



# SLOVENSKI STANDARD

## SIST EN 1251-3:2001

01-januar-2001

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**Kriogene posode - Premične vakuumsko izolirane posode s prostornino, ki ni večja od 1 000 litrov - 3. del: Obratovalne zahteve**

Cryogenic vessels - Transportable vacuum insulated vessels of not more than 1000 litres volume - Part 3: Operational requirements

Kryo-Behälter - Orstbewegliche, vakuumisolierte Behälter mit einem Fassungsraum von nicht mehr als 1000 Liter - Teil 3: Betriebsanforderungen

Réipients cryogéniques - Réipients transportables, isolés sous vide, d'un volume n'excédant pas 1000 litres - Partie 3: Exigences de fonctionnement

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 1251-3

January 2000

ICS 23.020.40

English version

**Cryogenic vessels - Transportable vacuum insulated vessels of  
not more than 1000 litres volume - Part 3: Operational  
requirements**

Réipients cryogéniques - Réipients transportables, isolés  
sous vide, d'un volume n'excédant pas 1000 litres - Partie  
3: Exigences de fonctionnement

Kryo-Behälter - Ortsbewegliche, vakuum-isolierte Behälter  
mit einem Fassungsraum von nicht mehr als 1000 Liter -  
Teil 3: Betriebsanforderungen

This European Standard was approved by CEN on 19 June 1999.

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 Central Secretariat 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 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

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## Contents

|   |    |
|---|----|
| Foreword.....   | 3  |
| 1 Scope .....   | 4  |
| 2 Normative references .....  | 4  |
| 3 Definitions.....  | 4  |
| 4 Preliminaries before putting into service .....   | 5  |
| 4.1 Marking and labelling .....   | 5  |
| 4.2 Handover documents .....  | 5  |
| 5 Personnel training .....  | 6  |
| 6 General safety requirements .....   | 6  |
| 6.1 General.....  | 6  |
| 6.2 Safety considerations.....  | 6  |
| 7 Putting into service.....   | 7  |
| 8 Location .....  | 7  |
| 9 Transport within the location.....  | 8  |
| 10 Filling.....   | 9  |
| 10.1 Prefill checks .....   | 9  |
| 10.2 Preparations .....   | 9  |
| 10.3 After fill check .....   | 9  |
| 11 Product withdrawal.....  | 10 |
| 12 Change of service .....  | 10 |
| 13 Taking out of service .....  | 11 |
| 14 Maintenance and repair .....   | 11 |
| 15 Periodic inspection.....   | 12 |
| 16 Additional requirements for flammable gases.....   | 12 |
| 16.1 General safety requirements (see also clause 6) .....  | 12 |
| 16.1.1 General.....   | 12 |
| 16.1.2 Electrical equipment and installation/earthing .....   | 12 |
| 16.2 Putting into service (see also clause 7).....  | 13 |
| 16.3 Location (see also clause 8) .....   | 13 |
| 16.4 Transport within the location (see also clause 9).....   | 13 |
| 16.5 Filling (see also clause 10).....  | 13 |
| 16.6 Change of service (see also clause 12) .....   | 14 |
| 16.7 Taking out of service (see also clause 13) .....   | 14 |
| 16.8 Maintenance and repair (see also clause 14).....   | 14 |
| 16.9 Periodic inspection (see also clause 15).....  | 14 |
| 17 Emergency equipment/procedures.....  | 14 |
| Annex A (informative) Example of an emergency procedure .....   | 15 |
| Annex B (informative) Safety distance.....  | 16 |
| Annex C (informative) Qualification of existing national small transportable cryogenic vessels for use<br>in the European union ..... | 17 |
| C.1 Scope .....   | 17 |
| C.2 Normative references .....  | 17 |
| C.3 Symbols .....   | 17 |
| C.4 General requirements.....   | 17 |
| C.5 Markings .....  | 18 |
| C.6 Inspection report.....  | 18 |
| Annex D (informative) A–deviations .....  | 19 |

## 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 July 2000, and conflicting national standards shall be withdrawn at the latest by July 2000.

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.

The standard has been submitted for reference into the RID and/or in 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 standard are normative only when the standards themselves are referred to in the RID and/or in the technical annexes of the ADR.

The other parts of EN 1251 are :

— Part 1 : Fundamental requirements ;

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

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## 1 Scope

This European Standard specifies operational requirements for transportable vacuum insulated cryogenic vessels of not more than 1 000 litres volume designed to operate above atmospheric pressure. Appropriate parts may be used as a guidance for a vessel design to operate open to the atmosphere.

