BS ISO 12614-1:2014

BSI Standards Publication

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

Part 1: General requirements and definitions

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of ISO 12614-1:2014.

The UK participation in its preparation was entrusted to Technical Committee GSE/40, Gas supply equipment for natural gas vehicles.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 77042 5

ICS 43.060.40

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2014.

Amendments issued since publication

Date	Text affected

BS ISO 12614-1:2014

INTERNATIONAL STANDARD

ISO 12614-1

First edition
2014-07-01

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

Reference number
ISO 12614-1:2014(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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*.

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*

INTERNATIONAL STANDARD **ISO 12614-1:2014(E)**

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

Part 1: General requirements and definitions

1 Scope

This part of ISO 12614 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 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) fuelling 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 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, 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 3833:1977, *Road vehicles — Types — Terms and definitions*

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

ISO 15500:2012, *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.

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

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

3.2
electronic control unit
ECU
device for control of the engine — it is not in the scope of ISO 12614

3.3
filter
component that is intended to remove contaminants from the gas stream

3.4
fitting
connector used in joining a piping, tubing, or hose system

3.5
flexible fuel line
flexible tubing or hose through which natural gas flows

3.6
fuel content gauge
device that shows the liquid fuel level in the fuel tank

3.7
differential pressure fuel content gauge
fuel content gauge 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)

3.8
capacitance fuel content gauge
fuel content gauge based on the relationship between the mass and electrical capacitance of natural gas

3.9
gas-air mixer
device for mixing the gaseous fuel and intake air for the engine

3.10
gas flow adjuster
gas flow restricting device, installed downstream of a pressure regulator, controlling gas flow to the engine

3.11
gas injector
device for introducing gaseous fuel into the engine or associated intake system

3.12
gas temperature sensor
device for gas temperature measurement, which is placed downstream of the vaporizer

3.13
gas tight housing
device which vents gas leakage to outside the vehicle including the gas ventilation hose, the clear opening of which is at least 450 mm^2

3.14
heat exchanger - vaporizer
device for vaporizing the cryogenic liquid fuel and delivering it as gas to the engine with a gas temperature between −40 °C and +85 °C

3.16
liquefied natural gas
LNG
natural gas which has been liquefied after processing for storage, transportation, or use as a fuel

3.17
LNG vehicle
vehicle which is using liquefied natural gas (LNG) as a source of gaseous fuel for its engine

3.18
natural gas detector
device for sensing the presence of natural gas

3.19
natural gas vehicle
NGV
road vehicle powered by natural gas

3.20
pressure regulator
device used to control the delivery pressure of gaseous fuel to the engine

3.21
tank pressure regulator
pressure regulator for controlling pressure in the fuel tank

3.22
rigid fuel line
tubing which has been designed not to flex in normal operation and through which natural gas flows

3.23
tank pressure gauge
pressurized device which indicates the pressure of the gas space in the fuel tank

3.24
test pressure
pressure to which a component is taken during acceptance testing

3.25
valve
device by which the flow of a fluid can be controlled

3.36
manual valve
valve which is operated manually

3.37
automatic shut-off valve
valve which is not operated manually and is used on vaporized gas only for emergency operation

3.38
check valve
automatic valve which allows gas to flow in only one direction

3.39
excess flow valve
valve which automatically shuts off or limits the gas flow when the flow exceeds a set design value

3.40
pressure relief valve
PRV
device which prevents a pre-determined upstream pressure being exceeded

3.41
service valve
manual valve which is closed only when servicing the vehicle

3.42
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

4.1 For the description of components, see Annex A.

4.2 Components shall be made of materials suitable for use with liquefied natural gas.

4.3 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.

4.4 Components shall be suitable for service within a temperature range as specified below:

4.4.1 Components, which are not intended to be used at temperatures less than −40 °C, shall be designed and specified in accordance with ISO 15500.

4.4.2 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.

4.4.3 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.

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

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

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

4.8 It is recognized that multifunctional components have the functions of several components where the functions are as defined in ISO 12614-3 and subsequent parts of this International Standard. Such multifunctional components shall be examined for conformance to ISO 12614-3 and subsequent parts of this International Standard and tested according to the appropriate functional tests.

