INTERNATIONAL STANDARD

ISO 12614-1

Second edition

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

Part 1: General requirements and definitions

Véhicules routiers — Équipements pour véhicules utilisant le gaz naturel liquéfié (GNL) comme combustible —
Partie 1: Exigences générales et définitions

PROOF/ÉPREUVE

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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 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 12614-1:2014), 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 1: General requirements and definitions

1 Scope

This document specifies general requirements and definitions of liquefied natural gas fuel system components, intended for use on the types of motor vehicles as defined in ISO 3833. It also provides general design principles and specifies requirements for instructions and marking.

This document is not applicable to the following:

a) fuel containers;

b) stationary gas engines;

c) container mounting hardware;

d) electronic fuel management;

e) fuelling 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 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 6722 (all parts), *Road vehicles — 60 V and 600 V single-core cables*

ISO 12614 (all parts), *Road vehicles — Liquefied natural gas (LNG) fuel system components*

ISO 15500 (all parts), *Road vehicles — Compressed natural gas (CNG) fuel system components*

3 Terms and definitions

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

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

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

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

3.1
burst pressure
static pressure which causes failure and consequential fluid loss through the component envelope

Note 1 to entry: It is the highest pressure during a burst test.

3.2
electronic control unit
ECU
device for control of the engine

3.3
fitting
connector used in joining a piping, tubing, or hose system

3.4
flexible fuel line
flexible tubing or hose through which natural gas flows

3.5
fuel content gauge
system that measures the level of the liquid in the fuel tank

3.6
differential pressure fuel content gauge
fuel content gauge (3.5) based on the difference of the pressure at the top and bottom parts of the fuel tank (the system measures the weight of the liquid)

3.7
capacitance fuel content gauge
device that measures changes in fuel level through indirect or direct capacitive sensing techniques

3.8
gas temperature sensor
device for gas temperature measurement, which is placed downstream of the *vaporizer* (3.10)

3.9
gas tight housing
device which vents gas leakage to outside the vehicle, including the gas ventilation hose

3.10
heat exchanger
vaporizer
device for vaporizing the cryogenic liquid fuel and delivering it as gas to the engine

3.11
liquefied natural gas
LNG
natural gas which has been liquefied after processing for storage, transportation, or use as a fuel

3.12
LNG vehicle
vehicle which is using *liquefied natural gas* (3.11) as a source of gaseous fuel for its engine

3.13
natural gas detector
device for sensing the presence of natural gas

3.14
natural gas vehicle
NGV
road vehicle powered by natural gas

3.15
pressure regulator
device used to control the delivery pressure of gaseous fuel to the engine

3.16
tank pressure control regulator
pressure regulator (3.15) for controlling pressure in the fuel tank

3.17
rigid fuel line
tubing which has been designed not to flex in normal operation and through which natural gas flows

3.18
tank pressure gauge
pressurized device which indicates the pressure of the gas space in the fuel tank

3.19
test pressure
pressure to which a component is taken during acceptance testing

3.20
valve
device by which the flow of a fluid can be controlled

3.21
manual valve
valve (3.20) which is operated manually

3.22
automatic shut-off valve
valve (3.20) which is not operated manually and is used on vaporized gas only for emergency operation

3.23
check valve
automatic *valve* (3.20) which allows gas to flow in only one direction

3.24
excess flow valve
valve (3.20) which automatically shuts off or limits the gas flow when the flow exceeds a set design value

3.25
pressure relief valve
PRV
device which prevents a pre-determined upstream pressure being exceeded

3.26
working pressure
maximum pressure to which a component is designed to be subjected to and which is the basis for determining the strength of the component under consideration

4 Construction and assembly

For the description of components, see Annex A.

4.1 Components in contact with liquefied natural gas or vapor shall be made of suitable materials.

4.2 Jointing components shall provide gas-tight sealing performance. Where joints are required to be disassembled, it is recommended that any tapered thread fittings be replaced.

4.3 Components shall be suitable for service within a temperature range as specified below.

4.3.1 Components, which are not intended to be used at temperatures less than −40 °C, shall be designed and specified in accordance with the ISO 15500 series, with the exception of the gas temperature sensor which shall only comply with ISO 12614-18.

4.3.2 Components, which are intended to be used at temperatures less than −40 °C, shall be suitable for service within a temperature range of −162 °C to 85 °C.

4.3.3 Components, which are intended to be used at temperatures less than −40 °C, when placed in the engine compartment, shall be suitable for service within a range of −162 °C to 120 °C.

4.4 All non-metallic materials shall comply with the oxygen ageing test specified in ISO 12614-2.

4.5 All non-metallic materials in contact with natural gas shall comply with the non-metallic material immersion test specified in ISO 12614-2.

4.6 All components subject to weather exposure and other corrosive conditions shall be made of corrosion-resistant material or otherwise protected.

4.7 It is recognized that multifunctional components have the functions of several components where the functions are as defined in the ISO 12614 series. Such multifunctional components shall be examined for conformance to the ISO 12614 series and tested according to the appropriate functional tests.