For small cryogenic vessels specially designed for personal medical use, this standard can be used as a guide only.

The scope includes putting into service, filling, withdrawal, transport within the location, storage, maintenance, periodic inspection and emergency procedures. Operational requirements for vessels used on public roads, sea and air are not covered.

For the transportation of these vessels by public road, rail, sea and air, other requirements apply; these are defined in specific regulations.

This standard applies to vessels for cryogenic fluids as specified in EN 1251-1. The additional requirements for flammable fluids are detailed in clause 16.

For existing small transportable cryogenic vessels, see annex C.

## 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.

EN 1251-1, *Cryogenic vessels - Transportable vacuum insulated vessels of not more than 1 000 litres volume - Part 1: Fundamental requirements*

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

## 3 Definitions

For the purposes of this standard, the following definitions apply in addition with those given in EN 1251-1 :

- 3.1 putting into service**  
the operation by which a vessel is prepared to be used. It applies to either a new vessel being used for the first time or an existing vessel being returned to service
- 3.2 filling**  
the operation by which a vessel undergoes a prefill check, filling with a cryogenic fluid and an after fill check
- 3.3 withdrawal**  
the operation by which vessels are 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**  
areas or rooms 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 mitigate the effect of a likely foreseeable incident and prevent a minor incident escalating into a larger incident. The safety distance 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 vessels 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 an escape 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 danger 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, danger from a lack of oxygen or enrichment is eliminated.

The safety distances given in annex B are based on experience and calculation of minor releases.

The safety distances 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****vessel**

throughout EN 1251-3, vessels means transportable cryogenic vessel as defined in EN 1251-1, clause 3.2.

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**4 Preliminaries before putting into service**

Before putting into service verification shall take place to ensure that the vessel is suitable for the intended service and that the marking, labelling and handover documents are complete.

**4.1 Marking and labelling**

Marking and labelling shall be in accordance with EN 1251-1.

**4.2 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 :

- operations ;
- auxiliary equipment ;
- inspection records.

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

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



## 5 Personnel training

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

The training programme shall include :

- normal procedures ;
- product and hazard identification ;
- safe operating limits ;
- emergency procedures (see annex A) ;
- 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.

## 6 General safety requirements

### 6.1 General

Marking and labelling shall not be removed or defaced.

Appropriate warning signs regarding product 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 be tightened using suitable tools and procedures.

Direct flame or intense heat shall never be used to raise the pressure.

Vessels and their equipment shall be kept free from oil and grease. Cleanliness requirements shall be in accordance with EN 12300.

Valve outlets shall be kept clean, dry and free from contaminants.

Vessels and their accessories shall not be modified without proper authorisation.

### 6.2 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 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 ;
- vaporizing cryogenic fluids produce gases that are always heavier than air and can accumulate in lower areas (e.g. pits, trenches) ;
- 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.

## 7 Putting into service

This operation shall follow a written procedure and the results of the steps involved should be recorded (e.g. in a check list). Such lists should be retained by the operating company.

Vessel and accessories shall be visually checked for damage.

It shall be verified that :

- valves and accessories are appropriate for the intended service, comply with the flow-sheet and are appropriately marked ;
- relief device with a set pressure not higher than the maximum allowable working pressure of the vessel are fitted. Devices requiring approval shall be correctly stamped and matching certificates shall be available ;
- all valves are easy to operate ;
- all labels are clearly displayed and appropriate for the product ;
- all required tests have been carried out.

The vessel shall be purged with an appropriate gas at a temperature above 0°C until the gas emerging from the vessel is sufficiently dry and pure.

The vessel shall be cooled down according to the manufacturer's recommendations. Steps shall be taken to avoid uncontrolled pressure rise due to rapid liquid evaporation. The cool down gas chosen shall take into account the risk of solidification.

Measuring and controlling devices (e.g. level gauge, pressure regulator etc.) shall be checked for correct operation or setting.

