



SLOVENSKI STANDARD
SIST EN 13458-1:2002
01-november-2002

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

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

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

Réipients cryogéniques - Réipients fixes, isolés sous vide - Partie 1: Prescriptions fondamentales

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Ta slovenski standard je istoveten z: EN 13458-1:2002

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ICS:

23.020.40

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English version

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

Réceptifs cryogéniques - Réceptifs fixes, isolés sous vide
- Partie 1: Exigences fondamentales

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

This European Standard was approved by CEN on 25 March 2002.

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

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document EN 13458-1:2002 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of an identical text or by endorsement, at the latest by November 2002, and conflicting national standards shall be withdrawn at the latest by November 2002.

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.

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.*

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

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

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

For static vacuum insulated cryogenic vessels designed for a maximum allowable pressure of not more than 0,5 bar, this 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 temperature below – 80 °C.*

EN 1252-2, *Cryogenic vessels - Materials - Part 2: Toughness requirements for temperature between – 80 °C and – 20 °C.*

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

EN 1797, *Cryogenic vessels - Gas/material compatibility.*

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

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

EN 13371, *Cryogenic vessels - Couplings for cryogenic service.*

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

prEN 13458-3, *Cryogenic vessels – Static vacuum insulated vessels - 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)

gas which is partially liquid because of its low temperature¹⁾. In the context of all parts of this standard, the (refrigerated but) non-toxic gases given in Table 1 and mixtures of them are referred to as cryogenic fluids

Table 1 — Refrigerated but non toxic gases

classification code	Identification number, name and description ²⁾
3° A	Asphyxiant gases 1913 Neon, refrigerated liquid 1951 Argon, refrigerated liquid 1963 Helium, refrigerated liquid 1970 Krypton, refrigerated liquid 1977 Nitrogen, refrigerated liquid 2187 Carbon dioxide, refrigerated liquid 2591 Xenon, refrigerated liquid 3136 Trifluoromethane, refrigerated liquid 3158 Gas, refrigerated liquid, N.O.S. ³⁾
3° O	Oxidizing gases 1003 Air, refrigerated liquid 1073 Oxygen, refrigerated liquid 2201 Nitrous oxide, refrigerated liquid, oxidizing 3311 Gas, refrigerated liquid, oxidizing, N.O.S. ³⁾
3° F	Flammable gases 1038 Ethylene, refrigerated liquid 1961 Ethane, refrigerated liquid 1966 Hydrogen, refrigerated liquid 1972 Methane, refrigerated liquid or natural gas, refrigerated liquid, with high methane content 3138 Ethylene, acetylene and propylene mixture, refrigerated liquid, containing at least 71,5 % ethylene with not more than 22,5 % acetylene and not more than 6 % propylene 3312 Gas, refrigerated liquid, flammable, N.O.S. ³⁾

The flammable gases and mixtures of them may be mixed with: Helium, Neon, Nitrogen, Argon, Carbon dioxide.

NOTE Mixtures of oxidizing and flammable gases are not acceptable.

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- 1) This includes totally evaporated liquids and supercritical fluids.
 - 2) Classification code, identification number, name and description according to ADR.
 - 3) N.O.S. = not otherwise specified.

3.2

static cryogenic vessels

thermally insulated vessel intended for use with one or more cryogenic fluids at a stationary place, consisting of an inner vessel, an outer jacket and the piping system. This static cryogenic vessel is not intended to be transported filled. It may be transported empty or containing marginal residues of cryogenic fluid or gas from one static location to another. This static cryogenic vessel represents a complete assembly ready for putting into service

3.3

thermal insulation

vacuum interspace between the inner vessel and the outer jacket. The space may or may not be filled with material to reduce the heat transfer between the inner vessel and the outer jacket

3.4

inner vessel

vessel intended to contain the cryogenic fluid

3.5

outer jacket

gas-tight enclosure which contains the inner vessel and enables the vacuum to be established

3.6

normal operation

reasonable foreseeable operation of the vessel either up to the maximum allowable pressure (see 3.15) or empty subjected to the handling loads defined in 3.7

3.7

handling loads

loads exerting on the static cryogenic vessel in all expected situations of transport including loading, unloading, installation, etc.

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3.8

putting into service

operation by which a vessel is prepared to be used. 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

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3.9

documentation

technical documents delivered by the manufacturer:

- the documentation mentioned in the chosen conformity assessment procedure (see annex III of the Directive 97/23/EEC);
- for the user:
 - operating instructions (according to 3.4 of annex I of the Directive 97/23/EEC);
- for the owner:
 - documentation on request of the owner.

3.10

piping system

pipes including their valves, fittings, pressure relief devices, equipment and their supports

3.11

safety accessories

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

3.12**manufacturer of the static cryogenic vessel**

company which carries out the final assembly and testing of the static cryogenic vessel

3.13**volume of the inner vessel**

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

3.14**pressure**

pressure relative to atmospheric pressure, i.e. gauge pressure. As a consequence, vacuum is designated by a negative value. Vapour pressure is always expressed in absolute pressure

3.15**maximum allowable pressure (p_s)**

the maximum pressure for which the equipment is designed, as specified by the manufacturer, defined at a location specified by the manufacturer, being the location of connection of protective or limiting devices or the top of the equipment

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

3.16**year build**

date of the final acceptance test of the final assembled cryogenic vessel at the manufacturer

4 General requirements

The static cryogenic vessel shall safely withstand the mechanical and thermal loads and the chemical effects encountered during pressure test and normal operation. 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 13458-3.

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.

The static cryogenic vessel shall resist the mechanical loads mentioned in clause 4 without such deformation which could affect safety and which could lead to leakage.

The mechanical loads to be considered are:

— the loads exerted during the pressure test is:

$$p_T \geq 1,43 (p_s + 1)$$

where

p_T = test pressure (in bar);

p_s = maximum allowable pressure (= relief device set pressure) (in bar);

+ 1 = allowance for external vacuum (in bar)];

— loads imposed during installation and removal of the vessel;