SLOVENSKI STANDARD
SIST EN 12542:2020

01-oktober-2020

Nadomešča:
SIST EN 12542:2010

Oprema in pribor za utekočinjeni naftni plin (UNP) - Nepremične varjene valjaste posode iz jekla serijske proizvodnje za skladiščenje utekočinjenega naftnega plina s prostornino do vključno 13 m³ - Konstruiranje in proizvodnja

LPG equipment and accessories - Static welded steel cylindrical tanks, serially produced for the storage of Liquefied Petroleum Gas (LPG) having a volume not greater than 13 m³ - Design and manufacture

Flüssiggas-Geräte und Ausrüstungsteile - Ortsfeste, geschweißte zylindrische Behälter aus Stahl, die serienmäßig für die Lagerung von Flüssiggas (LPG) hergestellt werden, mit einem Fassungsvermögen bis 13 m³ - Gestaltung und Herstellung

Équipements pour gaz de pétrole liquéfié et leurs accessoires - Réservoirs cylindriques fixes, aériens, en acier soudé, fabriqués en série pour le stockage de gaz de pétrole liquéfié (GPL) ayant un volume inférieur ou égal à 13 m³ - Conception et fabrication

Ta slovenski standard je istoveten z: **EN 12542:2020**

ICS:

23.020.10	Nepremične posode in rezervoarji	Stationary containers and tanks

SIST EN 12542:2020 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12542

August 2020

ICS 23.020.30

Supersedes EN 12542:2010

English Version

LPG equipment and accessories - Static welded steel cylindrical pressure vessels, serially produced for the storage of Liquefied Petroleum Gas (LPG) having a volume not greater than 13 m^3 - Design and manufacture

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This European Standard was approved by CEN on 15 June 2020.

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.

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

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Ref. No. EN 12542:2020 E

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European foreword

This document (EN 12542:2020) has been prepared by Technical Committee CEN/TC 286 “Liquefied petroleum gas equipment and accessories”, the secretariat of which is held by NSAI.

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 2021, and conflicting national standards shall be withdrawn at the latest by February 2021.

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 has been prepared under a standardization request 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.

This document supersedes EN 12542:2010.

The following main changes have been introduced during the revision of EN 12542:2010:

— a reference to “CEN/TS 16765 LPG equipment and accessories – Environmental considerations for CEN/TC 286 standards” has been added and the existing wording has been amended (including the deletion of environmental references throughout this document);

— Annex J Environmental checklist has been deleted;

— inclusion of the use of compensation calculations from EN 13445-3:2014, in order to reduce the distance between openings or branches;

— a new informative Annex J Exterior corrosion protective coating with special performance against chemical and mechanical attacks has been added.

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, Turkey and the United Kingdom.

Introduction

This document calls for the use of substances and procedures that may be injurious to health and/or the environment if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations at any stage.

Protection of the environment is a key political issue in Europe and elsewhere; for CEN/TC 286 this is covered in CEN/TS 16765, *LPG equipment and accessories — Environmental considerations for CEN/TC 286 standards*, and this Technical Specification should be read in conjunction with this document. This Technical Specification provides guidance on the environmental aspects to be considered regarding equipment and accessories produced for the LPG industry and the following is addressed:

a) design;

b) manufacture;

c) packaging;

d) use and operation;

e) disposal.

Provisions should be restricted to a general guidance. Limit values are specified in national laws.

It is recommended that manufacturers develop an environmental management policy. For guidance see the ISO 14000 series.

It has been assumed in the drafting of this document that the execution of its provisions is entrusted to appropriately qualified and experienced people.

All pressures are gauge pressures unless otherwise stated.

NOTE This document requires measurement of material properties, dimensions and pressures. All such measurements are subject to a degree of uncertainty due to tolerances in measuring equipment, etc. It may be beneficial to refer to the leaflet “Measurement Uncertainty Leaflet (SP INFO 2000 27 uncertainty.pdf)”.

