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

**Part 19:  
Fittings**

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

*Partie 19: Raccords*



Reference number  
ISO 15500-19:2012(E)

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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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15500-19 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 25, *Vehicles using gaseous fuels*.

This second edition cancels and replaces the first edition (ISO 15500-19:2001), which has been technically revised.

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*

## Introduction

For the purposes of this part of ISO 15500, all fuel system components in contact with natural gas have been considered suitable for natural gas as defined in ISO 15403. However, 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.

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

This part of ISO 15500 is based on a service pressure for natural gas used as fuel of 20 MPa [200 bar<sup>1)</sup>] 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.

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1) 1 bar = 0,1 MPa = 10<sup>5</sup> Pa 1 MPa = 1 N/mm<sup>2</sup>.



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

## Part 19: Fittings

### 1 Scope

This part of ISO 15500 specifies tests and requirements for fittings, compressed natural gas (CNG) fuel system components intended for use on the types of motor vehicles defined in ISO 3833.

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. 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.

### 2 Normative references

The following referenced documents are indispensable for the application 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 15500-1, *Road vehicles — Compressed natural gas (CNG) fuel system components — Part 1: General requirements and definitions*

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

### 3 Terms and definitions

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

### 4 Marking

Marking of the component shall provide sufficient information to allow the following to be traced:

- 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.

The following additional markings are recommended:

- the direction of flow (when necessary for correct installation);
- the type of fuel;
- electrical ratings (if applicable);
- the symbol of the certification agency;
- the type approval number;
- the serial number or date code;
- reference to this part of ISO 15500.

NOTE 1 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.

NOTE 2 This information can be located on, or on a notice list inside, the packaging in which the component is shipped.

## 5 Construction and assembly

The fitting shall comply with the applicable provisions of ISO 15500-1 and ISO 15500-2, and with the tests specified in Clause 6 of this part of ISO 15500.

The fitting shall be compatible with the rigid fuel line.

## 6 Tests

### 6.1 Applicability

The tests required to be carried out are indicated in Table 1.

**Table 1 — Applicable tests**

Test	Applicable	Test procedure as required by ISO 15500-2	Specific test requirements of this part of ISO 15500
Hydrostatic strength	X	X	X (see 6.2)
Leakage	X	X	
Excess torque resistance	X	X	
Bending moment	X	X	
Continued operation	X	X	X (see 6.3)
Corrosion resistance	X	X	
Oxygen ageing	X	X	
Electrical over-voltages			
Non-metallic material immersion	X	X	
Vibration resistance	X		X (see 6.4)
Pull-off	X		X (see 6.5)
Brass material compatibility	X	X	

## 6.2 Hydrostatic strength

Test the fitting according to the procedure for testing hydrostatic strength specified in ISO 15500-2. The test pressure shall be four times the working pressure.

NOTE The higher hydrostatic test pressure for the fittings compared to the other components in the other parts of the ISO 15500 series is due to consistency with fuel line provisions.

## 6.3 Continued operation

Test the fitting in accordance with the procedure for testing continued operation given in ISO 15500-2 for a total of 100 000 cycles. The fitting shall only be tested while connected with a rigid fuel line.

Following cycling testing, perform the leak test specified by ISO 15500-2, then the hydrostatic strength test in accordance with 6.2 of this part of ISO 15500.

## 6.4 Vibration resistance

Vibrate the fitting assembly, pressurized to its working pressure and sealed at both ends, for 30 min along each of the three orthogonal axes at the most severe resonant frequencies determined as follows:

- by an acceleration of 1,5 g;
- within a sinusoidal frequency range of 10 Hz to 500 Hz;
- with a sweep time of 10 min.

If the resonance frequency is not found in this range, the test shall be conducted at 500 Hz.

At the completion of the test, the component shall not show any indication of fatigue or component damage, and shall meet the leakage test requirements specified in ISO 15500-2 and the hydrostatic strength test in accordance with 6.2 of this part of ISO 15500.

## 6.5 Pull off

Test the fitting, attached to its rigid fuel line and coupled to its mating part or parts, according to the following procedure and acceptance criterion. Secure the subject specimen in an appropriate test fixture, then statically apply a tensile load along the rigid fuel line axis at a maximum rate of 250 N/min until the rigid fuel line separates from the fitting.

The force ( $F$ ) in newtons, required to pull apart the rigid fuel line from its fitting, as measured in the previous test, shall be higher than the one calculated as:

$$F = (\pi \cdot d^2 \cdot P) \div 10$$

where

$d$  is the internal diameter, in millimetres;

$P$  is the working pressure, in bar.

This formula already includes a safety factor of four.

## 6.6 Repeated assembly

Fittings shall be able to withstand being assembled and disassembled 25 times in a manner that is representative of their field application.

At the completion of the test, the fittings shall comply with the leakage requirement specified in ISO 15500-2, 6.2.

## Bibliography

- [1] ISO 3833, *Road vehicles — Types — Terms and definitions*
- [2] ISO 15403-1, *Natural gas — Natural gas for use as a compressed fuel for vehicles — Part 1: Designation of the quality*
- [3] ISO/TR 15403-2, *Natural gas — Natural gas for use as a compressed fuel for vehicles — Part 2: Specification of the quality*



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