SLOVENSKI STANDARD
SIST EN 1626:2001

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Kriogene posode - Ventili za kriogeno področje

Cryogenic vessels - Valves for cryogenic service

Kryo-Behälter - Absperrarmaturen für tiefkalten Betrieb

Récipients cryogéniques - Robinets pour usage cryogénique

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ICS:

23.020.40	Proti mrazu odporne posode (kriogenske posode)	Cryogenic vessels
23.060.01	Ventili na splošno	Valves in general

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Cryogenic vessels - Valves for cryogenic service

Récipients cryogéniques - Robinets pour usage cryogénique

Kryo-Behälter - Absperrarmaturen für tiefkalten Betrieb

This European Standard was approved by CEN on 3 March 1999.

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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 Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 268 "Cryogenic vessels", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by September 1999, and conflicting national standards shall be withdrawn at the latest by September 1999.

This European Standard 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 standard.

This document also supports the objectives of the framework Directives on Transport of dangerous Goods. This standard has been submitted for reference into the RID and/or the technical annexes of the ADR.

Therefore, the standards listed in the normative references and covering basic requirements of the RID/ADR not addressed within the present document are normative only when the standards themselves are referred to in the RID and/or in the technical annexes of the ADR.

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

1 Scope

This standard specifies the requirements for the design, manufacture and testing of valves for cryogenic service, i.e. for operation with cryogenic fluids (as defined in prEN 1251-1:1995) below - 10 °C as well as at ambient conditions to allow for start-up and run-down. It specifies additional requirements for cryogenic service for the appropriate valve product standard.

It applies to sizes up to DN 150 and vacuum jacketed cryogenic valves.

This standard is not applicable to safety valves and valves for liquefied natural gas (LNG).

It is intended that the valve be designed and tested to satisfy the generally accepted nominal pressure e.g. PN 40. Valves may then be selected with a PN equal to or greater than the maximum allowable pressure (PS) of the equipment to which it is to be used.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at 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.

prEN 19:1996, *Industrial valves - Marking*

prEN 1251-1:1995, *Cryogenic vessels - Transportable vacuum insulated of not more than 1000 litres volume - Part 1 : Fundamental requirements*

EN 1252-1, *Cryogenic vessels - Materials - Part 1 : Toughness requirements for temperatures below - 80 °C*

EN 1333, *Pipework components - Definition and selection of PN*

prEN 1503-1:1994, *Valves - Shell materials - Part 1 : Steels*

prEN 1503-2:1994, *Valves - Shell materials - Part 2 : ISO-steels*

prEN 1503-3:1994, *Valves - Shell materials - Part 3 : Cast iron*

prEN 1503-4:1997, *Valves - Shell materials - Part 4 : Copper alloys specified in European Standards*

EN 1797-1, *Cryogenic vessels - Gas/material compatibility - Part 1 : Oxygen compatibility*

EN 12300, *Cryogenic vessels - Cleanliness for cryogenic service*

EN ISO 6708, *Pipework components - Definition and selection of DN (nominal size) (ISO 6708:1995)*

ISO 5208, *Industrial valves - Pressure testing of valves*

3 Definitions

For the purpose of this standard the following definitions apply :

3.
nominal size (DN)
Is defined in accordance with EN ISO 6708.

3.2
nominal pressure (PN)
Is defined in accordance with EN 1333.

3.3
specified minimum temperature
Is the lowest temperature the valve is specified for.

3.4
valve category A
Valves intended to be operated with normal frequency (above 20 cycles a year).

3.5
valve category B
Valves intended to be operated only occasionally i.e. with a frequency below 20 cycles a year.

4 Requirements

4.1 Materials

4.1.1 Metallic materials

Metallic materials to be used in the construction of cryogenic valves shall be suitable for general valve uses as defined in prEN 1503-1:1994, prEN 1503-2:1994, prEN 1503-3:1994 and prEN 1503-4:1997. In addition, the following requirements apply :

4.1.1.1 Toughness requirements

Materials which exhibit a ductile/brittle transition shall have minimum impact test values specified in EN 1252-1. These requirements apply only to the valve parts exposed to critical temperatures (and not to control elements for example).

Non ferrous materials which can be shown to have no ductile/brittle transition do not require additional impact tests.

4.1.1.2 Corrosion resistance

Materials shall be resistant to normal atmospheric corrosion and to the medium handled.

4.1.1.3 Oxygen compatibility

If the specified minimum temperature is equal to or below the boiling point of air or the valve is intended for oxygen service the materials which are, or likely to be, in contact with oxygen or an oxygen enriched air shall be oxygen compatible in accordance with EN 1797-1.

