SLOVENSKI STANDARD

SIST EN 14197-1:2004

01-junij-2004

Kriogene posode – Stabilne, vakuumsko neizolirane posode - 1. del: Osnovne zahteve

Cryogenic vessels - Static non-vacuum insulated vessels - Part 1: Fundamental requirements

Kryo-Behälter - Ortsfeste nicht vakuum-isolierte Behälter - Teil 1: Grundanforderungen

Récipients cryogéniques - Récipients statiques, non isolés sous vide - Partie 1: Exigences fondamentales

Ta slovenski standard je istoveten z: **EN 14197-1:2003**

ICS:

23.020.40

SIST EN 14197-1:2004 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14197-1

August 2003

ICS 23.020.40

English version

Cryogenic vessels - Static non-vacuum insulated vessels - Part 1: Fundamental requirements

Produits cryogéniques - Récipients fixes, non isolés sous vide - Partie 1: Exigences fondamentales

Kryo-Behälter - Ortsfeste nicht vakuum-isolierte Behälter - Teil 1: Grundanforderungen

This European Standard was approved by CEN on 2 July 2003.

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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 Management Centre has the same status as the official versions.

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Ref. No. EN 14197-1:2003 E

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Foreword

This document (EN 14197-1:2003) 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of an identical text or by endorsement, at the latest by February 2004, and conflicting national standards shall be withdrawn at the latest by February 2004.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 EC Directive(s).

For relationship with EC Directive(s), see informative annex ZA, which is an integral part of this document.

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, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the fundamental requirements for static non-vacuum insulated cryogenic vessels designed for a maximum allowable pressure greater than 0,5 bar.

This European Standard applies to static non-vacuum insulated cryogenic vessels for fluids as specified in 3.1.

For static non vacuum insulated cryogenic vessels designed for a maximum allowable pressure of not more than 0,5 bar, this European Standard can be used as a guide.

This European Standard is not applicable to vessels built on-site.

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 - 80 °C and - 20 °C.*

EN 1626, *Cryogenic vessels – Valves for cryogenic service.*

EN 1797, *Cryogenic vessels – Gas/Material compatibility.*

EN 10204:1991, *Metallic products - Types of inspection documents.*

EN 12213, *Cryogenic vessels – Methods for performance evaluation of thermal Insulation.*

EN 13275, *Cryogenic vessels - Pumps for cryogenic service.*

EN 13648-1:-, *Cryogenic vessels – Safety devices for protection against excessive pressure – Part 1: Safety valves for cryogenic service.*

EN 13648-2, *Cryogenic vessels – Safety devices for protection against excessive pressure –Part 2: Bursting disc safety devices for cryogenic service.*

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

prEN 14197-3, *Cryogenic vessels - Static non vacuum insulated vessel - Part 3: Operational requirements.*

3 Terms and definitions

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

3.1
cryogenic fluid (refrigerated liquefied gas)
a gas which is partially liquid because of its low temperature.

In the context of all parts of this standard the following (refrigerated but) non-toxic gases and mixtures of them are referred to as cryogenic fluids as given in table 1:

Table 1

Classification code	Identification number, name and description [a]
3 A	Asphyxiant gases 2187 Carbon dioxide, refrigerated liquid 3158 Gas, refrigerated liquid, N.O.S.[b]
3 O	Oxidizing gases 2201 Nitrous oxide, refrigerated liquid 3311 Gas, refrigerated liquid, oxidizing, N.O.S
3 F	Flammable gases 1038 Ethylene, refrigerated liquid 3312 Gas, refrigerated liquid, N.O.S. [b]
[a] Item group, identification number, name and description according to ADR [b] N.O.S. = not otherwise specified	

The flammable gases and mixtures of them may be mixed with: Carbon dioxide or other asphyxiant gases.

NOTE Mixtures of oxidizing and flammable gases are not acceptable.

