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

Part 16: Heat exchanger-vaporizer

Véhicules routiers — Équipements pour véhicules utilisant le gaz naturel liquéfié (GNL) comme combustible —
Partie 16: Échangeur de chaleur-vaporisateur

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).

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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 41, *Specific aspects of gaseous fuels*.

This second edition cancels and replaces the first edition (ISO 12614-16:2014), which has been technically revised.

The main changes compared to the previous edition are as follows:

— editorial changes.

A list of all parts in the ISO 12614 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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

Part 16:
Heat exchanger-vaporizer

1 Scope

This document specifies tests and requirements for the heat exchanger-vaporizer, a liquefied natural gas fuel system component intended for use on the types of motor vehicles defined in ISO 3833. This document is not applicable to the following:

a) fuel containers;

b) stationary gas engines;

c) container mounting hardware;

d) electronic fuel management;

e) refuelling receptacles.

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

All references to pressure in this document are to be considered gauge pressures unless otherwise specified.

This document 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, a 2 MPa (20 bar) working pressure system will require pressures to be multiplied by 1,25.

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.

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 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

1) 1 bar = 0,1 MPa = 105 Pa; 1 MPa = 1 N/mm^2.

— IEC Electropedia: available at http://www.electropedia.org/

3.1
vaporizer design pressure
pressure equal to or higher than the maximum pump discharge pressure or the working pressure MAWP of the LNG tank, whichever is greater

4 Marking

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

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

b) the model designation (part number);

c) the maximum allowable pressure for gas and coolant space;

d) the maximum and minimum working temperature;

e) the serial number or date code.

The following additional markings are recommended:

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

ii) the type of fuel;

iii) electrical ratings (if applicable);

iv) the symbol of the certification agency;

v) the type approval number;

vi) a reference to this document (i.e. ISO 12614-16).

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 heat exchanger-vaporizer shall comply with the applicable provisions of ISO 12614-1 and ISO 12614-2, and with the tests specified in Clause 6.

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 document
Hydrostatic strength	X	X	X (see 6.2)
Leakage*	X	X	
* Test the natural gas space.			

Table 1 *(continued)*

Excess torque resistance	X	X	
Bending moment	X	X	
Continued operation	X		X (see 6.3)
Corrosion resistance	X	X	
Oxygen ageing			
Electrical overvoltages			
Non-metallic synthetic immersion	X	X	
Vibration resistance			
Brass material compatibility	X	X	
Water jacket freezing	X		X (see 6.4)
Compatibility with heat exchange fluids of non-metallic parts	X		X (see 6.5)
* Test the natural gas space.			

6.2 Hydrostatic strength

The LNG space of the heat exchanger-vaporizer shall be tested according to the procedure for testing hydrostatic strength specified in ISO 12614-2.

Test pressure shall be 2,5 times the working pressure of the heat exchanger–vaporizer design pressure.

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 ISO 12614-2.

6.4 Water jacket freezing

a) Attach 1 m sections of coolant hose to the coolant inlet and outlet of the regulator or water jacket. Fill the regulator or water jacket, which normally contains an antifreeze solution, with water to normal capacity and expose it at −40 °C (or −20 °C as applicable) for 24 h.

b) Following the freezing conditioning, and after exposing the assembly to 20 °C for 24 h, conduct an external leakage test at room temperature according to ISO 12614-2:2021, 6.2.

A separate sample can be used for this test.

6.5 Compatibility with heat exchange fluids of non-metallic parts

6.6.1 Test samples shall be submerged in heat exchange medium for 168 h at 90 °C; then they shall be dried for 48 h at a temperature of 40 °C. The composition of the heat exchange medium used for the test is water/ethylene-glycol fluid of 50 %/50 %.

6.6.2 The test is deemed to be satisfactory if the change in volume is less than 20 %, the change in mass is less than 5 %, the change in tensile strength is less than −25 %, and the change in elongation at break is within −30 % and +10 %.

Bibliography

[1] ISO 3833, *Road vehicles — Types — Terms and definitions*

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