4.1.1.4 Flammable gas compatibility

For hydrogen service, see relevant standards.

Copper alloysmore than 70 % of copper shall not be used for fluids containing acetylene.

4.1.2 Non metallic materials

Non metallic materials to be used in packing and glands shall :

- have mechanical properties which will allow the valves to pass the sample valve test for category A valves as defined in this standard (see 5.2) ;

- be oxygen compatible as defined in 4.1.1.3.

If non metallic materials are used for structural parts, their suitability shall be proven.

4.2 Design

4.2.1 General

The valves shall fulfil their function in a safe manner within the temperature range from + 65 °C to their specified minimum temperature and the pressure range intended for use.

4.2.2 Packing gland

Valves can have an extended stem. The length of the extension shall be sufficient to maintain the stem packing at a temperature high enough to permit operation within the normal temperature range of the packing material.

Valves without an extended stem shall have a stem packing capable of operating at the specified minimum temperature. The handle shall be designed to remain operable for the duration of the sample valve test in accordance with 5.2.3.2.

Gland designs incorporating a gland nut with a male or female thread shall be designed in such a way that they will not unscrew unintentionally, for example when the valve is operated.

4.2.3 Operating positions

As a minimum requirement valves with extended stem shall be capable of operation with the valve stem at any position from the vertical to 25° above the horizontal.

4.2.4 Trapped liquid

Cavities where liquid can be trapped and build up detrimental pressures due to evaporation of the liquid during warming up of the valve are not permitted.

NOTE : For ball and gate valves this requirement can be met by the provision of a pressure relief hole or passage or other means, e.g. pressure relieving seats, to relieve pressure in the bonnet and body cavities to the upstream side of the valve.

4.2.5 Valve bonnet

Valve bonnets may be brazed, welded, bolted, screwed or union type. Union type bonnets shall not be used on valves greater than DN 50. Union nuts shall be locked to the body. Screwed bonnets shall also be secured by a union nut or another device offering equivalent safety.

4.2.6 Securing of gland extension

For bronze or copper alloy valves of PN 100 or greater, the gland extensions shall be mechanically secured in the bonnet prior to brazing. (For instance by screwing).

4.2.7 Seat

Valves may have metal/metal or metal/soft seat or insert. Soft seats shall be backed by a secondary metal seat. Soft seat materials shall be adequately supported to prevent cold flow of the seat material.

4.2.8 Blow-off safety of the stem

The valve stem shall be secured so that it cannot be blown out of the body in the event of the gland being removed while the valve is under pressure.

4.2.9 Torque

The maximum torque to operate the valves manually under service conditions, when applied at the rim of the hand wheel or lever, shall not exceed 350 x R Nm, except for valve seating and unseating, when it shall not exceed 500 x R Nm. For a hand wheel, R is the radius of the wheel in meters. For a lever R is the length of the lever in meters minus 0,05 m.

The valve shall be robust enough to withstand three times the maximum torque as specified above without damage.

Valves intended for actuator operation may have torque or linear force requirements deviating from the above. The sample valve tests shall then be performed including a proper actuator to operate the valve.

4.2.10 Electric continuity and explosion proofness

All valves shall have a maximum electrical resistance of 10 Ω in order to ensure electrical continuity to prevent build-up of static electricity.

For flammable fluids, any equipment attached to or associated with a valve shall be suitable for the hazard zone.

5 Testing

5.1 Production tests

The production test shall be performed in accordance with the requirements of applicable valve product standards. If these standards refer to ISO 5208, closure test leakage rate A is required.

5.2 Sample valve tests

5.2.1 Selection of sample valves

One sample valve shall be tested. It shall be representative for the valves to be produced. If a range of valves of identical design but with different size is to be tested, one sample of the smallest and one sample of the largest shall be tested.

5.2.2 Verification of the design

A second sample valve shall be inspected to ensure that the design satisfies the requirements of clause 4.

5.2.3 Ambient condition tests

5.2.3.1 Initial tests

The sample valve shall first pass the tests as described in 5.1.

5.2.3.2 Strength test

The valve in open position shall be hydraulically tested with a pressure 4 times PN for PN < 100 bar and 2,25 times PN for PN ≥ 100 bar. Leakage of joints shall be accepted but failure by bursting is unacceptable. Certain components (e.g. membranes or bellow seals) may be temporarily removed or replaced by a dummy during this test. The strength test shall be performed after all other tests or on separate samples.