BRITISH STANDARD

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13371:2002

Cryogenic vessels — Couplings for cryogenic service

The European Standard EN 13371:2001 has the status of a British Standard

ICS 23.020.40

National foreword

This British Standard is the official English language version of EN 13371:2001.

The UK participation in its preparation was entrusted to Technical Committee PVE/18, Cryogenic vessels, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

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This British Standard, having been prepared under the direction of the Engineering Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 5 March 2002

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EUROPEAN STANDARD

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English version

Cryogenic vessels - Couplings for cryogenic service

Récipients cryogéniques - Raccords pour service cryogénique

Kryo-Behälter - Kupplungen für den tiefkalten Betrieb

This European Standard was approved by CEN on 11 November 2001.

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.

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

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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of an identical text or by endorsement, at the latest by June 2002, and conflicting national standards shall be withdrawn at the latest June 2002.

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.

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 European Standard specifies the minimum requirements for the design, manufacture and testing of couplings for cryogenic service to be used for temporary connecting of flexible hoses to cryogenic vessels at the following operating conditions :

— design temperature range from - 270 ° C to + 65 ° C ;

— maximum nominal pressure : 80 bar ;

— nominal size (DN) from 10 to 100.

Permanent connections such as flanges and unions are not covered by this standard.

It is intended that the couplings should be designed, tested and marked for service at one of the generally accepted pressure e.g. PN 40. Couplings can then be selected with a PN equal to or greater than the maximum allowable pressure (PS) of the equipment for which they are 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 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 1252-1, *Cryogenic Vessels - Materials - Part 1: Toughness requirements for temperatures below - 80 °C*

EN 1252-2*, Cryogenic Vessels - Materials - Part 2: Toughness requirements for temperatures between - 10 °C to - 80 °C*

EN 1333:1996, *Pipework components - Definition and selection of PN*

EN 1797-1, *Cryogenic vessels - Gas/materials compatibility*

EN 12300, *Cryogenic vessels – Cleanliness*

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

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1
nominal size (DN)
as defined in EN ISO 6708:1995

3.2
nominal pressure (PN)
as defined in EN 1333:1996

NOTE 1 PN ≥ PS (as defined in PED)

NOTE 2 See also the last sentence of the scope.

3.3
design temperature range
highest and lowest temperature to which the coupling is specified

3.4
specified minimum temperature
specified minimum temperature is the lowest temperature for which the coupling may be specified

4 General requirements

4.1 Design and construction

Couplings shall be able to be connected and disconnected within the full design temperature range. The method of assembling and necessary force shall be specified. The coupling shall be so designed that the necessary force to connect or disconnect it may be applied by hand tools in a controlled manner.

The design shall be such that disconnection under pressure will be obvious by audible gas venting or other method before complete disconnection.

The design shall be sufficient robust to withstand worst anticipated handling e.g. drop on pavement and the hammering etc.

The burst pressure shall be more than three times the nominal pressure within the design temperature range (see 5.3.4).

Couplings shall be leak tight in accordance with 5.3.3.

Couplings shall be made in such a way that anticipated vibrations from vehicle engine, pump or pulsating flow may not cause leakage.

Couplings for flammable fluids shall be electrically conductive from one end to the other (electrical resistance less than 0,5 Ω)

Couplings should have adequate protections, such as a cap or a plug, for mating surfaces and the thread against damage or contamination. The design of any cap or plug should take in consideration the possibility of leakage of residual product.

If seals are used they should be designed for long life or easy replacement and an instruction for maintenance shall be given.

4.2 Materials

All couplings shall be made of materials compatible with materials of the vessel piping equipment, the flexible hoses and the fluid conveyed.

A material is said to be compatible when it does not lead to any violent reaction (ignition) or any slow reaction (detrimatal ageing) that may occur during expected life.

If the specified minimum temperature is equal to or below the boiling point of air or the coupling is intended for oxygen service the material shall be oxygen compatible in accordance with EN 1797-1.

A metallic materials which exhibit a ductile/brittle transition shall have minimum impact values in accordance with EN 1252-1 and EN 1252-2.

Metallic materials which can be shown to have no ductile/brittle transition do not require additional impact test.

