
**Road vehicles — Compressed natural
gas (CNG) fuel system components —
Part 20:
Rigid fuel line in material other than
stainless steel**

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*Véhicules routiers — Composants des systèmes de remplissage en gaz
naturel comprimé —
Partie 20: Circuit de combustible rigide en matériaux autres que
l'acier inoxydable*

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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.

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 15500-20:2007), 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*

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

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

1 Scope

This part of ISO 15500 provides specific requirements and tests applicable to the rigid fuel line in carbon steel, intended for use on the types of motor vehicles, as defined in ISO 3833, with a service pressure for natural gas as a fuel of 20 MPa (200 bar) settled at 15 °C.

ISO 15500 is intended to be applied to vehicles using natural gas which comply with requirements established in ISO 15403-1 (mono-fuel, bi-fuel, or dual-fuel applications). This part of ISO 15500 does not apply 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.

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NOTE All references to pressure in this part of ISO 15500 are considered gauge pressures unless otherwise specified.¹⁾

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For the 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:—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.

1) 1 bar = 100 kPa = 0,1 MPa.

2) To be published. (Revision of ISO 15500-2:2012)

4 Marking and labelling

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;
- a reference to this part of ISO 15500.

Every fuel line shall have at intervals not greater than 0,5 m the abovementioned information [at least a), b) and c)]. It shall be clearly legible and indelible. Marking shall be considered indelible if it continues to be legible after the tests in [Clause 6](#).

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5 Qualifications for construction and assembly

The rigid fuel line shall comply with the applicable provisions of ISO 15500-1 and ISO 15500-2, and with the tests specified in [Clause 6](#). Tolerances should follow the specifications of ISO 15500-2.

The rigid fuel line in carbon steel shall be seamless.

The rigid fuel line and the fittings devices shall be compatible, in order to avoid electrochemical corrosion.

6 Tests

6.1 Applicability

The tests shall be carried out as indicated in [Table 1](#)

Table 1 — Applicable tests

Test methods	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			
Bending moment			
Continued operation	X	X	X (see 6.3)
Corrosion resistance	X	X	X (see 6.4)
Oxygen ageing	X ^a	X ^a	

^a Applicable to non-metallic coating.

Table 1 (continued)

Test methods	Applicable	Test procedure as required by ISO 15500-2	Specific test requirements of this part of ISO 15500
Ozone ageing			
Heat ageing			
Automotive fluids	X	X	
Electrical over-voltages			
Non-metallic synthetic immersion	X ^a	X ^a	
Vibration resistance			
Brass material compatibility			
Bending	X		X (see 6.5)
Conductivity			
^a Applicable to non-metallic coating.			

6.2 Hydrostatic strength

The rigid fuel line shall be tested according to the procedure for testing hydrostatic strength specified in ISO 15500-2.

Test pressure shall be four times working pressure.

NOTE The higher hydrostatic test pressure for the rigid fuel line than the other parts of ISO 15500 components is due to the necessary provisions to cope for eventual damage or abrasions under normal operation.

6.3 Continued operation

The rigid fuel line shall be subjected to a continued operation test in accordance with ISO 15500-2 for a total of 100 000 cycles. Following cycling, perform the hydrostatic test in accordance with 6.2.

6.4 Corrosion resistance

The rigid fuel line shall be subjected to a corrosion resistance test in accordance with ISO 15500-2 for a total of 500 hours. The corrosion resistance shall be made on the rigid fuel line without any protective sleeve.

6.5 Bending

Test the rigid fuel line according to the following procedure and acceptance criterion.

- Select a mandrel with a diameter according to Table 2.
- Bend the rigid fuel line over this mandrel once, forming a “U” shape.
- Perform corrosion resistance test according to ISO 15500-2:—, Clause 10 and 6.4.
- Close the rigid fuel line’s ends and pressurize it to four times its working pressure. At completion of the test, the rigid fuel line shall not leak.

Table 2 — Rigid fuel line external (RFLE) diameter

RFLE diameter	MANDREL diameter
≤8 mm	3 · RFLE diameter
>8 mm	5 · RFLE diameter