4.8 Fuel flow shut-off valve shall be fail-safe, closing with the loss of actuating energy.

5 Electrical equipment and wiring

5.1 Any openings in electrical wiring components shall be equipped with means to prevent chafing and abrasion of the wire insulation.

5.2 Electrical equipment and circuit wiring in a component shall be of automotive quality with respect to mechanical strength, insulation, and current carrying capacity, in accordance with the ISO 6722 series.

For example, possible explosion zones shall be taken into consideration with the component specifications according to existing International Standards.

5.3 Materials used for electrical construction shall be suitable for their particular application. When determining the acceptability of an electrical insulating material, consideration shall be given to its mechanical strength, dielectric strength, heat-resistant properties, the degree to which it is enclosed or protected, and any other features influencing fire and accident hazards.

6 Instructions

6.1 Clear, concise printed instructions and diagrams, stated in terms clearly understandable and adequate for proper assembly, installation, maintenance, and safe operation, shall be made available by the manufacturer of the component and component package.

6.2 Instructions for periodic maintenance of components, as required, shall be provided. Parts which require replacement shall be identified.

6.3 This information shall be in a form easily understood in the country of destination.

7 Marking

The components shall include the following information as required:

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;

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

e) the type of fuel;

f) electrical ratings;

g) the symbol of the certification agency;

h) the type approval number;

i) the serial number or date code;

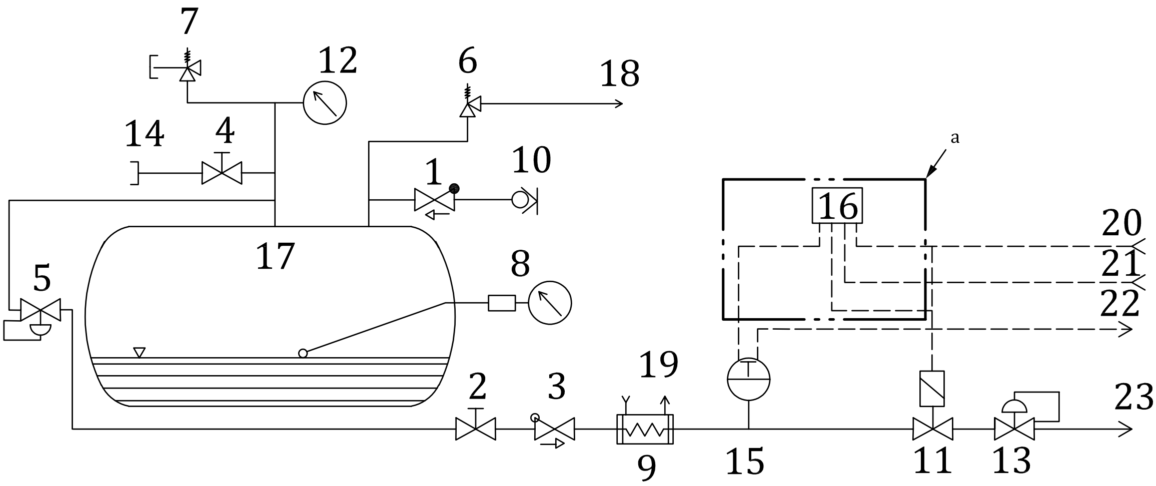
j) reference to this document (i.e. ISO 12614-1).

NOTE 1 Specific information required for each component can be found in ISO 12614-3 and subsequent parts of the ISO 12614 series.

NOTE 2 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.

Annex A
(informative)

Construction and assembly



Key

1 fill check valve
2 fuel shut-off valve
3 excess flow valve
4 vapour shut-off valve
5 tank pressure regulator
6 primary relief valve (PRV)
7 secondary relief valve (PRV)
8 fuel content gauge
9 heat exchanger – vaporizer
10 fill fitting
11 automatic fuel shut-off valve
12 tank pressure gauge
13 pressure regulator
14 vent connector
15 gas temperature sensor
16 electronic control unit of engine
17 vapor line
18 to vent stack
19 engine cooling system
20 ignition
21 signal from gas detector
22 dash-board
23 gas to engine
a Optional.

Figure A.1 — LNG fuelling system

Description of the example flow scheme (see Figure A.1):

LNG is delivered through the filling receptacle (key 10), which is equipped with a check valve. The function of the check valve is to close the receptacle after filling and to prevent leak of natural gas. Another check valve (key 1) doubles the function. The primary relief valve (key 6) is placed on the fill line. Its outlet is headed to the vent stack, which leads possible vent gas outside of the confined space to a safe location. The secondary relief valve (key 7), set to higher pressure and equipped with a blow-off cap, is placed on a separate vent line. The pressure gauge (key 12) and manual vent valve (key 4), followed with a connector (key 14), which can be fitted to a hose, are placed on the same line. The tank pressure regulator (key 5) is placed on a line, connecting the vent line with liquid withdrawal. Its function is to transfer part of the gas to the liquid withdrawal in case of increased pressure in the tank. The manual valve (key 2) allows separation of the fuel tank system from the line to the engine. The excess flow valve (key 3) stops the flow in case of excess flow rate in case of pipe fraction, e.g. heat exchanger (key 9) vaporizes LNG and warms it up to a temperature close to ambient by heat exchange

