SLOVENSKI STANDARD
SIST EN 16125:2019

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Oprema in pribor za utekočinjeni naftni plin (UNP) - Cevovodi in podpore - Tekoča in parna faza UNP

LPG Equipment and Accessories - Pipework systems and supports - LPG in liquid phase and vapour pressure phase

Flüssiggas-Geräte und Ausrüstungsteile - Rohrleitungssysteme und -befestigungen - Flüssigphase und ungeregelte Gasphase von Flüssiggas (LPG)

Equipements pour GPL et leurs accessoires - Systèmes de canalisations et supports - Phase liquide et phase vapeur

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LPG Equipment and Accessories - Pipework systems and supports - LPG in liquid phase and vapour pressure phase

Equipements pour GPL et leurs accessoires - Systèmes de canalisations et supports - Phase liquide et phase vapeur

Flüssiggas-Geräte und Ausrüstungsteile - Rohrleitungssysteme und -befestigungen - Flüssigphase und ungeregelte Gasphase von Flüssiggas (LPG)

This European Standard was approved by CEN on 28 July 2019.

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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 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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Contents

Page

European foreword

This document (EN 16125:2019) has been prepared by Technical Committee CEN/TC 286 “LPG 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of an identical text or by endorsement, at the latest by March 2020, and conflicting national standards shall be withdrawn at the latest by March 2020.

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 16125:2015.

The main technical changes include:

— the removal of the environmental annex and associated clauses in favour of a reference to CEN/TS 16765,

— the removal of Annex E (*Manufacturing and type testing of composite pipes*) with the intent of developing a dedicated composite pipe manufacturing standard within CEN/TC 155. At the time of this document going to formal vote, the proposed project within CEN/TC 155 is under consideration.

At all stages of building and operating pipework systems the use of materials and disposal of waste material may have an effect on the environment. CEN/TS 16765 [10] sets out environmental considerations for this document.

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.

This document is intended for users who take on the responsibility for the assembly of the pipework on site.

Protection of the environment is a key political issue in Europe and elsewhere. Protection of the environment is taken in a very broad sense, as in the total life cycle aspects of, e.g. a product on the environment, including expenditure of energy and during all phases from mining of raw materials, fabrication, packaging, distribution, use, scrapping, recycling of materials, etc.

It is recommended that manufacturers develop an environmental management policy. For guidance see the ISO 14004 [6]. 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 unless otherwise stated.

NOTE This document uses 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 could be beneficial to refer to the leaflet “measurement uncertainty leaflet (SP INFO 2000 27 uncertainty.pdf)”[13].

1 Scope

This document specifies the requirements for the design, construction, testing, commissioning, operation and maintenance of LPG pipework in both the liquid phase and at full vapour pressure.

This document is applicable to LPG pipework having a maximum allowable pressure of less than or equal to 25 bar.

This document is applicable to new LPG pipework as well as to replacements of, or extensions to, existing LPG pipework.

This document is not applicable to:

— pipelines (as defined in 2014/68/EU, PED) and their accessories;

— pipework for the propulsion systems of road vehicles or boats; and

— pipework on ships.

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 549, *Rubber materials for seals and diaphragms for gas appliances and gas equipment*

EN 751-2, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water – Part 2: Non-hardening jointing compounds*

EN 751-3, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water – Part 3: Unsintered PTFE tapes*

EN 837 (all parts), *Pressure gauges*

EN 1045, *Brazing – Fluxes for brazing – Classification and technical delivery conditions*

EN 1057, *Copper and copper alloys – Seamless, round copper tubes for water and gas in sanitary and heating applications*

EN 1092-1, *Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 1: Steel flanges*

EN 1254-1, *Copper and copper alloys - Plumbing fittings – Part 1: Fittings with ends for capillary soldering or capillary brazing to copper tubes*

EN 1254-2, *Copper and copper alloys – Plumbing fittings – Part 2: Fittings with compression ends for use with copper tubes*

EN 1254-5, *Copper and copper alloys – Plumbing fittings – Part 5: Fittings with short ends for capillary brazing to copper tubes*

EN 1515-1, *Flanges and their joints – Bolting – Part 1: Selection of bolting*

EN 10216-1, *Seamless steel tubes for pressure purposes – Technical delivery conditions – Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10216-2, *Seamless steel tubes for pressure purposes – Technical delivery conditions – Part 2: Non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10216-3, *Seamless steel tubes for pressure purposes – Technical delivery conditions – Part 3: Alloy fine grain steel tubes*

EN 10216-4, *Seamless steel tubes for pressure purposes – Technical delivery conditions – Part 4: Non-alloy and alloy steel tubes with specified low temperature properties*