3.2
static cryogenic vessel
a thermally insulated vessel intended for use by one or both cryogenic fluids at a stationary place, consisting of an insulated vessel, all of the valves and equipment[1]) together with any additional supporting facilities.

This static cryogenic vessel is intended to be transported empty or containing marginal residues of gas. This static cryogenic vessel represents a complete assembly ready for putting into service.

3.3
thermal insulation
an insulating layer around the vessel. The layer is normally covered by cladding (e.g. of steel, aluminium or plastic).

3.4
vessel
vessel intended to contain the cryogenic fluid.

3.5
normal operation
the intended operation of the vessel up to the maximum allowable pressure within the designed temperature range when it is located at a site.

It means also the transport of the vessel when empty or containing marginal residues of gases including the handling loads defined in 3.6.

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[1]) in PED 'accessories'

3.6
handling loads
the loads exerted on the static cryogenic vessel in all expected situations during operation including loading, unloading, installation etc.

3.7
putting into service
the 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

3.8
documentation
technical documents delivered by the manufacturer to the owner consisting of :

- all certificates establishing the conformity with this standard;
- a short description of the vessel (including characteristic data etc.);
- a list of fluids and their net mass for which the cryogenic vessel is designed;
- an operating manual (for the user) which consists of
  - a short description of the vessel (including characteristic data etc.),
  - a statement that the vessel is in conformity with this standard ;
  - the instructions for normal operation.

3.9
piping system
all pipes which can come in contact with cryogenic fluids including their valves, fittings, pressure relief devices as well as their supports.

3.10
safety accessories
devices which have a safety related function with respect to pressure containment and/or control (e. g. protective or limiting devices, regulating and monitoring devices, valves, indicators).

3.11
manufacturer of the static cryogenic vessel [2])
the company who carries out the final assembly and testing of the static cryogenic vessel.

3.12
volume of the vessel
volume of the shell, excluding nozzles, pipes etc. determined at minimum design temperature and atmospheric pressure.

3.13
pressure
pressure relative to atmospheric pressure, i.e. gauge pressure. Vapour pressure is always expressed in absolute pressure.

3.14
maximum allowable pressure (p_s)
the maximum operating pressure at normal operating conditions normally measured at the top of equipment, specified for safety reasons

[2]) in the sense of PED

NOTE p_s is equivalent to *PS* used in article 1, 2.3 of the PED.

3.15
filling factor
the maximum quantity of gas in kg which may be filled in one litre of the cryogenic vessel.

4 General requirements

The static cryogenic vessel shall safely withstand the mechanical and thermal loads and the chemical effects encountered during pressure test, normal operation and repressurization of the vessel following a fall in temperature below the minimum design level. (see also 7.3) These requirements are deemed to be satisfied if clauses 5 to 9 are fulfilled. The vessel shall be marked in accordance with clause 10, tested in accordance with clauses 11 and 12 and operated in accordance with prEN 14197-3.

5 Mechanical loads

NOTE Throughout this European Standard p_s is equivalent to PS used in article 1, 2.3 of the PED and p_T is equivalent to PT used in annex I of the PED

5.1 General

The cryogenic vessel shall resist the mechanical loads mentioned in clause 4 without such deformation which could affect safety and which could lead to leakage. This requirement can be validated by

— calculation;

— by calculation and pressure strengthening;

— calculation and experimental method.

The mechanical loads to be considered are given in 5.2 and 5.3.

5.2 Load during the pressure test

The loads exerted during the pressure test is

$$p_T \geq 1{,}43 \cdot p_S$$

where

p_T is the test pressure, in bar;

p_S is the maximum allowable pressure (= relief device set pressure), in bar.

5.3 Other mechanical loads

The following loads shall be considered to act in combination where relevant:

— a pressure equal to the maximum allowable pressure in the inner vessel and pipework;

— the pressure exerted by the liquid when filled to capacity;

— loads produced by the thermal movement of the inner vessel, outer jacket and interspace piping;

— loads imposed during installation and removal of the empty vessel;