SLOVENSKI STANDARD

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Kriogene posode – Stabilne, vakuumsko neizolirane posode - 3. del: Zahteve za obratovanje

Cryogenic vessels - Static non-vacuum insulated vessels - Part 3: Operational requirements

Kryo-Behälter - Ortsfeste nicht vakuum-isolierte Kryo-Behälter - Teil 3: Betriebsanforderungen

Récipients cryogéniques - Récipients statiques non isolés sous vide - Partie 3: Exigences de fonctionnement

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Cryogenic vessels - Static non-vacuum insulated vessels - Part 3: Operational requirements

Récipients cryogéniques - Récipients fixes, non isolés sous vide - Partie 3: Exigences de service

Kryo-Behälter - Ortsfeste nicht vakuum-isolierte Kryo-Behälter - Teil 3: Betriebsanforderungen

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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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Contents

Foreword

This document EN 14197-3:2004 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of an identical text or by endorsement, at the latest by September 2004, and conflicting national standards shall be withdrawn at the latest by September 2004.

This document 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 document.

Annexes A and B are informative.

EN 14197 consists of the following parts under the general title, "*Cryogenic vessels – Static non-vacuum insulated vessels*" :

— *Part 1: Fundamental requirements*;

— *Part 2: Design, fabrication, inspection and testing*;

— *Part 3: Operational requirements.*

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

1 Scope

This European Standard specifies operational requirements for static non vacuum insulated vessels for cryogenic fluids according to EN 14197-1, designed for a maximum allowable pressure greater than 0,5 bar. It can be used as a guideline for vessels designed for a maximum allowable pressure of not more than 0,5 bar.

The scope includes installation, putting into service, inspection, filling, maintenance and emergency procedures.

This European Standard applies to vessels for cryogenic fluids as specified in EN 14197-1.

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 12300, *Cryogenic vessels – Cleanliness for cryogenic service.*

EN 14197-1:2003, *Cryogenic vessels – Static non-vacuum insulated vessels – Part 1 : Fundamental requirements.*

EN 14197-2, *Cryogenic vessels – Static non-vacuum insulated vessels – Part 2 : Design, fabrication, inspection and testing.*

EN 60079-10, *Electrical apparatus for explosive gas atmospheres -- Part 10: Classification of hazardous areas (IEC 60079-10:1995).*

EN 60079-14, *Electrical apparatus for explosive gas atmospheres -- Part 14: Electrical installations in hazardous areas (other than mines) (IEC 60079-14:1996).*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 14197-1 (some of which are repeated below for convenience) and the following apply.

3.1
putting into service
operation by which a vessel is prepared to be used for the first time. It applies to either a new vessel used for the first time or a vessel which has been taken out of service and will be brought into service

3.2
filling
operation by which a vessel undergoes a prefill check, filling with a cryogenic fluid and an after fill check

3.3
withdrawal
operation by which a vessel is connected to supply equipment and product is drawn off

3.4
outdoor location
location outside of any building or structure and not enclosed by more than two walls

3.5
underground location
area of room whose ground or floor is on all sides lower than the adjacent ground surfaces

3.6
safety distance
the safety distance from a piece of equipment with inherent hazard is that minimum separation which will reduce the effect of a likely foreseeable incident and prevent a minor incident escalating into a larger incident. It will also provide protection from foreseeable external impact (e.g. roadway, flare) or activities outside the control of the operation (e.g. plant or customer station boundary).

Included in safety distances are :

— distances between vessels and neighbouring installations, buildings or public roads, the purpose of which is to protect the vessel from any damage, such as heating as a result of fire or mechanical damage ;

— the distance between the vessel and an object outside the installation, which has to be protected from the effects of a gas release arising from normal operation. These distances are measured from those points on a vessel from which in the normal course of operation a release of product can occur, e.g. vent point, fill connection, flanges or other mechanical joints.

The safety distance is the distance, outside of which :

— in the case of flammable gases dangers through formation of an explosive atmosphere is eliminated, i.e. the lower explosive limit (LEL) is not exceeded ;

— in the case of inert and oxidising gases, dangers from a lack of oxygen or enrichment are eliminated.

