INTERNATIONAL STANDARD

ISO 15500-1

Second edition
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Road vehicles — Compressed natural gas (CNG) fuel system components —

Part 1: General requirements and definitions

Véhicules routiers — Composants des systèmes de combustible gaz naturel comprimé (GNC) —

Partie 1: Exigences générales et définitions

Reference number
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Foreword

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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 41, *Specific aspects for gaseous fuels*.

This second edition cancels and replaces the first edition (ISO 15500-1:2000), which has been technically revised.

It also incorporates the Amendment ISO 15500-1:2000/AMD 1:2003.

ISO 15500 consists of the following parts, under the general title *Road vehicles — Compressed natural gas (CNG) 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: Manual cylinder valve*

— *Part 6: Automatic valve*

— *Part 7: Gas injector*

— *Part 8: Pressure indicator*

— *Part 9: Pressure regulator*

— *Part 10: Gas-flow adjuster*

— *Part 11: Gas/air mixer*

— *Part 12: Pressure relief valve (PRV)*

— *Part 13: Pressure relief device (PRD)*

— *Part 14: Excess flow valve*

— *Part 15: Gas-tight housing and ventilation hose*

— *Part 16: Rigid fuel line in stainless steel*

— *Part 17: Flexible fuel line*

— *Part 18: Filter*

— *Part 19: Fittings*

— *Part 20: Rigid fuel line in material other than stainless steel*

Road vehicles — Compressed natural gas (CNG) fuel system components —

Part 1: General requirements and definitions

1 Scope

This part of ISO 15500 specifies general requirements and definitions of compressed 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 15500 is applicable to vehicles (mono-fuel, bi-fuel, or dual-fuel applications) using natural gas in accordance with ISO 15403-1. It is not applicable to the following:

a) liquefied natural gas (LNG) fuel system components located upstream of, and including, the vaporizer;

b) fuel containers;

c) stationary gas engines;

d) container mounting hardware;

e) electronic fuel management;

f) refuelling 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 15500 and tested according to the appropriate functional tests.

NOTE 2 All references to pressure in this part of ISO 15500 are to be considered gauge pressures unless otherwise specified.

NOTE 3 This part of ISO 15500 is based upon a service pressure for natural gas as fuel of 20 MPa [200 bar[1)]] settled at 15 °C. Other service pressures can be accommodated by adjusting the pressure by the appropriate factor (ratio). For example, a 25 MPa (250 bar) service 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 6722-1, *Road vehicles — 60 V and 600 V single-core cables — Part 1: Dimensions, test methods and requirements for copper conductor cables*

ISO 6722-2, *Road vehicles — 60 V and 600 V single-core cables — Part 2: Dimensions, test methods and requirements for aluminium conductor cables*

ISO 15500-2, *Road vehicles — Compressed natural gas (CNG) fuel system components — Part 2: Performance and general test methods*

ISO 15500-3, *Road vehicles — Compressed natural gas (CNG) fuel system components — Part 3: Check valve*

1) 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2

ISO 15501-1, *Road vehicles — Compressed natural gas (CNG) fuel systems — Part 1: Safety requirements*

3 Terms and definitions

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

3.1
valve
device by which the flow of a fluid may be controlled

3.1.1
manual valve
valve which is operated manually

3.1.2
automatic valve
valve which is not operated manually

3.1.3
automatic cylinder valve
automatic valve rigidly fixed to the cylinder which controls the flow of gas to the fuel system

3.1.4
check valve
automatic valve which allows gas to flow in only one direction

3.1.5
excess flow valve
valve which automatically shuts off, or limits, the gas flow when the flow exceeds a set design value

3.1.6
manual cylinder valve
manual valve rigidly fixed to the cylinder

3.1.7
pressure relief valve (discharge valve)
PRV
self-closing device which opens to prevent a pre-determined pressure being exceeded

3.1.8
service valve
manual valve which is closed only when servicing the vehicle

3.2
compressed natural gas
CNG
natural gas which has been compressed and stored for use as a vehicle fuel

3.3
filter
component containing a screen or media that is intended to remove foreign debris 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
gas/air mixer
device for mixing the gaseous fuel and intake air for the engine

3.7
gas flow adjuster
gas flow restricting device, installed downstream of a pressure regulator, controlling gas flow to the engine

3.8
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

3.9
natural gas vehicle
NGV
road vehicle powered by natural gas

3.9.1
mono-fuel NGV
road vehicle which operates on natural gas only

Note 1 to entry: It is also known as "Dedicated Natural Gas Vehicle".

