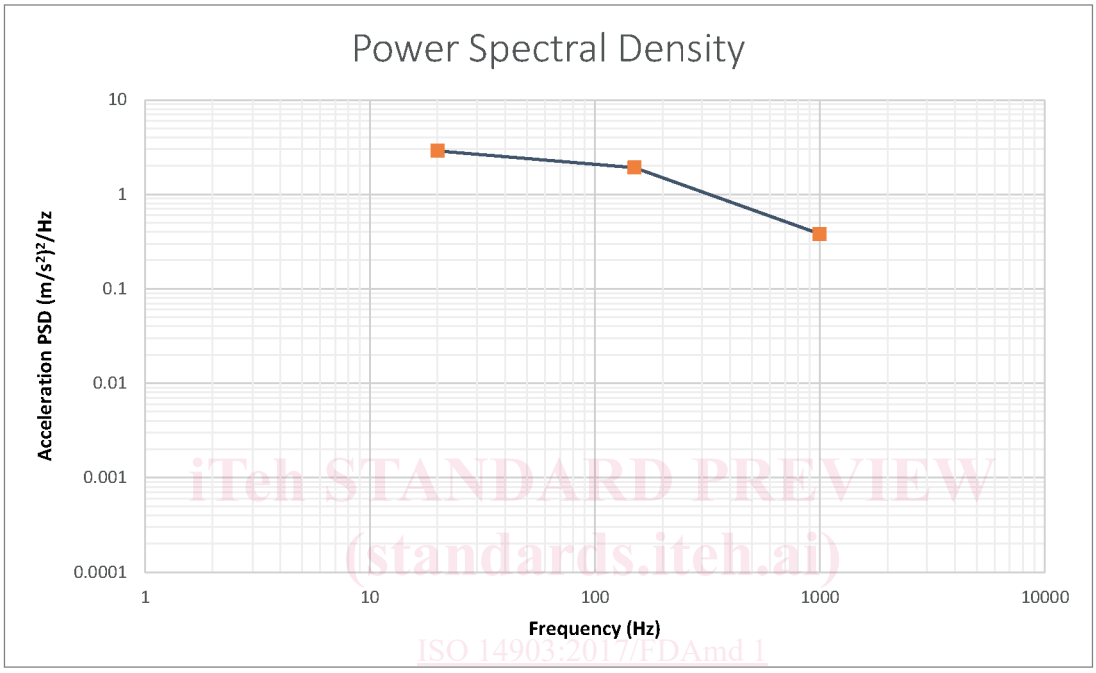


Figure 8 — Power Spectral Density

Table 10 — Test parameters for random testing

	Frequency (Hz)	Acceleration PSD (m/s²)²/Hz	Acceleration PSD (g²/Hz)
Value	20	2,88	0,03
	150	1,92	0,02
	1 000	0,38	0,004
Acceleration (RMS)	3,1 g		
Duration	2 h		

7.6.4.3.5 Procedure

The following procedure shall be applied:

— Before testing, execute the operation simulation according to 7.7.

— Fit the test items on a test-bench in accordance with the instructions of the manufacturer.

— Set the test parameters for samples in accordance with Table 9 and Table 10.

— Submit the samples to the vibration test according to the numbers of tests specified in the respective tables.