1 Scope

This document specifies requirements for the design and manufacture of static welded steel cylindrical pressure vessels, serially produced for the storage of liquefied petroleum gas (LPG) with a volume not greater than 13 m^3 and for installation above or below ground.

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 764-5:2014, *Pressure equipment — Part 5: Inspection documentation of metallic materials and compliance with the material specification*

EN 837-2:1997, *Pressure gauges — Part 2: Selection and installation recommendations for pressure gauges*

EN 1708-1:2010, *Welding — Basic welded joint details in steel — Part 1: Pressurized components*

EN 10025-2:2019, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10028-2:2017, *Flat products made of steels for pressure purposes — Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

EN 10028-3:2017, *Flat products made of steels for pressure purposes — Part 3: Weldable fine grain steels, normalized*

EN 10028-5:2017, *Flat products made of steels for pressure purposes — Part 5: Weldable fine grain steels, thermomechanically rolled*

EN 10204:2004, *Metallic products — Types of inspection documents*

EN 13445-2:2014, *Unfired pressure vessels — Part 2: Materials*

EN 13445-3:2014, *Unfired pressure vessels — Part 3: Design*

EN 13636:2004, *Cathodic protection of buried metallic tanks and related piping*

EN 14717:2005, *Welding and allied processes — Environmental check list*

EN 14784-1:2005, *Non-destructive testing — Industrial computed radiography with storage phosphor imaging plates — Part 1: Classification of systems*

EN ISO 16371-2:2017, *Non-destructive testing — Industrial computed radiography with storage phosphor imaging plates — Part 2: General principles for testing of metallic materials using X-rays and gamma rays (ISO 16371-2:2017, Corrected version 2018-05)*

EN ISO 636:2017, *Welding consumables — Rods, wires and deposits for tungsten inert gas welding of non-alloy and fine-grain steels — Classification (ISO 636:2017)*

EN ISO 2560:2009, *Welding consumables — Covered electrodes for manual metal arc welding of non-alloy and fine grain steels — Classification (ISO 2560:2009)*

EN ISO 3452-1:2013, *Non-destructive testing — Penetrant testing — Part 1: General principles (ISO 3452-1:2013, Corrected version 2014-05-01)*

EN ISO 5173:2010, *Destructive tests on welds in metallic materials — Bend tests (ISO 5173:2009)*

EN ISO 5178:2019, *Destructive tests on welds in metallic materials — Longitudinal tensile test on weld metal in fusion welded joints (ISO 5178:2019)*

EN ISO 5817:2014, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections (ISO 5817:2014)*

EN ISO 6520-1:2007, *Welding and allied processes — Classification of geometric imperfections in metallic materials — Part 1: Fusion welding (ISO 6520-1:2007)*

EN ISO 9016:2012, *Destructive tests on welds in metallic materials — Impact tests — Test specimen location, notch orientation and examination (ISO 9016:2012)*

EN ISO 9606-1:2017, *Qualification testing of welders — Fusion welding — Part 1: Steels (ISO 9606-1: 2012 including Cor 1:2012 and Cor 2:2013)*

EN ISO 9712:2012, *Non-destructive testing — Qualification and certification of NDT personnel (ISO 9712:2012)*

EN ISO 10675-1:2016, *Non-destructive testing of welds — Acceptance levels for radiographic testing — Part 1: Steel, nickel, titanium and their alloys (ISO 10675-1:2016)*

EN ISO 11666:2018, *Non-destructive testing of welds — Ultrasonic testing — Acceptance levels (ISO 11666:2018)*

EN ISO 4136:2012, *Destructive tests on welds in metallic materials — Transverse tensile test (ISO 4136:2012)*

EN ISO 14171:2016, *Welding consumables — Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for submerged arc welding of non alloy and fine grain steels — Classification (ISO 14171:2016)*

EN ISO 14732:2013, *Welding personnel — Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732:2013)*

