
**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

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 15500 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 15500-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 25, *Road vehicles using natural gas*.

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 cylindrical 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*

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- *Part 16: Rigid fuel line*
- *Part 17: Flexible fuel line*
- *Part 18: Filter*
- *Part 19: Fittings*

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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 using natural gas in accordance with ISO 15403 (mono-fuel, bi-fuel or dual-fuel applications). 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) 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 normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 3833:1977, *Road vehicles — Types — Terms and definitions.*

ISO 6722-1:1996, *Road vehicles — Unscreened low-tension cables — Part 1: Test methods.*

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ISO 6722-2:1996, *Road vehicles — Unscreened low-tension cables — Part 2: Requirements.*

ISO 6722-3:1993, *Road vehicles — Unscreened low-tension cables — Part 3: Conductor sizes and dimensions for thick-wall insulated cables.*

ISO 6722-4:1993, *Road vehicles — Unscreened low-tension cables — Part 4: Conductor sizes and dimensions for thin-wall insulated cables.*

ISO 15403:—¹⁾, *Natural gas — Designation of the quality of natural gas for use as a compressed fuel for vehicles.*

ISO 15500-2:—¹⁾, *Road vehicles — Compressed natural gas (CNG) fuel system components — Part 2: Performance and general test methods.*

ISO 15500-3:—¹⁾, *Road vehicles — Compressed natural gas (CNG) fuel system components — Part 3: Check valves.*

ISO 15501-1:—¹⁾, *Road vehicles — Compressed natural gas fuelling systems — Part 1: Safety requirements.*

DIN 477-1:1990, *Gas cylinder valves rated for test pressures up to 300 bar — Types, sizes, connections, screwthreads.*

ANSI/ASME B1.1:1989, *Unified inch screw threads (UN and UNR thread form).*

3 Terms and definitions

For the purposes of this part of ISO 15500, the following terms and definitions apply.

3.1

valve

device by which the flow of a fluid may be controlled

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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

1) To be published.

3.1.7**pressure relief valve****PRV**

device which prevents a pre-determined upstream 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**

protective screen which removes 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

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3.7**gas flow adjuster**

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

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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 mm²

3.9**natural gas vehicle****NGV**

road vehicle powered by natural gas

3.10**pressure indicator**

pressurised device which indicates the gas pressure

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 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

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

4 Construction and assembly

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4.1 Components shall be made of materials suitable for use with CNG.

4.1 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.

4.2 Components to be attached to the cylinder shall have one of the following threads:

- DIN 477 W 28.8 – 14 F × 1"
- 1 – 3/16" SAE
- 2-12 UNJ (nominal 2")

4.4 Components in the engine compartment shall be suitable for service within a temperature range of – 40 °C to 120 °C. All other components shall be suitable for service within a range of – 40 °C to 85 °C.

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

4.6 All synthetic materials in contact with natural gas shall comply with the non-metallic synthetic 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.

4.8 It is recognised that multifunctional components may be made up of several components as defined in ISO 15500-3. Such components shall be examined for conformance to this part of ISO 15500 and tested according to the appropriate functional tests.

4.9 Fuel flow shut-off shall be failure-safe.

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, parts 1 to 4.

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

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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 service 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 15500.

NOTE 1 Specific information required for each component can be found in ISO 15500-3 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.