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Kriogene posode - Cevi (ISO/DIS 21012:2017)

Cryogenic vessels - Hoses (ISO/DIS 21012:2017)

Kryo-Behälter - Schlauchleitungen (ISO/DIS 21012:2017)

Récipients cryogéniques - Tuyaux (ISO/DIS 21012:2017)

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Cryogenic vessels — Hoses

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Foreword

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The committee responsible for this document is ISO/TC 220.

This second edition cancels and replaces the first edition (ISO 21012:2006), the entire standard has been technically revised.

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DRAFT INTERNATIONAL STANDARD

Cryogenic vessels — Hoses

1 Scope

This International Standard gives design, construction, type and production testing, and marking requirements for non-insulated cryogenic flexible hoses used for the transfer of cryogenic fluids within the following range of operating conditions:

- working temperature: from 270 °C to + 65 °C;
- nominal size (DN): from 10 to 100.

End fittings for mounting of any couplings are within the scope of this International Standard, but the couplings are subject to other standards.

It is intended that the hose be designed and tested to satisfy the generally accepted rated pressure i.e. at least PR 40. Hoses may be then selected with a PR equal to or greater than the maximum allowable pressure (PS) of the equipment to which it is to be used.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 7369:2004, Pipework — Metal hoses and hose assemblies - Vocabulary

ISO 10806:2003, Pipework — Fittings for corrugated metal hoses

ISO 21010, Cryogenic vessels — Gas/materials compatibility

EN ISO 21028-1, Cryogenic vessels — Toughness requirements for materials at cryogenic temperature — Part 1: Temperatures below -80 °C

ISO 23208, Cryogenic vessels — Cleanliness for cryogenic service

3 Terms and definitions

For the purposes of this document, the following terms and definitions given in EN ISO 7369:2004 and the following apply.

3.1

hose

flexible leak-tight inner tube of either corrugated metal, elastomer or plastic

3.2

braid

layer, or layers, of cylindrically woven wires covering the hose and permanently attached to the flexible hose assembly end fittings, serving the function of restraining the flexible hose against elongation

3.3

protection coil or cover

outer coil or cover fitted to protect the main hose and braid against damage and abrasion

3.4

end fittings

fitting (of material compatible with material and product transferred) attached to each end of the hose and braid (when fitted)

3.5

hose assembly

hose with end fittings attached, complete with braid and/or other covering, ready for service

3.6

nominal size (DN)

alphanumeric designation of size for components of a pipework system, is used for reference purposes

Note 1 to entry: It comprises the letters DN followed by a dimensionless whole number that is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections.

[SOURCE: ISO 6708:1995, definition 2.1]

3.7

rated pressure (PR)

(of a hose) lowest Maximum Allowable Working Pressure (MAWP) of any component of the hose at 20 °C

Note 1 to entry: PR > PS (as defined in PED)

Note 2 to entry: See also the last sentence of the scope

3.8

rated minimum temperature

lowest temperature to which the hose assembly is rated by the manufacturer

3.9

working temperature range https://standards.iteh.ai)

highest and lowest temperature to which the hose assembly is to be subjected

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3.10

cyclic life

minimum number of complete cycles which, at the test conditions, the hose assembly is designed to withstand without failure nalog/standards/sist/6634ba55-8a5e-486b-ac7d-60896011b61/sist-en-iso-21012-2019

4 General requirements

4.1 Design and construction

The test pressure used during tests (see <u>clause 5</u>) shall be greater than or equal to the rated pressure (PR) specified. In addition, the rated pressure (PR) shall not be less than the maximum allowable pressure (PS) of the equipment to which it is to be used. A hose is typically made from corrugated metal, from strip steel. The corrugation may be parallel or helical. The maximum pressure in service shall be lower than or equal to the rated pressure stamped on the hose assembly.

If elastomers or composites are used, additional requirements shall be applied in accordance with 5.3.2.2.

A braid is commonly fitted over the hose. This generally consists of woven wire in one or two layers in stainless steel, or a high strength copper alloy. It may have a cover that shall be compatible with the surroundings and with the conveyed fluid.

The design shall ensure that pressurization, or corrosion, between the inner tube and the outer braid or sheath is prevented.