## 8 Location

The requirements listed in this clause are valid for storage as well as other activities such as filling, withdrawal etc. :

- vessels shall be located in a suitable area such as in the open air or in a sufficiently ventilated enclosed area, away from sources of heat (e.g. welding source, open fire etc.). Hot work shall be subjected to appropriate safety measures. The area shall be kept clear and suitable access shall be provided ;
- vessels should not be located underground. However, where this is unavoidable, relief valve outlet(s) should be piped to a safe external venting point and the underground location shall have sufficient continuous ventilation to deal with product releases arising from normal operation ;
- adequate ventilation shall be provided. In locations over ground level, natural ventilation is generally sufficient, provided that the room is large enough or that the outdoor area is not enclosed by walls. In other circumstances, forced ventilation or other precautions shall be provided ;
- the floor of the designated area shall be level and strong enough to take the weight of the full vessel. The vessel shall be located at a sufficient distance from the normal paths used by people or vehicles. Water accumulation in the vicinity of the vessel shall be avoided ;
- vessels and their components shall be protected against mechanical damage ;
- in case of emergency, adequate means of escape shall be provided. Emergency exits shall be kept clear at all times ;

- all doors/gates should be preferably outward opening and wide enough to provide an easy access and exit route for personnel ;
- vessels which exhibit a risk of toppling over shall be firmly secured in the upright position ;
- the operating area should be clearly marked with appropriate warning signs. These can be displayed on the vessel ;
- if vessels are indoors for extended periods (i.e. overnight or weekends) all vent and relief valve outlets should be piped to a safe place. The vent pipework shall be designed in such a way so as to prevent rainwater accumulation, or blockage by airborne material ;
- access by unauthorized persons shall be prevented. On sites without sufficient supervision fencing shall be provided.

## 9 Transport within the location

This clause refers to the transport of filled vessels other than by public road, rail, water-ways, sea and air ; these activities are fully covered by specific regulations.

Before transport, the vessels shall be examined for signs or damage or leaks and valves shall be checked to ensure that they are in the correct positions.

Cryogenic vessels should never be subjected to impacts or falls ; these could damage the outer jacket or the suspension system of the inner vessel causing loss of insulating properties. Where vehicles are used (either powered or unpowered) the vessels shall be secured against toppling over.

The vessels shall be handled only by those means for which they are designed and equipped.

Because of the potential hazard of oxygen deficiency or enrichment where an lift is stopped for a certain period between floors, vessels shall not be transported together with persons, unless adequate safety precautions have been taken.

Vehicles used for transport, shall have well ventilated cargo areas and wherever possible separate cargo and passenger compartments. Where this is not possible, or in cases of doubt as to the effectiveness of the ventilation, an atmosphere monitor shall accompany the personnel travelling with the vessel. Vessels should be transported in their correct operating position.

## 10 Filling

The following operations shall be carried out in accordance with a written procedure.

### 10.1 Prefill checks

Prior to filling the filler shall examine the condition of the vessel as indicated in table 1.

**Table 1 — Prefill checks**

|                               | Acceptance criteria for filling   |
|-------------------------------|---|
| Data plate                    | Present, legible and in accordance with 4.1                                   |
| Inspection date               | Within required period  |
| Product identification labels | Fitted and legible  |
| Vessel and accessories        | No obvious signs of damage, corrosion, dirt, oil or grease ; no excessive ice |
| Manual valves                 | Operable  |
| Safety relief devices         | In place, free from ice or other obstructions                                 |
| Filling connection            | Correct connection fitted for product and cap-fitted if required              |
| Pressure gauge                | Positive pressure in vessel.  |
| Connections                   | Free from dirt, oil or grease and free from water or excessive oil            |

The vessel shall not be filled if any of these acceptance criteria cannot be met. Prior to filling all non-compliances shall be corrected.

### 10.2 Preparations

Depending on the type of the cryogenic vessel, it may be filled by volume or by weight, taking into account product density. The necessary measuring equipment shall be in good working order and within the calibration period.

If there is no residual pressure in the vessel prior to filling it should be purged to remove possible contaminants. For carbon dioxide vessels, only gaseous carbon dioxide should be used for purging.

If the vessel is warm, it should be cooled down according to the manufacturer's recommendations. Carbon dioxide vessels shall be pressurized with gaseous carbon dioxide before introducing liquefied gas.

The purity of the residual product in the vessel shall be analyzed and recorded where required by specification. Where the residual purity is outside specification the vessel should be purged until it meets specification.

The fill hose should be purged and cooled down.

Where necessary, the pressure should be reduced by venting to facilitate filling. For carbon dioxide the pressure shall not drop below 5 bar.

### 10.3 After fill check

The vessel weight or level of contents and pressure shall be checked and, where necessary, the vessel should be vented to reach the level required by specification.