EN 10216-5, *Seamless steel tubes for pressure purposes – Technical delivery conditions – Part 5: Stainless steel tubes*

EN 10217-1, *Welded steel tubes for pressure purposes – Technical delivery conditions – Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10217-2, *Welded steel tubes for pressure purposes – Technical delivery conditions – Part 2: Electric welded non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10217-3, *Welded steel tubes for pressure purposes – Technical delivery conditions – Part 3: Alloy fine grain steel tubes*

EN 10217-4, *Welded steel tubes for pressure purposes - Technical delivery conditions – Part 4: Electric welded non-alloy steel tubes with specified low temperature properties*

EN 10217-6, *Welded steel tubes for pressure purposes - Technical delivery conditions – Part 6: Submerged arc welded non-alloy steel tubes with specified low temperature properties*

EN 10217-7, *Welded steel tubes for pressure purposes – Technical delivery conditions – Part 7: Stainless steel tubes*

EN 10226-1, *Pipe threads where pressure tight joints are made on the threads – Part 1: Taper external threads and parallel internal threads – Dimensions, tolerances and designation*

EN 10226-2, *Pipe threads where pressure tight joints are made on the threads – Part 2: Taper external threads and taper internal threads – Dimensions, tolerances and designation*

EN 10253-2, *Butt-welding pipe fittings – Part 2: Non alloy and ferritic alloy steels with specific inspection requirements*

EN 12068, *Cathodic protection – External organic coatings for the corrosion protection of burried or immersed steel pipelines used in conjunction with cathodic protection – Tapes and shrinkable materials*

EN 12266-1, *Industrial valves – Testing of metallic valves – Part 1: Pressure tests, test procedures and acceptance criteria – Mandatory requirements*

EN 12266-2, *Industrial valves – Testing of metallic valves – Part 2: Tests, test procedures and acceptance criteria – Supplementary requirements*

EN 12799, *Brazing – Non-destructive examination of brazed joints*

EN 13175, *LPG Equipment and accessories – Specification and testing for Liquefied Petroleum Gas (LPG) pressure vessel valves and fittings*

EN 14291, *Foam producing solutions for leak detection on gas installations*

EN 14324, *Brazing – Guidance on the application of brazed joints*

EN 15001-1, *Gas Infrastructure – Gas installation pipework with an operating pressure greater than 0,5 bar for industrial installations and greater than 5 bar for industrial and non-industrial installations – Part 1: Detailed functional requirements for design, materials, construction, inspection and testing*

EN ISO 3183, *Petroleum and natural gas industries – Steel pipe for pipeline transportation systems (ISO 3183)*

EN ISO 3452-1, *Non-destructive testing – Penetrant testing – Part 1: General principles*

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

EN ISO 9454-2, *Soft soldering fluxes – Classification and requirements – Part 2: Performance requirements (ISO 9454-2)*

EN ISO 9606-1, *Qualification testing of welders – Fusion welding – Part 1: Steels (ISO 9606-1)*

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

EN ISO 10380, *Pipework – Corrugated metal hoses and hose assemblies (ISO 10380)*

EN ISO 10497, *Testing of valves – Fire type-testing requirements (ISO 10497)*

EN ISO 16810, *Non-destructive testing – Ultrasonic testing – General principles (ISO 16810)*

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

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

EN ISO 17638, *Non-destructive testing of welds – Magnetic particle testing (ISO 17638)*

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

EN ISO 17672, *Brazing – Filler metals (ISO 17672)*

EN ISO 17292, *Metal ball valves for petroleum, petrochemical and allied industries (ISO 17292)*

ASME B31.3, *Process piping*

ASME B31.4, *Pipeline transportation systems for liquids and slurries*

ASME B16.5, *Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard*

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

3.1
accessible
capable of being reached for inspection, removal or maintenance without the removal of permanent structures

3.2
brazed joint
joint obtained by the joining of metal parts with alloys which melt at temperatures that are generally higher than 450 °C, but less than the melting temperatures of the joined parts

3.3
commissioning
preparation for safe service

3.4
competent person
person which by combination of appropriate qualification, training, experience, and resources, is able to make objective judgments on the subject

3.5
composite pipe
pipe manufactured from thermoplastic and/or stainless steel which is also reinforced with stainless steel or other non-metallic materials and has an outer thermoplastic protective cover

3.6
crimped joint
joint in which gas tightness is achieved by compression with or without a seal, but cannot be readily disassembled and reassembled

3.7
fitting
pressure containing component fitted to an LPG pressure system

3.8
dew point
temperature below which vapour at a given pressure will condense back into liquid

3.9
flexible pipe
pipe that can be bent by hand to any radius above a set minimum without any change in performance

3.10
hydrostatic relief valve
self-closing valve which automatically, without the assistance of any energy other than that of the fluid concerned, discharges fluid at a predetermined pressure

3.11
leak test
pressure test to determine the presence of leaks at joints or within components of a piping system

[SOURCE: ISO 14692-1:2017, 3.2.68]

3.12
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

3.13
maximum allowable pressure
maximum pressure for which the equipment is designed

Note 1 to entry: All pressures are gauge pressures unless otherwise stated.