EN ISO 15609-1:2019, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding (ISO 15609-1:2019)*

EN ISO 15613:2004, *Specification and qualification of welding procedures for metallic materials — Qualification based on pre-production welding test (ISO 15613:2004)*

EN ISO 15614-1:2017, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1:2017, Corrected version 2017-10-01)*

EN ISO 17632:2015, *Welding consumables — Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non-alloy and fine grain steels — Classification (ISO 17632:2015)*

EN ISO 17635:2016, *Non-destructive testing of welds — General rules for metallic materials (ISO 17635:2016)*

EN ISO 17636-1:2013, *Non-destructive testing of welds — Radiographic testing — Part 1: X- and gamma-ray techniques with film (ISO 17636-1:2013)*

EN ISO 17636-2:2013, *Non-destructive testing of welds — Radiographic testing — Part 2: X- and gamma-ray techniques with digital detectors (ISO 17636-2:2013)*

EN ISO 17637:2016, *Non-destructive testing of welds — Visual testing of fusion-welded joints (ISO 17637:2016)*

EN ISO 17638:2016, *Non-destructive testing of welds — Magnetic particle testing (ISO 17638:2016)*

EN ISO 17639:2013, *Destructive tests on welds in metallic materials — Macroscopic and microscopic examination of welds (ISO 17639:2003)*

EN ISO 17640:2018, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment (ISO 17640:2018)*

EN ISO 19232-1:2013, *Non-destructive testing — Image quality of radiographs — Part 1: Determination of the image quality value using wire-type image quality indicators (ISO 19232-1:2013)*

EN ISO 19232-2:2013, *Non-destructive testing — Image quality of radiographs — Part 2: Determination of the image quality value using step/hole-type image quality indicators (ISO 19232-2:2013)*

EN ISO 23277:2015, *Non-destructive testing of welds — Penetrant testing — Acceptance levels (ISO 23277:2015)*

EN ISO 23278:2015, *Non-destructive testing of welds — Magnetic particle testing — Acceptance levels (ISO 23278:2015)*

EN ISO 23279:2017, *Non-destructive testing of welds — Ultrasonic testing — Characterization of discontinuities in welds (ISO 23279:2017)*

ISO 9162:2013, *Petroleum products — Fuels (class F) — Liquefied petroleum gases — Specifications*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp/ui

Note 1 to entry: See CEN/TS 16769.

3.1 General terms

3.1.1
Liquefied Petroleum Gas
LPG
low pressure liquefied gas composed of one or more light hydrocarbons which are assigned to UN 1011, UN 1075, UN 1965, UN 1969 or UN 1978 only and which consists mainly of propane, propene, butane, butane isomers, butene with traces of other hydrocarbon gases

3.1.2
serially produced pressure vessels
more than one vessel manufactured in the same factory to a common design using the same material and manufacturing procedure and produced with no major interruption within a given period of time

3.1.3
manufacturer
individual or organization responsible for the design, fabrication, testing, installation where relevant, and compliance with the requirements of the relevant product standard, whether executed by him or a subcontractor

Note 1 to entry: The manufacturer can subcontract one or more of the abovementioned tasks under its responsibility.

Note 2 to entry: In EU member states the manufacturer is responsible for compliance with the Pressure Equipment Directive 2014/68/EU. For those manufacturers outside of the EU their authorized representative inside the EU assumes this responsibility.

3.1.4
yield strength
upper yield strength R_{eH} or, for steels that do not exhibit a definite yield, the 0,2 % proof strength $R_{p0,2}$

3.1.5
design pressure
pressure used for the calculation of the minimum wall thickness

3.1.6
climatic area
geographic area agreed or defined by the relevant national authorities, or other bodies, responsible for defining the design conditions for LPG storage pressure vessels, in the country(ies) where the pressure vessel is intended to be operated

Note 1 to entry: The area is used to define the reference temperature for design pressure and filling.

