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Road vehicles — Liquefied natural gas (LNG) fuel system components —

Part 11: **Fittings**

Véhicules routiers — Équipements pour véhicules utilisant le gaz naturel liquéfié (GNL) comme combustible —

Partie 11: Raccords

Reference number
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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).

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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*.

ISO 12614 consists of the following parts, under the general title *Road vehicles — Liquefied natural gas (LNG) fuel system components*:

— *Part 1: General requirements and definitions*

— *Part 2: Performance and general test methods*

— *Part 3: Check valve*

— *Part 4: Manual valve*

— *Part 5: Tank pressure gauge*

— *Part 6: Overpressure regulator*

— *Part 7: Pressure relief valve*

— *Part 8: Excess flow valve*

— *Part 9: Gas-tight housing and ventilation hose*

— *Part 10: Rigid fuel line in stainless steel*

— *Part 11: Fittings*

— *Part 12: Rigid fuel line in material other than stainless steel*

— *Part 13: Pressure control regulator*

— *Part 14: Differential pressure fuel content gauge*

— *Part 15: Capacitance fuel content gauge*

— *Part 16: Heat exchanger - vaporizer*

— *Part 17: Natural gas detector*

— *Part 18: Gas temperature sensor*

Road vehicles — Liquefied natural gas (LNG) fuel system components —

Part 11: Fittings

1 Scope

This part of ISO 12614 specifies tests and requirements for the fittings, a liquefied natural gas fuel system component intended for use on the types of motor vehicles defined in ISO 3833.

This part of ISO 12614 is not applicable to the following:

a) fuel containers;

b) stationary gas engines;

c) container mounting hardware;

d) electronic fuel management;

e) refueling receptacles.

NOTE 1 It is recognized that miscellaneous components not specifically covered herein can be examined to meet the criteria of this part of ISO 12614 and tested according to the appropriate functional tests.

NOTE 2 All references to pressure in this part of ISO 12614 are to be considered gauge pressures unless otherwise specified.

NOTE 3 This part of ISO 12614 is based upon a working pressure for natural gas as a fuel of 1,6 MPa [16 bar[1)]]. Other working pressures can be accommodated by adjusting the pressure by the appropriate factor (ratio). For example, 2 MPa (20 bar) working pressure system will require pressures to be multiplied by 1,25.

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 3833, *Road vehicles — Types — Terms and definitions*

ISO 12614-1, *Road vehicles — Liquefied natural gas (LNG) fuel system components — Part 1: General requirements and definitions*

ISO 12614-2, *Road vehicles — Liquefied natural gas (LNG) fuel system components — Part 2: Performance and general test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12614-1 apply.

1) 1 bar = 0,1 MPa = 105 Pa; 1 MPa = 1 N/mm2.

4 Marking

Marking of the component shall provide sufficient information to allow the following to be traced:

a) the manufacturer's or agent's name, trademark, or symbol;

b) the model designation (part number);

c) the working pressure or pressure and temperature range.

The following additional markings are recommended:

a) the direction of flow (when necessary for correct installation);

b) the type of fuel;

c) electrical ratings (if applicable);

d) the symbol of the certification agency;

e) the type approval number;

f) the serial number or date code;

g) reference to this part of ISO 12614 (i.e. ISO 12614-11:2014).

NOTE This information can be provided by a suitable identification code on at least one part of the component when it consists of more than one part.

5 Construction and assembly

The fittings shall comply with the applicable provisions of ISO 12614-1 and ISO 12614-2 and with the tests specified in Clause 6 of this part of ISO 12614-1.

The fittings shall be compatible with rigid fuel line.

6 Test

6.1 Applicability

The tests required to be carried out are indicated in Table 1.

Table 1 — Tests applicable

Test	Applicable	Test procedure as required by ISO 12614–2	Specific test requirements of this part of ISO 12614
Hydrostatic strength	X	X	X (see 6.2)
Leakage	X	X	
Excess torque resistance	X	X	
Bending moment	X	X	
Continued operation	X	X	X (see 6.3)
Corrosion resistance	X	X	
Oxygen ageing	X	X	
Electrical over voltages			
Non-metallic material immersion	X	X	
Vibration resistance	X		X (see 6.4)
Pull-off	X		X (see 6.5)
Brass material compatibility	X	X	

6.2 Hydrostatic strength

The fitting shall be tested according to the procedure for testing hydrostatic strength specified in ISO 12614-2.

The test pressure shall be four times the working pressure.

NOTE The higher hydrostatic test pressure for the rigid fuel line than the other ISO 12614 series components is due to the necessary provisions to cope for eventual damage or abrasions under normal operation.

6.3 Continued operation

6.3.1 Subject the fitting to continued operation for a total of 100 cycles. The fitting shall only be tested while connected with a rigid fuel line.

6.3.2 Fittings shall be subjected to 25 connection/disconnection cycles.

6.3.3 Perform the leakage test in accordance with 6.3.

6.4 Vibration resistance

Vibrate the fittings, pressurized to its working pressure and sealed at both ends, for 30 min along each of the three orthogonal axes at the most severe resonant frequencies determined as follows:

— by an acceleration of 1,5 *g*;

— within a sinusoidal frequency range of 10 Hz to 500 Hz;

— with a sweep time of 10 min.

At the completion of the test, the fittings shall not show any indication of fatigue or component damage and shall meet the leakage test requirements.

Following the vibration testing, perform the hydrostatic test in accordance with 6.2.

6.5 Pull-off

Test the fitting attached to its rigid fuel line and coupled to its mating part or parts, according to the following procedure and acceptance criterion. Secure the subject specimen in an appropriate test fixture, then statically apply a tensile load along the rigid fuel line axis at a maximum rate of 250 N/min until the rigid fuel line separates from the fitting.

The force, *F*, in Newtons, required to pull apart the rigid fuel line from its fitting shall be in minimum and calculated as

$$F = (\pi \times d^2 \times P) / 10 \quad (1)$$

where

d is the internal diameter, in millimetres;

P is the pressure, in bar.

Formula (1) already includes a safety factor of four.

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