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

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

*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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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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 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 15500-20 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 25, *Vehicles using gaseous fuels*.

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*

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- *Part 16: Rigid fuel line*
- *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 (mono-fuel, bi-fuel or dual-fuel applications). This part of ISO 15500 does not apply to the following:

- liquefied natural gas (LNG) fuel system components located upstream of, and including, the vaporizer;
- fuel containers;
- stationary gas engines;
- container mounting hardware;
- electronic fuel management;
- refuelling receptacles.

NOTE All references to pressure in this part of ISO 15500 are considered gauge pressures unless otherwise specified. 1 bar = 100 kPa = 0,1 MPa.

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

ISO 15500-1, *Road vehicles — Compressed natural gas (CNG) fuel system components — Part 1: General requirements and definitions*

ISO 15500-2:2001, *Road vehicles — Compressed natural gas (CNG) fuel system components — Part 2: Performance and general test methods*

ISO 15403 (all parts), *Natural gas — Natural gas for use as a compressed fuel for vehicles*

EN 10305-1, *Steel tubes for precision applications — Technical delivery conditions — Part 1: Seamless cold drawn tubes*

3 Terms and definitions

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

4 Marking and labelling

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

- the manufacturer's or agent's name, trademark or symbol;
- the model designation (part number);
- the service 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 This information applies to both coated and uncoated tubes and can be provided by a suitable identification code, in accordance with EN 10305-1.

5 Qualifications for construction and assembly

The rigid fuel line shall comply with the applicable provisions of ISO 15500-1 and ISO 15500-2:2001, and with the tests specified in Clause 6.

The rigid fuel line in carbon steel shall be in accordance with EN 10305-1.

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 15500-2:2001 | 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 | |
| Oxygen ageing | X ^a | X ^a | |
| Electrical over-voltages | | | |
| Non-metallic synthetic immersion | X ^a | X ^a | |
| Vibration resistance | | | |
| Brass material compatibility | | | |
| Bending | X | | X (see 6.4) |
| 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 15500-2:2001.

Test pressure upstream of the first stage of the pressure reduction shall be 100 MPa (1 000 bar). Test pressure downstream of the first stage of the pressure reduction shall be four times its working pressure.

6.3 Continued operation

The rigid fuel line shall be subjected to a continued operation test for a total of 100 000 cycles.

6.4 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 ISO 15500-2:2001, Clause 10.
- Close the rigid fuel line's ends and pressurize it to four times its service pressure.

At completion of the test, the rigid fuel line shall not leak and all coatings that provide the corrosion resistance shall not break or crack.

Table 2 — Rigid fuel line external (RFLE) diameter

| RFLE diameter | MANDREL diameter |
|---------------|-------------------|
| ≤ 8 mm | 3 × RFLE diameter |
| > 8 mm | 5 × RFLE diameter |

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