3.14
mechanical jointing
joint in which gas tightness is achieved by compression with or without a seal

Note 1 to entry: This joint can be readily disassembled and reassembled.

3.15
nominal diameter
DN

numerical designation of the size of a component, which is a convenient round number, approximately equal to the manufacturing dimensions in millimetres (mm)

EXAMPLE DN 50.

3.16
non-return valve
valve designed to close automatically to restrict reverse flow

3.17
pipework
pressure containing enclosure used for the conveyance of LPG consisting of pipe, pipe fittings, valves and other accessories

3.18
purging
displacing LPG with a non-flammable gas, steam or water or the reverse procedure

Note 1 to entry: Water/steam is not the preferred option for purging into service due to the difficulty of removing water.

3.19
road tanker
rigid vehicle, semi-trailer or trailer comprising of one or more fixed pressure vessels

Note 1 to entry: Referred to as fixed tanks (tank-vehicles) and demountable tanks in the ADR.

3.20
sleeve
protective pipe through which a gas pipe passes

3.21
strength test
specific procedure intended to verify that the pipework meets the requirements for mechanical strength

3.22
threaded joint
joint in which tightness is achieved by metal to metal contact within threads with the assistance of a sealant

3.23
void
enclosed, generally inaccessible and unventilated, space other than a service shaft

3.24
welded joint
joining of two compatible components by melting their edges and melting a suitable material into a space between the components, or by raising the temperature of their edges to the fusion temperature and applying pressure to join the two together

Note 1 to entry: Whilst this is most commonly applied to steel, it is also applicable to other materials such as copper.

Note 2 to entry: Due to the application of heat, welded joints can be subject to complex stress pattern and therefore the joints should only be made by suitably qualified personnel.

3.25
working pressure
pressure under normal operating conditions

4 Design safety considerations

4.1 General

4.1.1 The design of an LPG installation shall be done by a competent person.

4.1.2 The pipework designer shall provide information on the design and location of the pipework to the persons responsible for the construction, installation, testing, commissioning and operation of the pipework.

4.1.3 The pipework shall be designed, installed and constructed to allow testing and purging to be safely carried out.

4.1.4 Pipework joints shall be kept to a minimum.

4.2 Operating conditions

Pipework used in accordance with this document shall be suitable for the following conditions:

— a minimum operating temperature of – 20 °C. In service, temperatures below this can be encountered during short periods, for example, when filling. In some parts of Europe and certain applications where a lower temperature than – 20 °C can be encountered, the minimum design temperature shall be – 40 °C;

— the maximum working temperature shall be 65 °C for above ground pipework and 40 °C for underground pipework;

— the maximum allowable pressure for pipework shall be less than or equal to 25 bar;

— pipes shall be suitable for transport and storage at – 40 °C and 65 °C.

NOTE Vacuum conditions on the pipework arising from butane at low temperature or evacuation of the pipework can expose the pipework to a vacuum of 50 mbar absolute. The minimum pressure to which pipework is normally exposed is 0 bar.

4.3 Protection against hazards

4.3.1 Protection against mechanical damage

Pipework shall be protected against mechanical damage. For protection of underground pipework, see 6.6.1.5.

4.3.2 Resistance to corrosive substances and atmospheres

All pipework and fittings, including supports, shall be protected from corrosion according to the environment and operating conditions they will be subjected to during their service life.

NOTE Stainless steel pipework and fittings can be subject to chloride induced stress cracking, e.g. coastal areas or other areas where salt laden atmospheres can occur.

4.3.3 Protection against condensation

For vapour pressure pipework, precautions shall be taken to avoid problems occurring in the pipe and downstream equipment due to LPG vapour condensing. Figure 1 indicates the pressure temperature relationship for various mixtures of propane and butane.

NOTE 1 Where the stored LPG liquid temperature is higher than the temperature of the downstream pipework, the LPG can condense to a liquid. This is known as the dew point.

NOTE 2 In Figure 1, where the LPG is exposed to a pressure above the curve, the LPG vapour will condense.

In order to prevent condensation of LPG between the pressure vessel and the first stage pressure regulator, the pipework shall drain back to the pressure vessel. Alternatively, trace heating of the pipework shall be considered. If this is not possible, a suitably located vapour-liquid separator (knockout pot) may be installed in the line to allow condensation to collect and subsequently boil off without causing problems.