3.1.7
hot forming
forming at temperatures above the maximum permissible temperature for stress relieving in accordance with the material specification

3.1.8
cold forming
forming at temperatures not less than 25 °C below the maximum permissible temperature for stress relieving, in accordance with the applicable material specifications

3.1.9
Ar_3
critical point, on the iron-iron carbide equilibrium diagram, representing the temperature at the end of transformation of austenite to ferrite on cooling of the steel

Note 1 to entry: The actual temperature varies with composition of the steel.

3.1.10
production-batch
group of pressure parts or finished pressure vessels, made consecutively by the same manufacturer using the same manufacturing techniques to the same design, nominal size and material specifications on the same production machinery and subject to the same heat treatment conditions

Note 1 to entry: In this context, consecutively need not imply continuous production.

3.2 Terms for coatings

3.2.1
coating material
product, in liquid, paste or powder form, that, when applied to a substrate, forms a layer possessing protective, decorative and/or other specific properties

[SOURCE: EN ISO 4618:2014, 2.51, modified – The original Note 1 to entry is not reproduced here.]

3.2.2
coating
layer formed from a single or multiple application of a coating material to a substrate

[SOURCE: EN ISO 4618:2014, 2.50.1]

3.2.3
coating process
method of application of a coating material to a substrate

[SOURCE: EN ISO 4618:2014, 2.53]

4 Materials

4.1 Environmental

The manufacturer shall endeavour to acquire materials and components from suppliers who have a declared environmental policy; see CEN/TS 16765, EN ISO 14021, EN ISO 14024 and EN ISO 14025.

4.2 Shells and ends

4.2.1 Materials for shells and ends shall be selected from the range of steels specified in EN 10028-2:2017, EN 10028-3:2017 or EN 10028-5:2017.

Other equivalent material specifications which have either European materials approval or have been subjected to a particular material appraisal may be used.

4.2.2 In all cases the materials used shall comply with the following:

— the chemical composition and mechanical properties shall meet the requirements of either Group 1 or Group 2, as defined in Table 1 — Material grouping;

— the minimum specified ultimate tensile strength shall not exceed 700 MPa;

— the minimum elongation after fracture shall be 14 %;

— the impact properties shall be not less than 27 J at the minimum design temperature or shall meet the requirements for low temperature design as detailed in EN 13445-2.

4.2.3 Steels shall be grouped in accordance with Table 1 — Material grouping.

4.2.4 Where materials subject to particular material appraisal have been used, satisfactory properties following welding shall be demonstrated by production weld test plates, see 9.7.

Table 1 — Material grouping

Group	Sub-group	Type of steel
1		Steels with a specified minimum yield strength $R_{eH} \leq 460$ MPa [a] and with analysis in percent: C ≤ 0,25 Si ≤ 0,60 Mn ≤ 1,70 Mo ≤ 0,70 [b] S ≤ 0,045 $P \leq 0,045$ Cu ≤ 0,40 [b] Ni ≤ 0,5 [b] Cr ≤ 0,3 (0,4 for castings) [b] Nb ≤ 0,05 V ≤ 0,12 [b] Ti ≤ 0,05
	1.1	Steels with a specified minimum yield strength $R_{eH} \leq 275$ MPa
	1.2	Steels with a specified minimum yield strength 275 MPa < $R_{eH} \leq 360$ MPa
	1.3	Normalized fine grain steels with a specified minimum yield strength ReH > 360 MPa
2		Thermomechanically treated fine grain steels and cast steels with a specified minimum yield strength $R_{eH} > 360$ MPa
	2.1	Thermomechanically treated fine grain steels and cast steels with a specified minimum yield strength 360 MPa < $R_{eH} \leq 460$ MPa
[a] In accordance with the specification of the steel product standards, R_{eH} may be replaced by $R_{p0,2}$. [b] A higher value is accepted provided that Cr + Mo + Ni + Cu + V ≤ 0,75 %.		
NOTE This table is based on CEN ISO/TR 15608.		