4.9 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 ISO 6722 (all parts).

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;

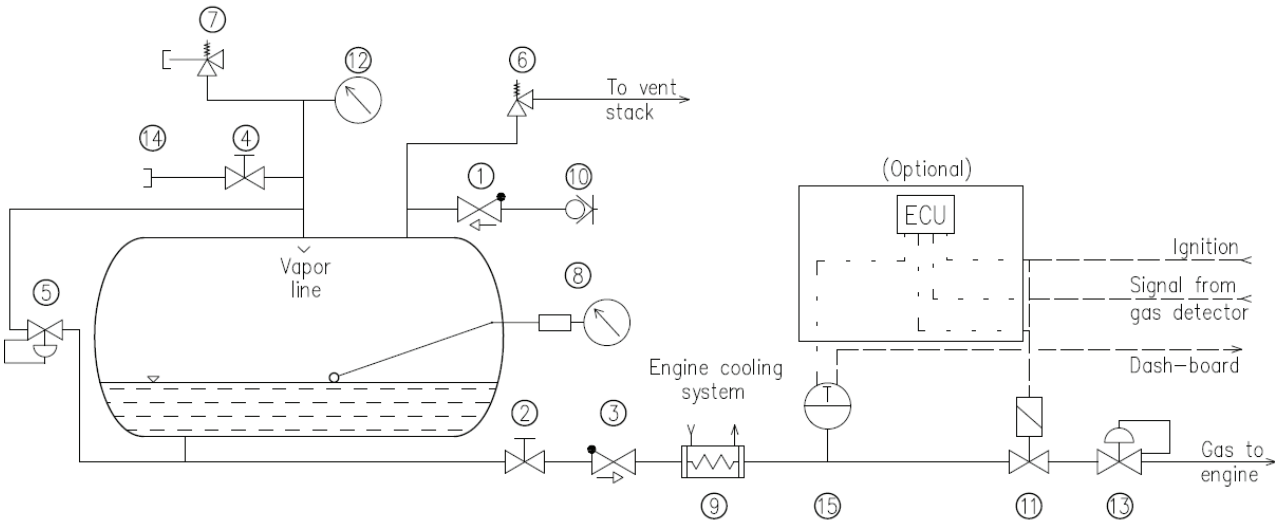
j) reference to this part of ISO 12614 (i.e. ISO 12614-1).

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

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	9	heat exchanger – vaporizer
2	fuel shut-off valve	10	fill fitting
3	excess flow valve	11	automatic fuel shut-off valve
4	vapour shut-off valve	12	tank pressure gauge
5	tank pressure regulator	13	pressure regulator
6	primary relief valve (PRV)	14	vent connector
7	secondary relief valve (PRV)	15	gas temperature sensor
8	fuel content gauge	ECU	electronic control unit of engine

Figure A.1 — LNG fuelling system

Description of the example flow scheme:

LNG is delivered through the filling receptacle 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 1 doubles the function. Primary relief valve 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. Secondary relief valve 7, set to higher pressure and equipped with a blow-off cap, is placed on a separate vent line. Pressure gauge 12 and manual vent valve 4, followed with a connector 14, which can be fitted to a hose, is placed on the same line. Tank pressure regulator 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. Manual valve 2 allows separation of the fuel tank system from the line to the engine. Excess flow valve 3 stops flow in case of excess flow rate in case of pipe fraction, e.g. Heat exchanger 9 vaporizes LNG and warms it up to a temperature close to ambient by heat exchange with the engine cooling liquid. The gas temperature sensor 15 delivers a signal on possibly low temperature of the gas, which is further used for signalization to the driver or possibly other safety measures including possible stopping of the engine after a certain time limit. The automatic fuel shut-off valve 11 opens only with the

ignition of the engine and closes at specified hazard situations. The pressure regulator 13 reduces the pressure of the gas in case the pressure in the tank is too high for the engine injection system function.

ICS 43.060.40
Price based on 7 pages

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™