The safety distance*s* are not intended to provide protection against catastrophic events or major releases and these should be addressed by other means to reduce the frequency and/or consequences to an acceptable level

3.7
gas release
gas release can be due to operating conditions or malfunctions

Gas escape, caused by malfunctions, which can be reasonably excluded, are not taken into account.

Gas release for operating reasons can be produced, for example, on :

— vent lines ;

— pressure release lines.

Gas escape due to malfunctions which cannot be excluded can occur, for example, in the case of :

— overfilling ;

— failure of fittings ;

— loose connections ;

— faulty operation ;

— leakage.

3.8
vessel
throughout this European Standard, vessel means a static cryogenic vessel as defined in EN 14197-1:2003, 3.4

3.9
competent person/body
person, who by training, resources and approval is able to make objective judgements according to this standard. The person can be the manufacturer or the installer

4 Personnel training

Only persons trained for the specific task shall be allowed to install, put into service, fill, handle, operate or maintain the vessel.

The training programme shall include :

— normal operating procedures ;

— product and hazard identification ;

— safe operating limits ;

— emergency procedures ;

— physical and chemical properties of the vessel's contents and their effects on the human body ;

— personnel protective equipment (e.g. safety boots/goggles/gloves).

Training shall be repeated as necessary to ensure that personnel remain competent. A training record should be maintained which details the information personnel have received.

5 General safety requirements

5.1 General

Identification labels and plates shall not be removed or defaced. Appropriate warning signs regarding product and operational hazards and personnel protective equipment requirements should be displayed. Parts under pressure shall be disconnected only if they have been previously depressurized. When under pressure leaking valves or connections shall only be tightened using suitable tools and procedures. Direct flame or intense heat shall never be used to raise the pressure or to de-ice frozen valves.

Vessels shall be kept free from oil and grease ; for cleanliness requirements EN 12300 applies. Valve outlets shall be kept clean, dry and free from contaminants. Vessels shall not be modified without proper authorization.

5.2 Safety considerations

In all operations and training the following safety considerations shall be taken into account :

— small amounts of cryogenic fluids will produce large volumes of vaporized gas. Spillage of cryogenic fluids can result in an oxygen deficient atmosphere, or in the case of vaporizing oxygen, in an oxygen enriched atmosphere. Provision is to be made for appropriate measures for this, e.g. ventilation ;

— due to the possibility of cold embrittlement, cryogenic fluids shall not come in contact with materials (metals or plastics) which are not suitable for low temperatures ;

— because of their extremely low temperatures, cryogenic fluids will produce cold burns when coming in contact with the skin. Cold burns can also be produced from contact with uninsulated equipment ;

— oxygen enrichment due to liquefaction of ambient air can occur on the cold surfaces of uninsulated equipment which contain fluids with a boiling point lower than oxygen.

6 Installation

6.1 General requirements

Vessels shall be installed and operated in such a way that employees or third parties are not endangered. Necessary safety distances shall be observed; see also annex B (informative).

Vessels shall be installed so that the name plate is easily readable.

The installation should allow inspection of vessels on all sides. All vessel controls shall be capable of being operated safely.

Vessels shall be installed in such a way that its filling operation can be carried out safely.

Vessels shall be erected in such a way that no inadmissible misalignment or inclination can occur due to

— the actual foundations ;

— the inherent weight of the vessel including its contents;

— external forces.

Gas from pressure relief devices or vents shall be discharged to a safe place.

Appropriate warning signs regarding product hazards shall be displayed, e.g. in rooms, areas, or on vessels ; the operating instructions shall also refer to the hazardous properties of the gas.

Vessels shall be installed in locations where there is sufficient ventilation such that the formation of dangerous gas-air mixtures is avoided; e.g. oxygen deficient/enriched atmosphere, explosive/flammable atmosphere, etc.

Vessels shall be installed in such a way that adequate space is provided for maintenance and cleaning, as well as for emergency cases.

The adequate space for maintenance and cleaning should be at least 0,5 m around the installation.

