Design and manufacture of site built, vertical, cylindrical, flat-bottomed tank systems for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and -196 °C - Part 1: General

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 14620-1:2024 sisaldab Euroopa standardi EN 14620-1:2024 ingliskeelset teksti.	This Estonian standard EVS-EN 14620-1:2024 consists of the English text of the European standard EN 14620-1:2024.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 15.05.2024.	Date of Availability of the European standard is 15.05.2024.
Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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EUROPEAN STANDARD

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English Version

Design and manufacture of site built, vertical, cylindrical, flat-bottomed tank systems for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and -196 °C - Part 1: General

Conception et fabrication de réservoirs cylindriques fond plat, verticaux, construits sur site, destinés au stockage des gaz réfrigérés, liquéfiés, dont les températures de service sont comprises entre 0 °C et -196 °C - Partie 1 : Généralités

Auslegung und Herstellung standortgefertigter, stehender, zylindrischer Flachboden-Tanksysteme für die Lagerung von tiefkalt verflüssigten Gasen bei Betriebstemperaturen zwischen 0 °C und -196 °C - Teil 1: Allgemeines

This European Standard was approved by CEN on 16 March 2024.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

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

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European foreword

This document (EN 14620-1:2024) has been prepared by Technical Committee CEN/TC 265 “Metallic tanks for the storage of liquids”, the secretariat of which is held by BSI.

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 2024, and conflicting national standards shall be withdrawn at the latest by November 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14620-1:2006.

EN 14620-1:2024 includes the following significant technical changes with respect to EN 14620-1:2006:

— general editorial update;

— standard boundaries are defined in the scope and applicability extended to −196 °C;

— terms and definitions adjusted;

— normative references updated;

— description of various tank system concepts updated;

— risk assessment requirements improved;

— liquid levels and capacities clarified;

— foundation requirements updated and allowable foundation settlement requirements added;

— secondary containment design requirements clarified;

— earthquake requirements clarified;

— new chapter on marking and documentation added;

— new informative annex with recommendation for geotechnical investigation and seismic hazard evaluation added;

— design requirements for permanent openings, improved.

A list of all parts in the EN 14620 series, “*Design and manufacture of site built, vertical, cylindrical, flat-bottomed tank systems for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and −196 °C*”, can be found on the CEN website.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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

1 Scope

This document is a specification for vertical, cylindrical tank systems, built on site, above ground and of which either the primary liquid container or the liquid tight barrier is made of steel. The secondary liquid container, if applicable, can be of steel or of concrete or a combination of both. A primary liquid container made of pre-stressed concrete is excluded from the scope of this document.

This document provides general requirements and specifies principles and application rules for the structural design of the tank system during construction, testing, commissioning, operation (accidental included), and decommissioning. This document applies to all tank system components attached to and located within the liquid, vapour, purge gas, membrane or membrane tank outer containers of the tank system. It does not address the requirements for ancillary equipment such as pumps, pumpwells, valves, instrumentation, external staircases and walkways, roof mounted platforms, external pipe supports, etc. The requirements for those components are covered by the relevant European Standards, structurally designed in accordance with Eurocodes where appropriate, and meeting applicable safety regulations.

This document also does not address tank system operating procedures unless specified for determination of the relevant resistance and protection criteria for the tank systems. It specifies minimum performance requirements for the tank system, tank system foundation and protection systems. From a process piping standpoint, the scope of this document is limited to the following boundaries:

a) the face of the first flange outside of the tank in bolted flanged connection;

b) the first threaded joint outside of the tank in threaded connection;

c) the first circumferential pipe welded joint outside of the tank in welding-end pipe connection, which does not have a flange.

This document is applicable to storage tank systems designed to store products, having an atmospheric boiling point below ambient temperature, in a dual phase, i.e. liquid and vapour. The equilibrium between liquid and vapour phases being maintained by cooling down the product to a temperature equal to, or just below, its atmospheric boiling point in combination with a slight overpressure in the storage tank system.

The maximum design pressure of the tank systems covered by this document is limited to 500 mbar. For higher pressures, reference can be made to EN 13445, Parts 1 to 5.

The operating range of the gases to be stored is between 0 °C and −196 °C.

The tank systems covered by this document are used to store large volumes of hydrocarbon products, ammonia and other non-hydrocarbon gases with low temperature boiling points, generally called “Refrigerated Liquefied Gases” (RLGs). Typical products stored in the tank systems are: methane, ethane, propane, butane, ethylene, propylene, butadiene (this range includes the Liquefied Natural Gas (LNG’s) and Liquefied Petroleum Gas (LPG’s)), ammonia, nitrogen, oxygen and argon.

NOTE Properties of the gases are given in Annex A.

The requirements of this document cannot cover all details of design and construction because of the variety of sizes and configurations that may be employed. Where complete requirements for a specific design are not provided, the intention is for the designer, subject to approval of the purchaser's authorized representative and of the regulatory body, to provide design and details that are as safe as those laid out in this document.

EN 14620 consists of multiple parts. This document specifies general requirements for the tank system concept, selection and general design considerations.

In case of a conflict between general requirements of this document and the requirements in other parts of EN 14620 related to a specific liquefied gas, the product-specific requirements set forth in the other parts prevail.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1990:2023, *Eurocode — Basis of structural and geotechnical design*

EN 1991-1-3:2003,[1] *Eurocode 1 — Actions on structures — Part 1-3: General actions - Snow loads*

EN 1991-1-4:2005,[2] *Eurocode 1: Actions on structures — Part 1-4: General actions - Wind actions*

EN 1991-1-6:2005,[3] *Eurocode 1 — Actions on structures Part 1-6: General actions - Actions during execution*

EN 1997-1:2004,[4] *Eurocode 7: Geotechnical design — Part 1: General rules*

EN 1998-1:2004,[5] *Eurocode 8: Design of structures for earthquake resistance — Part 1: General rules, seismic actions and rules for buildings*

EN 1998-4:2006, *Eurocode 8 — Design of structures for earthquake resistance — Part 4: Silos, tanks and pipelines*

EN 1998-5:2004, *Eurocode 8: Design of structures for earthquake resistance — Part 5: Foundations, retaining structures and geotechnical aspects*

EN 14620-2:2006, *Design and manufacture of site built, vertical, cylindrical, flat-bottomed steel tanks for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and -165 °C — Part 2: Metallic components*

EN 14620-3:2006, *Design and manufacture of site built, vertical, cylindrical, flat-bottomed steel tanks for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and -165 °C — Part 3: Concrete components*

EN 14620-4:2006, *Design and manufacture of site built, vertical, cylindrical, flat-bottomed steel tanks for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and -165 °C — Part 4: Insulation components*

EN 14620-5:2006, *Design and manufacture of site built, vertical, cylindrical, flat-bottomed steel tanks for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and -165 °C — Part 5: Testing, drying, purging and cool-down*

EN ISO 28300:2008, *Petroleum, petrochemical and natural gas industries — Venting of atmospheric and low-pressure storage tanks (ISO 28300:2008)*

[1] As impacted by EN 1993-1-3:2003/AC:2009 and EN 1993-1-3:2003/A1:2015.
[2] As impacted by EN 1993-1-4:2005/A1:2010 and EN 1993-1-4:2005/AC:2010.
[3] As impacted by EN 1991-1-6:2005/AC:2013.
[4] As impacted by EN 1997-1:2004/A1:2013.
[5] As impacted by EN 1998-1:2004/AC:2009 and EN 1998-1:2004/A1:2013.