SLOVENSKI STANDARD

SIST EN 13458-3:2003

01-december-2003

Kriogene posode - Stabilne, vakuumsko izolirane posode - 3. del: Obratovalne zahteve

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

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

Récipients cryogéniques - Récipients fixes isolés sous vide - Partie 3: Exigences opérationnelles

Ta slovenski standard je istoveten z: **EN 13458-3:2003**

ICS:

23.020.40

SIST EN 13458-3:2003 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13458-3

May 2003

ICS 23.020.40

English version

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

Récipients cryogéniques - Récipients fixes isolés sous vide - Partie 3: Exigences opérationnelles

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

This European Standard was approved by CEN on 21 February 2003.

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.

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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 13458-3:2003 E

Contents

Foreword

This document (EN 13458-3:2003) 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of an identical text or by endorsement, at the latest by November 2003, and conflicting national standards shall be withdrawn at the latest by November 2003.

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.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Annexes A and B are informative.

EN 13458 consists of the following Parts under the general title, *Cryogenic vessels – Static vacuum insulated vessels*:

– Part 1: Fundamental requirements.

– Part 2: Design, fabrication, inspection and testing.

– Part 3: Operational requirements.

Introduction

Elements of this document support the requirements of the Pressure Equipment Directive and other national or local requirements.

Static cryogenic vessels are often partly equipped by the manufacturer, but may be installed or re-installed by another party, such as the operator, the user or the owner. For this reason some of the scope this European Standard which includes installation, putting into service, inspection, filling, maintenance and emergency procedure overlaps with some of the parts EN 13458-1 and EN 13458-2.

1 Scope

1.1 This European Standard specifies operational requirements for static vacuum insulated vessels designed for a maximum allowable pressure of more than 0.5 bar. It may also be used as a guideline for vessels designed for a maximum allowable pressure of less than 0,5 bar.

1.2 This European Standard applies to vessels designed for cryogenic fluids specified in EN 13458-1.

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 13458-1:2002 *Cryogenic vessels - Static vacuum insulated vessels – Part 1: Fundamental requirements.*

EN 13458-2:2002, *Cryogenic vessels - Static vacuum insulated vessels – Part 2: Design, fabrication, inspection and testing.*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply in addition to those given in EN 13458-1:2002.

3.1
putting into service
operation by which a vessel is prepared to be used for the first time

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 the product is taken from a vessel connected to the supply system

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

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

NOTE Installations should be considered on an individual base after a suitable and sufficient risk assessment has been carried out.

3.6
safety distance
safety distance from a piece of equipment with inherent hazard is that minimum separation which will mitigate the effect of a likely foreseeable incident and prevent a minor incident escalating into a larger incident

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 may 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 distances defined in annex B are based on experience and calculation of minor releases. They are given for inert fluids, oxidising fluids and flammable fluids.

The maximum volumes/masses of product in the vessel considered are as follows:

— 175 m^3 for inert fluids;

— 200 t for oxidising fluids (corresponding to approx. 175 m^3 LOX);

— 5 t for liquid hydrogen (corresponding to approx. 75 m^3 LH2); and

— 50 t for other flammable fluids.

For larger volumes/masses of products in the vessel the safety distances shall be determined by a specific hazard study.

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 may 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 may be produced, for example; on

— vent lines;

— pressure release lines.

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

— overfilling;

— failure of fittings;

— loose connections;

— faulty operation;

— leakages.

3.8
vessel
throughout this standard, vessel means a static cryogenic vessel as defined in 3.2 of EN 13458-1:2002.

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 depressurised. When under pressure leaking valves or connections may 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 see EN 12300. Valve outlets shall be kept clean, dry and free from contaminants. Vessels shall not be modified without proper authorisation.

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 vaporised gas. Spillage of cryogenic fluids can result in an oxygen deficient atmosphere, or in the case of vaporising 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 and pipe;

— 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 mass 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 explosive gas-air mixtures or an oxygen deficient/enriched atmosphere is avoided.

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 unauthorised 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.

Consideration shall also be given to the need for similar precautions on liquid hydrogen and liquid helium installations where significant air liquefaction may occur around uninsulated equipment.

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; 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.

On sloping sites an installation may 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 a competent person.

7.1 Inspection before putting into service

The inspection comprises:

— checking the markings;

— checking the completeness of the handover documents;

— checking the equipment;