Vessels shall not be installed in corridors, passages or thoroughfares, generally accessible lobbies, stair-wells or near steps. Vessels should not be installed close to the aforementioned areas either, if traffic routes, escape routes or accessibility are limited.

Access by unauthorized persons should be prevented.

The floor under vessels as well as below detachable connections and fittings on the liquid phase on oxidising gases shall be of non-flammable materials and free of oil, grease and other flammable contaminants.

Pressure relief devices shall be provided to prevent overpressure of the equipment connected down stream of the vessel's outlet.

If this connected equipment is not designed for low temperatures safety devices shall be provided to protect it against possible low operating temperatures.

6.2 Indoor installation

Vessels should be installed outdoors wherever reasonably possible. If an indoor installation has to be carried out the following safety precautions shall apply.

The entrance of rooms in which vessels are installed shall be labelled. Reference shall be made to the hazardous properties of the gas.

Rooms shall :

— have self-closing doors, where these do not lead directly outside ;

— consist of materials which are fire resistant or non-combustible, with the exception of windows and other closures of apertures in external walls ;

— be separated from other rooms in accordance with a fire resistance class of 30 min ;

— be separated in a gas-tight manner and without any apertures, from rooms normally occupied by public ;

— have adequate ventilation ;

— adequate ventilation ; gas release from the trycock valve shall be taken into account when assessing the ventilation requirements.

Precautions/procedures shall be implemented to ensure that personnel entering or within the rooms are not exposed to hazardous atmospheres.

Rooms containing vessels shall not be used in any other way which may be a danger to the vessels due to mechanical effects, fire or explosion.

Filling connections shall be hard piped to an outdoor location.

In rooms there shall be no :

— air intake openings for the ventilation of other rooms ;

— open ducts ;

— any ducts inlets unprotected against the ingress of gas ;

— open shafts ;

— openings to lower rooms.

6.3 Outdoor installation

The drainage of surface water from the place of installation shall be ensured.

Full weatherproof cover shall be ensured where the insulation and cladding of the vessel or the weighing equipment provided are unsuitable for external use without such protection.

If a refrigeration unit is installed suitable weather protection is required for the refrigeration unit, the electrical installation and the control instruments.

On sloping sites an installation can be necessary to prevent gas from penetrating over the place of installation down into lower rooms, ducts, shafts or air intakes; this may be a wall for example.

Vessels and their components shall be protected against mechanical damage, e.g. by vehicle buffer bars, enclosures, safety distances. The protection of vessel supports against leaking cryogenic fluid should be considered.

7 Inspection

The tests and inspections shall be carried out by the competent person/inspection body.

7.1 Inspection before putting into service

The inspection comprises :

— checking the markings ;

— checking the completness of the handover documents ;

— checking the equipment ;

— checking the installation.

7.1.1 Marking and labelling

Marking and labelling shall be in accordance with EN 14197-1.

7.1.2 Handover documents

In addition to the manufacturer's documentation, where necessary the cryogenic vessel shall be accompanied by vessel specific documents and instructions for all items supplied covering :

— operations ;

— auxiliary equipment ;

— inspection records.

These documents shall be retained by the owner or user of the vessel.

The user shall have appropriate operating instructions available. Such instructions may be attached to the vessel in a permanent manner.

7.1.3 Equipment

Checking the equipment covers :

— checking the safety relevant measuring devices for their availability and appropriate choice in respect of the suitability of the measuring range and, in so far as possible, for performance/correct operation ;

— checking the safety devices against overpressure for availability, appropriate choice and setting, appropriate arrangement, safe venting location and, in so far as possible, for performance/correct operation ;

— checking the safety relevant shut-off devices for availability, appropriate choice and arrangement in respect of pressure and temperature and, in so far as possible, for performance/correct operation ;

— checking other safety relevant fittings, gauges and controlling devices in particular with regard to the medium to be supplied and vented ; where these are automatically driven or controlled, also their performance in the event of a power cut or loss of pneumatic supply.

The vessel's connections are to be tested for leak-tightness before putting into service.