Non metallic materials are so far well established only for use as sealing materials. If such materials are to be used for structural parts they shall at least have properties in accordance with the requirements above.

The above requirement need not to be applied on protection caps and plugs.

The coupling materials and soldering alloy shall contain less than 70 % copper, if it is specified for mixtures containing acetylene.

Materials shall be resistant to normal atmospheric corrosion and induced stress corrosion.

Materials shall be robust enough to withstand standardized testing conditions in accordance with 5.3.

5 Prototype tests

5.1 General

Three sample couplings shall be tested. They shall be representative of the couplings to be produced.

The test results shall be recorded in a written report as a reference.

5.2 Inspection

5.2.1 Design verification

The coupling shall be inspected to ensure that it satisfies the requirement of clause 4.

5.2.2 Dimension of the coupling

Dimensions shall be confirmed to be in accordance with the drawings.

5.2.3 Identification of material

Certification of all materials together with any weld procedures and welders qualification shall be recorded.

5.2.4 Cleanliness check

It shall be checked that the coupling meets the requirement of EN 12300.

5.3 Testing

5.3.1 General

Couplings shall be assembled in accordance with the operating instruction.

5.3.2 Pressure test

The assembled coupling shall be subjected to a hydraulic pressure test, at ambient temperature (20 ± 10) °C, equal to 1,5 times the nominal pressure. The pressure shall be held for a minimum of 3 min. There shall be no visual leaks and no visual deformation.

As an alternative to the hydraulic test it is also permissible to perform a pneumatic test, at the same pressure, provided that the necessary safety precautions are met.

5.3.3 Leak tests

The assembled couplings shall be leak tested at ambient and cryogenic temperatures and both at PN and at 0,5 bar. The leak test at ambient temperature may be by immersion in water. The test at cryogenic temperature may be by immersion in a cryogenic fluid but other methods of equivalent or better accuracy are permitted. The test gas for the ambient test temperature should be N_2 or air and for the cryogenic test He.

Couplings with a specified minimum temperature not lower than - 196 °C shall be tested at a temperature not greater than the specified minimum temperature. Couplings with a design temperature lower than - 196 °C shall be tested at a temperature not greater than - 196 °C. A deviation in the temperature measured of +/- 10 % (in °C) is allowed depending on the practical conditions of testing. Ambient temperature shall not exceed 25 °C and the humidity shall be not less than 40 %.

The leak test shall not be started until the coupling has reached its stable test temperature. A re-tightening of the coupling when cold shall be permitted in accordance with the operating instructions.

The coupling leakage rate for non flammable fluids for the warm or cold test shall be less than 1 mbar l/s x DN (1000 Nmm^3/s x DN) and for flammable fluids 10^{-2}mbar l/s x DN (10 Nmm^3/s x DN).

5.3.4 Strength test

The assembled couplings shall be hydraulically tested at ambient conditions at a pressure of 3 times PN.

Leakage shall be accepted but no bursting.

5.3.5 Functional test

The coupling shall be assembled and tightened in accordance with the relevant operating instructions. It shall then be disconnected. Each of these operations shall be repeated until 500 cycles have been completed. Thereafter each of the components of the coupling, excluding seals, shall be visually inspected. Gross deformation, gross wear or cracking shall be cause for rejection.

If the results of the visual examination are ambiguous this can be supplemented by a liquid penetrate test.

6 Cleaning and packaging

Couplings shall satisfy the requirements of EN 12300.

7 Marking

The couplings shall be permanently marked with the nominal pressure (PN), fluid or fluid group the specified minimum temperature and EN-number of this standard.

Annex ZA
(informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU directives

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 Pressure Equipment Directive 97/23/EC (PED).

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

The clauses of this standard given in table ZA.1 are likely to support requirements of Directive 97/23/EC.

Table ZA.1 — Comparison between this European standard and PED

Harmonized clauses/sub-clauses of this standard	Content	PED
4.1	Provisions to ensure safe handling and operation	Annex I § 2.3
4.1	Provisions for filling and discharge	Annex I § 2.2.3 b
5	Proof test	Annex I § 3.2.2

Compliance with the clauses of this standard provides one with means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

Bibliography

EN 12434:2000, *Cryogenic vessels - Cryogenic flexible hoses.*

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