End fittings shall be designed as a rigid seal to the ends of a hose to ensure:

- a tight fit to the hose;
- a strong joint between the braid, hose and end fitting to stabilize the hose against elongation at rated pressure.

Fittings for corrugated metal hose assemblies shall conform to ISO 10806.

An area for marking shall be provided on one of the end fittings or on an attachment.

All joining methods used in corrugated hose assemblies shall be qualified. Manual welds shall be in accordance with applicable standards.

A typical cryogenic hose assembly is shown in <u>Annex A</u>.

4.2 Materials

All materials shall be compatible with the fluid conveyed and shall be controlled by the manufacturer of the hose assembly by a specification ensuring control of chemical content and physical properties, and quality at least equivalent to an internationally recognized standard. Materials for the manufacture of corrugated metal hose assemblies shall be selected on the basis of their suitability for fabrication, e.g. cold forming and welding, etc. and for the conditions under which they shall be used. In addition the following requirements shall meet:

- end connections and couplings shall be made of materials compatible with the other materials of the hose assembly;
- a material is compatible when it does not lead to any violent reaction (ignition, etc.) or any slow reaction with the conveyed gases, and permeability shall be appropriate for intended use;
- a test certificate providing the chemical content and physical property test results shall be provided with the hose assembly.

The materials used in a cryogenic hose assembly shall:

— maintain sufficient ductility at the rated minimum temperature (as specified in ISO 21028-1);

— be oxygen compatible, if specified for oxygen or nitrous oxide service (as specified ISO 21010);

 contain less than 65 % copper, in the alloy as well as the soldering materials, if it is specified for mixtures containing acetylene.

4.3 Cleanliness

Hose assemblies specified for all cryogenic fluids shall be cleaned in accordance with ISO 23208.

NOTE Measures should be taken during manufacture to remove or avoid hydrocarbons, moistures, particles, or other contaminations inside the hose assembly.

4.4 Mechanical properties

4.4.1 Burst pressure

The burst pressure shall be at least three times the rated pressure at ambient temperature. Failure shall occur only in the body of the hose and braid and not in their connections. See <u>clause 5.3.3</u> for burst test.

4.4.2 Pressure cycles

Hose assemblies shall have a minimum cyclic life 10 000 cycles when repeatedly pressurized from < 1 bar to their rated pressure in accordance with 5.3.1.

4.4.3 Bending Test (optional, upon request of purchaser)

Hose assemblies shall have a minimum cyclic life of 50 000 cycles when repeatedly flexed at their rated pressure in accordance with 5.3.2.

4.4.4 Resistance to abuse

Hose assemblies should have sufficient resistance to deterioration of the braid when they are dragged on the ground. For additional protection of the braid a coil, can be used.

Hose assemblies shall withstand a crushing test, simulating a person stepping on the hose assembly, in accordance with 5.2.6.

4.4.5 Low temperature resistance

All components of the hose assemblies which become cold during operation shall retain their toughness at the lowest design temperature.

4.4.6 Leak tightness

Hose assemblies shall be leak-tight in accordance with <u>5.2.5</u>.

4.4.7 Electrical properties

Hose assemblies specified for flammable products shall be electrically conducting from one end to the other (electric resistance less than 25 Ω).

5 Hose sample tests

5.1 General

The hose test samples shall be representative of production. In case of a connection breaking preprogrammed system, testing will be performed on flexible hoses without these connections. The hose sample test procedures shall include:

https://standards.iteh.ai/catalog/standards/sist/6634ba55-8a5e-486b-ac7d-608960f11b61/sist-en-iso-21012-2019 a) inspection and non-destructive tests:

- inspection: dimensions, cleanliness, material identification and marking;
- tests: pressure test, leak and crushing tests;
- b) destructive tests:
- pressure cycling, bursting test, rolling bend cycling and examination of sectional cut.

The tests shall be recorded in a written report which shall be retained for 10 year after the last hose has been placed on the market.

Four sample hose assemblies (A, B, C and D) are necessary to perform the tests.

The tests and order of tests are summarized in Table 1.

(The numbers 1 to 5 give the order of the tests).