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Napeljave in oprema za utekočinjeni zemeljski plin - Načrtovanje kopenskih napeljav

Installation and equipment for liquefied natural gas - Design of onshore installations

Anlagen und Ausrüstung für Flüssigerdgas - Auslegung von landseitigen Anlagen

Installations et équipements de gaz naturel liquéfié - Conception des installations terrestres

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Anlagen und Ausrüstung für Flüssigerdgas - Auslegung von landseitigen Anlagen

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European foreword

This document (prEN 1473:2019) has been prepared by Technical Committee CEN/TC 282 “Installation and equipment for LNG”, the secretariat of which is held by AFNOR.

This document is currently submitted to the second CEN Enquiry.

This document will supersede EN 1473:2016.

In comparison with EN 1473:2016, the following changes have been made:

— the standard has been re-structured to improve usability and to detect and delete duplications;

— pressurized storage has been incorporated;

— terms and definitions were adjusted ;

— the normative references were updated.

Introduction

The objective of this document is to give functional guidelines for on-shore LNG installations. It recommends procedures and practices that will result in safe and environmentally acceptable design, construction and operation of LNG plants.

Seveso, PED, and ATEX Directives are expected to be followed. Where national and/or local regulations exist in which some of the requirements are equal or more stringent than in this document, it is up to agreement with national and/or local regulators to determine which of the requirements apply.

It need not be applied retrospectively, but application is recommended when major modifications of existing installations are being considered.

This document is also recommended for debottlenecking, revamping and plant life extension in the limits that will be defined by the local authorities. The appliance of the European Directives to the existing facilities is part of the limits to be defined together with the local authorities.

In case of plant expansion, this document is applicable for the new facilities. The application of these recommendations for the tie-ins and connections to the existing facilities will be defined by the local authorities. The limits of such application should consider the practicality of such appliance. In the same way, the limits of the European Directives appliance will be accurately defined with the local authorities.

1 Scope

This document gives guidelines for the design, construction and operation of all onshore liquefied natural gas (LNG) installations for the liquefaction, storage, vaporization, transfer and handling of LNG and natural gas (NG). These requirements can be applied to bio methane and synthetic natural gas (SNG) accordingly.

This document is valid for plants with LNG storage at a capacity above 200 t.

The designated boundary limits are LNG inlet/outlet by the ship's manifold including vapour return connection, the truck loading /unloading connection including vapour return, the rail loading/unloading connection including vapour return and the natural gas in and outlet boundary by piping systems.

Terminals or plant types have one or more boundary limits as described in this scope (see Figure 1).

Figure 1 — Boundary limits of onshore liquefied natural gas (LNG) installations

A short description of each of these installations is given in Annex G.

Feed gas for LNG liquefaction installations (plant) can be from gas field, associated gas from oil field, piped gas from transportation grid or from renewables.

Floating solutions (for example FPSO, FSRU, SRV), whether off-shore or near-shore, are not covered by this document even if some concepts, principles or recommendations could be applied. However, in case of berthed FSRU with LNG transfer across the jetty, the following recommendations apply for the jetty and topside facilities.

In case of solutions using floating storage unit (FSU) and land-based re-gasification solution, the on-shore part is covered by these standard recommendations.

This document is not applicable for installations specifically referred or covered by other standards, e.g. LNG fuelling stations, LNG road or rail tankers.

Plants with a storage inventory from 5 t up to 200 t are covered by [36].

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 809, *Pumps and pump units for liquids - Common safety requirements*

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

EN 1127-1, *Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology*

EN 1474-2, *Installation and equipment for liquefied natural gas - Design and testing of marine transfer systems - Part 2: Design and testing of transfer hoses*

EN 1514-1, *Flanges and their joints - Dimensions of gaskets for PN-designated flanges - Part 1: Non-metallic flat gaskets with or without inserts*

EN 1591 (all parts), *Flanges and their joints - Design rules for gasketed circular flange connections*

EN 1776, *Gas infrastructure - Gas measuring systems - Functional requirements*

EN 1990, *Eurocode - Basis of structural design*

EN 1991-1-2, *Eurocode 1: Actions on structures - Part 1-2: General actions - Actions on structures exposed to fire*

EN 1991 (all parts), *Eurocode 1: Actions on structures*

EN 1992-1-1, *Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings*

EN 1992-1-2, *Eurocode 2: Design of concrete structures - Part 1-2: General rules - Structural fire design*

EN 1993-1-1, *Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings*

EN 1993-1-2, *Eurocode 3: Design of steel structures - Part 1-2: General rules - Structural fire design*

EN 1994-1-1, *Eurocode 4: Design of composite steel and concrete structures - Part 1-1: General rules and rules for buildings*

EN 1994-1-2, *Eurocode 4 - Design of composite steel and concrete structures - Part 1-2: General rules - Structural fire design*

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

EN 1997-2, *Eurocode 7 - Geotechnical design - Part 2: Ground investigation and testing*

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

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

EN 1998 (all parts), *Eurocode 8: Design of structures for earthquake resistance*

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

EN 12065, *Installations and equipment for liquefied natural gas - Testing of foam concentrates designed for generation of medium and high expansion foam and of extinguishing powders used on liquefied natural gas fires*

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[1] As impacted by EN 1997-1:2004/AC:2009.

EN 12066, *Installations and equipment for liquefied natural gas - Testing of insulating linings for liquefied natural gas impounding areas*

EN 12162, *Liquid pumps - Safety requirements - Procedure for hydrostatic testing*

EN 12434, *Cryogenic vessels - Cryogenic flexible hoses*

EN 12483, *Liquid pumps - Pump units with frequency inverters - Guarantee and compatibility tests*

EN 12560 (all parts), *Flanges and their joints - Gaskets for Class-designated flanges*

EN 13445 (all parts), *Unfired pressure vessels*

EN 13458 (all parts), *Cryogenic vessels - Static vacuum insulated vessels*

EN 13480 (all parts), *Metallic industrial piping*

EN 13766, *Thermoplastic multi-layer (non-vulcanized) hoses and hose assemblies for the transfer of liquid petroleum gas and liquefied natural gas - Specification*

EN 14197 (all parts), *Cryogenic vessels - Static non-vacuum insulated vessels*

EN 14620 (all parts), *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*

EN 60034-5, *Rotating electrical machines - Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification (IEC 60034-5)*

EN 60079-0, *Explosive atmospheres - Part 0: Equipment - General requirements (IEC 60079-0)*

EN 60079-1, *Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d" (IEC 60079-1)*

EN 60079-2, *Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure "p" (IEC 60079-2)*

EN 60079-5, *Explosive atmospheres - Part 5: Equipment protection by powder filling "q" (IEC 60079-5)*

EN 60079-6, *Explosive atmospheres - Part 6: Equipment protection by liquid immersion "o" (IEC 60079-6)*

EN 60079-7, *Explosive atmospheres - Part 7: Equipment protection by increased safety "e" (IEC 60079-7)*

EN 60079-10-1, *Explosive atmospheres - Part 10-1: Classification of areas - Explosive gas atmospheres (IEC 60079-10-1)*

EN 60079-10-2, *Explosive atmospheres - Part 10-2: Classification of areas - Explosive dust atmospheres (IEC 60079-10-2)*

EN 60079-11, *Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" (IEC 60079-11)*

EN 60079-13, *Explosive atmospheres - Part 13: Equipment protection by pressurized room "p" and artificially ventilated room "v" (IEC 60079-13)*