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Road vehicles — Liquefied natural gas (LNG) refuelling connector — 3,1 MPa connector

Véhicules routiers — Connecteur pour le remplissage de gaz naturel liquéfié (GNL) — Connecteur à 3,1 MPa

Reference number
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Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 25, *Vehicles using gaseous fuels*.

The corrected version of ISO 12617:2015 incorporates the following corrections.

Figure 1 has been corrected and the key to Figure 1 has been updated to reflect the changes.

Road vehicles — Liquefied natural gas (LNG) refuelling connector — 3,1 MPa connector

1 Scope

This International Standard specifies liquefied natural gas (LNG) refuelling nozzles and receptacles constructed entirely of new and unused parts and materials for road vehicles powered by LNG. An LNG refuelling connector consists of, as applicable, the receptacle and its protective cap (mounted on the vehicle) and the nozzle. This International standard is applicable only to such devices designed for a maximum working pressure of 3,4 MPa (34 bar) to those using LNG as vehicle fuel and having standardized mating components.

NOTE All references to pressures given in megapascals and bar (1 bar = 0,1 MPa = 105 Pa; 1 MPa = 1 N/mm^2) are to be considered gauge pressures, unless otherwise specified.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14469, *Road vehicles — Compressed natural gas (CNG) refuelling connector*

ISO 15500-2, *Road vehicles — Compressed natural gas (CNG) fuel system components — Part 2: Performance and general test methods*

3 Terms and definitions

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

3.1
check valve
part of the receptacle, or of the nozzle, mounted inside which prevents return flow or venting of fuel after the nozzle was disconnected from the receptacle

3.2
cycle life
number of refuelling cycles, as specified in this International Standard, which the component can withstand without leak or without another fail of function

3.3
device
nozzle or receptacle

3.4
dry air
air with moisture content such that the dew point of the air at the required test pressure is at least 11 °C below the ambient test temperature

3.5
hydrostatic pressure
pressure to which a component is taken to verify the structural strength of the component

3.6
liquefied natural gas (LNG)
cryogenic liquid produced by reducing the temperature of natural gas to about −162 °C at atmospheric pressure

3.7
LNG refuelling connector
joined assembly of *LNG refuelling nozzle* (3.8) and receptacle

Note 1 to entry: Both parts have to have integrated mechanically opened *check valves* (3.1) which are operated by each other. The volume between the two check valves shall be reduced to a minimum to minimize the loss of fuel during the disconnection process.

3.8
LNG refuelling nozzle
device (3.3) which permits quick connection and disconnection of fuel supply hose to the LNG receptacle in a safe manner

3.9
LNG refuelling receptacle
device (3.3) connected to a vehicle or storage system which receives the *LNG refuelling nozzle* (3.8) and permits safe transfer of fuel

Note 1 to entry: The receptacle consists as minimum from a receptacle body and from a *check valve* (3.1) mounted inside the body.

3.10
maximum service pressure
maximum pressure of the fuel delivered by the fuelling station

3.11
nominal flow rate
flow rate through the connector at specified density of LNG and at specified pressure difference

3.12
poppet
movable closing part of the *check valve* (3.1)

3.13
positive locking means
feature which requires actuation of an interlocking mechanism to allow connection/disconnection of the nozzle from the receptacle

Note 1 to entry: It shall not be possible, except by actuation of the interlocking mechanism, to disconnect under unsafe conditions when an uncontrolled release of LNG can happen which causes damage to the user and/or the environment.

3.14
probe
part of the nozzle which enters inner space of the receptacle

3.15
working pressure (maximum allowable pressure)
maximum pressure that an *LNG refuelling connector* (3.7) can be expected to withstand in actual service

3.16
vapour spillage space
dead volume between the nozzle and the receptacle measured with trapped water

4 General construction requirements

4.1 General

This International Standard was developed to use in the examination, testing, and certification of newly produced liquefied natural gas (LNG) vehicle refuelling nozzles and receptacles and, as such, applies only to the nozzles and receptacles used in LNG refuelling systems and not to the system itself.

A nozzle certified to this International Standard will be functionally compatible from a safety and performance perspective with all listed receptacles of compatible profile and system pressure. Similarly, a certified receptacle will be functionally compatible from a safety and performance perspective with all the listed nozzles of compatible profile and system pressure.

