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Liquefied natural gas vehicles — Connector for refueling vehicles

Véhicules fonctionnant au gaz naturel liquéfié — Connecteur pour le remplissage des véhicules

ICS 43.060.40

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 12617 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 25, *Road vehicles using gaseous fuels*.

This second/third/... edition cancels and replaces the first/second/... edition (), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

Introduction

This part of ISO 12617 was developed to use in the examination, testing and certification of newly produced liquefied natural (LNG) gas vehicle fuelling nozzles and receptacles and, as such, applies only to the nozzles and receptacles used in LNG fuelling systems, and not to the system itself.

A nozzle certified to this ISO 12617 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 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 ISO 12617 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, material requirements) which may be considered in the certification of a submitted nozzle or receptacle. This ISO 12617 refers only to one working pressure and one application. Other working pressures and applications are under consideration for the future.

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

a) Working pressure

All nozzles and receptacles are designed to have a working pressure of 3.4 MPa.

b) Design 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 part of ISO 12617 (1 fill per day for 27 years). In addition, all nozzles will be tested according to the following frequency use classifications, as applicable:

1) Class A Nozzle, specifying high frequency use, with a cycle life of 100 000 cycles and equating to approximately 100 fills per day for three years;

2) Class B Nozzle, specifying medium frequency use, with a cycle life of 20 000 cycles and equating to approximately 10 fills per day for five years.

c) Training

Operator training required is in accordance with national requirements.

Road vehicles — Liquefied natural gas (LNG) fuelling connector — 3.1 MPa connector

1 Scope

This ISO/CD 12617 specifies LNG fuelling nozzles and receptacles constructed entirely of new and unused parts and materials, for road vehicles powered by liquefied natural gas (LNG). An LNG fuelling connector consists of, as applicable, the receptacle and its protective cap (mounted on the vehicle) and the nozzle. This ISO 12617 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 in accordance with ISO (norm on quality of LNG to be worked out)..... 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/mm2) are to be considered gauge pressures, unless otherwise specified.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 12614 (standard in process), Road vehicles — Liquefied natural gas (LNG) fuel systems — Part 1: Safety requirements (reference to this norm would be added in case that such a norm would exist before final version for voting.)

IEC 60534 Industrial-process control valves

ISO 14469 Part 1: 20 MPa (200 bar) connector (for non-igniting evaluation, see the clause 10.15)

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 device

nozzle or receptacle

3.3 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

3.4 hydrostatic pressure

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

3.5 liquefied natural gas (LNG)

LNG is a cryogenic liquid, produced by reducing the temperature of natural gas to about -162° C at atmospheric pressure

3.6 LNG fuelling connector

joined assembly of LNG refuelling nozzle and receptacle. Both parts have to have integrated mechanically opened check valves, 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.

3.7 LNG fuelling nozzle

device which permits quick connection and disconnection of fuel supply hose to the LNG receptacle in a safe manner

3.8 LNG fuelling receptacle

device connected to a vehicle or storage system which receives the LNG fuelling nozzle and permits safe transfer of fuel. The receptacle consists as minimum from a receptacle body and from a check valve mounted inside the body.

3.9 maximum service pressure

maximum pressure of the fuel delivered by the fuelling station.

3.10 nominal flow rate

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

3.11 poppet

the movable closing part of the check valve.

3.12 positive locking means

feature, which requires actuation of an interlocking mechanism to allow connection/disconnection of the nozzle from the receptacle. 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).

3.13 probe

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

3.14 working pressure (maximum allowable pressure)

maximum pressure that an LNG fuelling connector can be expected to withstand in actual service

3.15 spillage

Dead volume between the nozzle and the receptacle, measured with trapped water.

4 General construction requirements

4.1 LNG fuelling nozzles

(hereafter referred to as LNG nozzles) and receptacles (hereinafter both also referred to as devices) manufactured in accordance with this ISO 12617 shall be designed in accordance with reasonable concepts of safety, durability and maintainability

4.2 LNG nozzles and receptacle shall be

— designed to minimize the possibility of incorrect assembly,

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

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

— designed to prevent spillage in excess of 30 cm^3.

4.3 Pressure rating

4.3.1 Working pressure (maximum allowable pressure)

is 3.4 MPa

4.3.2 Maximum service pressure

is 3.1 MPa.

4.3.3 Hydrostatic pressure

is 4 times working pressure

4.3.4 Working temperature

4.3.4.1 the receptacle working temperature range is -196°c to +85°C.

4.3.4.2 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.