Note 2 to entry: In Europe and in India, the term mono-fuel also applies to a light duty NGV with maximum 15 litre gasoline tank.

3.9.2
bi-fuel NGV
vehicle that has two independent fuel systems (one of them for natural gas) and can run alternatively on either fuel, but only on one at a time

3.9.3
dual-fuel NGV
vehicle that has two independent fuel systems (one of them for natural gas) and can run on both fuels simultaneously; it also may run on one fuel alone

3.10
pressure indicator
pressurized device which indicates the gas pressure; it can be a gauge or a sensor

3.11
pressure regulator
device used to control the delivery pressure of gaseous fuel to the engine

3.12
pressure relief device
PRD
one-time-use device triggered by excessive temperature or temperature and pressure acting in series or in parallel which vents gas to protect the cylinder from rupture

3.13
rigid fuel line
tubing which has been designed not to flex in normal operation and through which natural gas flows

3.14
service pressure
settled pressure of 20 MPa (200 bar) at a uniform gas temperature of 15 °C

Note 1 to entry: Other service pressures can be accommodated by adjusting the pressure by the appropriate factor (ratio). For example, a 25 MPa (250 bar) settled at 15 °C service pressure system will require pressures to be multiplied by 1,25.

3.15
test pressure
pressure to which a component is taken during acceptance testing

3.16
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

3.17
burst pressure
pressure which causes failure and consequential fluid loss through the component envelope

3.18
gas injector
device for introducing gaseous fuel into the engine or associated intake system

3.19
fuel rail
pipe or duct that connects the gas injectors

3.20
multifunctional component
device consisting of two or more different components specified by this part of ISO 15500, combined or fitted together

4 Construction and assembly

4.1 Components shall be made of materials suitable for use with CNG. Resistance to galvanic corrosion shall be taken under consideration when joining components containing dissimilar 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 Threads for components attached to the cylinder shall be clean-cut, even, without surface discontinuities, to gauge and conform to International Standards applied to the CNG Cylinder neck thread.

4.4 Components shall be suitable for service over one of the following temperatures ranges:

	Engine compartment	On-board (except engine compartment)
Moderate	-20 °C to 120 °C	-20 °C to 85 °C
Cold	-40 °C to 120 °C	-40 °C to 85 °C

4.5 All non-metallic materials used in seals and diaphragms shall comply with the oxygen ageing test specified in ISO 15500-2.

4.6 All non-metallic materials in contact with natural gas shall comply with the non-metallic material immersion test specified in ISO 15500-2.

4.7 All components subject to weather exposure and other corrosive conditions shall be made of corrosion resistant material or otherwise protected and comply with the corrosion resistance tests specified in ISO 15500-2.

4.8 It is recognized that multifunctional components may be made up of several components. Such components shall be examined for conformance to ISO 15500-3 and subsequent parts and tested according to the appropriate functional tests.

4.9 Automatic fuel flow shut-off valves shall be closed when de-energized.

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 6722-1 and ISO 6722-2.

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 Printed instructions shall state that the installation shall be in accordance with the regulations of the local authority, or, in the absence of local regulations, in accordance with ISO 15501-1.

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

7 Marking

The components shall include the following information as applicable and required in the relevant parts of ISO 15500:

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

b) the model designation (part number);

c) the working pressure (WP) and temperature range;

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

e) the type of fuel;

f) electrical ratings;