Vägfordon – Bränslesystem för komprimerad naturgas –
Del 1: Säkerhetskrav

Road vehicles – Compressed natural gas (CNG) fuel systems –
Part 1: Safety requirements


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Foreword

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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 15501 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 15501-1 was prepared by Technical Committee ISO/TC 22, Road vehicles, Subcommittee SC 25, Road vehicles using natural gas.

ISO 15501 consists of the following parts, under the general title Road vehicles — Compressed natural gas (CNG) fuel systems:

— Part 1: Safety requirements
— Part 2: Test methods

Annexes A and B of this part of ISO 15501 are for information only.
Introduction

For the purposes of ISO 15501, all fuel system components in contact with natural gas have been considered suitable for natural gas as defined in ISO 15403.

When applying this part of ISO 15501, it is to be understood that a safety device to prevent overfilling the vehicle's fuel system is part of the refuelling station. The pressure gauge has not been considered as a safety component.

When necessary, technical solutions regarding functional requirements are given in this part of ISO 15501, as in annex A.

This part of ISO 15501 refers only to a service pressure of 20 MPa [200 bar\(^1\)]. Other service pressures and applications are under consideration for a future edition.

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1) \(1 \text{ bar} = 0,1 \text{ MPa} = 10^5 \text{ Pa}; 1 \text{ MPa} = 1 \text{ N/mm}^2\)
Road vehicles — Compressed natural gas (CNG) fuel systems —
Part 1: Safety requirements

1 Scope

This part of ISO 15501 specifies the minimum safety requirements applicable for the functionality of CNG on-board fuel systems intended for use on the types of motor vehicles as defined in ISO 3833. This part of ISO 15501 is applicable to vehicles using compressed natural gas in accordance with ISO 15403, including bi-fuel, original-production, and converted vehicles.

All matters relating to the skills of installers and converters have been excluded from this part of ISO 15501.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 15501. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 15501 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 1176:1990, Road vehicles — Masses — Vocabulary and codes
ISO 3833, Road vehicles — Types — Terms and definitions
ISO 11439, Gas cylinders — High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles
ISO 14469:— 1), Road vehicles — Compressed natural gas (CNG) refuelling connector
ISO 15403, Natural gas — Designation of the quality of natural gas for use as a compressed fuel for vehicles
ISO 15500 (all parts), Road vehicles — Compressed natural gas (CNG) fuel system components
ISO 15501-2, Road vehicles — Compressed natural gas (CNG) fuel systems — Part 2: Test methods
IEC 60079-10, Electrical apparatus for explosive gas atmospheres — Part 10: Classification of hazardous areas

3 Terms and definitions

For the purposes of this part of ISO 15501, the terms and definitions given in ISO 15500-1 and the following apply.

3.1 service pressure
settled pressure of vehicle fuel system of 20 MPa (200 bar) at a uniform natural gas temperature of 15 °C

1) To be published.
3.2 CNG on-board fuel system
compressed natural gas fuel system comprising cylinder, or cylinders, mounting, refuelling receptacle or more than one of each of these, according to ISO 14469, and the components described in ISO 15500-3 to ISO 15500-19

3.3 main shut-off valve
automatic valve designed to isolate a high-pressure source

4 Requirements

4.1 Design

4.1.1 General
The CNG on-board fuel system components shall comply with ISO 11439, ISO 14469 and ISO 15500, as applicable. The high-pressure system, specified in ISO 15500-1, shall be designed on the basis of the service pressure.

For bi-fuel vehicles, provision shall be made to avoid accelerated deterioration of the non-CNG fuel system as a result of sustained operation on natural gas. Such measures shall be as recommended by the original vehicle manufacturer (e.g. fuel hoses).

All fuel system components shall fulfill the following conditions.

a) They shall withstand the environmental temperatures and other environmental conditions safely during their operational life.

b) They shall be located with full regard for anticipated damage while the vehicle is being used safely. Such damage may be caused by the vehicle itself, by extraneous factors such as heat, road debris, automotive chemical splash (brake liquid, oil, petrol, cooling liquid, etc.) or rust.

c) They shall be fitted so that they are not the outermost, highest or lowest parts of the vehicle; otherwise they shall be protected.

d) They shall be fitted so as not to affect ground clearance, approach angle, ramp (break-over) angle or departure angles as defined by the vehicle manufacturer.

e) They shall be located so that they will not suffer corrosion damage by accumulation of water or cargo chemicals.

Both the gas cylinder valve and pressure relief device (PRD), an automatic shut-off valve that can be manually opened or closed in case of automated failure (see annex B), shall be located in a safe place or be suitably protected.

The CNG on-board fuel system shall include
— a main shut-off valve closed when the engine is not running on CNG, and
— a manual or manual override valve located on each gas cylinder.

The CNG on-board fuel system may include a device inside the gas cylinder or a functionally equivalent system to control gas leakage in the event of a rupture in the fuel supply system (see annex A).

The main shut-off valve shall only be open when
— CNG operation has been selected, either manually or automatically, and
— the engine is cranking or running.

Only automatic valves that are normally closed when deactivated shall be used in the CNG on-board fuel system.