As there may eventually be many different kinds of nozzles and receptacles available from a variety of manufacturers which, for safety reasons, must all be compatible with one another, this International Standard specifies a receptacle profile. The nozzle probe shall comply with the receptacle profile. This standard profile incorporates the design specification (mating dimensions, geometry and tolerances, and material requirements) which can be considered in the certification of a submitted nozzle or receptacle. This International Standard refers only to one working pressure and one application.

The construction and performance of nozzles and receptacles are based on the observation that three main parameters affect user safety and system compatibility, namely the following:

a) working pressure;

   All nozzles and receptacles are designed to have a working pressure of 3,4 MPa.

b) design cycle life;

   Frequency of use is the second parameter to be considered. Since frequency of use will differ with the nozzle/receptacle application (i.e. public sector, fleet employee, and residential), all receptacles will be tested at 10 000 connect/disconnect cycles for compliance with this International Standard (one fill per day for 27 years). In addition, all nozzles will be tested to a durability test of 20 000 cycles.

c) training.

   Operator training required is in accordance with national requirements.

4.2 LNG refuelling nozzles

LNG fuelling nozzles, hereafter referred to as LNG nozzles, and receptacles, hereinafter both also referred to as devices, manufactured in accordance with this International Standard shall be designed in accordance with reasonable concepts of safety, durability, and maintainability.

4.3 LNG nozzles and receptacles

LNG nozzles and receptacles shall be

— designed to minimize the possibility of incorrect assembly,

— designed to be secure against displacement, distortion, warping, or other damage,

— constructed to maintain operational integrity under normal and reasonable conditions of handling and usage, and

— designed with a vapour spillage space less than 25 cm^3.

4.4 Pressure rating

4.4.1 Working pressure (maximum allowable pressure)

3,4 MPa.

4.4.2 Maximum service pressure

3,1 MPa.

4.4.3 Hydrostatic pressure

2,5 times working pressure.

4.4.4 Working temperature

4.4.4.1 Receptacle working temperature range (−196 °C to +85 °C)

4.4.4.2 Nozzle working temperature range

The nozzle shall be designed for the temperature of the fuel −196 °C and for an ambient temperature range of −40 °C to +85 °C.

4.5 Materials

4.5.1 Corrosion protection

Corrosion-resistant materials shall be used (see 10.10). Unless suitably protected against electrolytic corrosion, dissimilar metals shall not be used in contact with each other.

4.5.2 LNG nozzle and receptacles

LNG nozzles and receptacles shall be manufactured of materials suitable and compatible for use with LNG at the pressure and the temperature ranges to which they will be subjected which shall be declared by the manufacturer in the component documentation delivered with the product.

4.5.3 Material of the bodies of the receptacle and of the nozzle

Material of the bodies of the receptacle and of the nozzle should be

a) suitable for the working temperature range,

a) conductive [only conductive materials comply with the electric conductivity test (see 10.8)], and

b) non-sparking according to 10.11.

4.6 Hand operation

LNG nozzles and receptacles shall be so designed as to be operated without the use of tools and excessive force for connecting and disconnecting.

4.7 Sealing exchange

Design of a device and its check valve sealing shall make possible exchange of the check valve sealing from the front side using suitable jig and related tools.

4.8 Installation

The receptacle shall be installed outside engine compartment.

5 Nozzles

5.1 Venting depressurization

Venting depressurization of all nozzle types is required prior to disconnection. Disconnection of all nozzles shall be accomplished in accordance with 10.2.

5.2 Identification

The nozzle shall bear a marking in accordance with Clause 9, if necessary, indicating the direction of the open and shut off operation of the actuating mechanism.

5.3 Internal check valve

The nozzle is equipped with an internal check valve to prevent the escape of gas. The check valve poppet face contacts with the receptacle poppet face during connection and pushes the receptacle poppet into the open position to allow rated flow. The reaction force of a nozzle poppet in fully open position, typically supported by firm stop, shall be larger than the reaction force of receptacle in fully open position, defined by the stroke of the nozzle, as specified in 7.1. Provision shall be made that movement of receptacle is not limited by any mechanical part within its stroke as defined in Clause 6.

6 Standard receptacle dimensions

6.1 Drawing

The receptacle shall comply with the dimensions shown in Figure 1.