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

Part 14: Excess flow valve

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

Partie 14: Valve de limitation de débit

Reference number
ISO 15500-14:2012(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 15500-14 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 15500-14:2002), 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[1)]] 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.

1) 1 bar = 0,1 MPa = 10^5 Pa 1 MPa = 1 N/mm^2.

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

Part 14: Excess flow valve

1 Scope

This part of ISO 15500 specifies tests and requirements for the excess flow valve, a compressed natural gas (CNG) fuel system component 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 and the following apply.

3.1
internal excess flow valve
excess flow valve installed inside the cylinder or cylinder valve

3.2
external excess flow valve
excess flow valve installed outside the cylinder or cylinder valve

3.3
shut-off type excess flow valve
excess flow valve that stops flow when in the closed position

3.4
flow-limiter type excess flow valve
excess flow valve that limits flow when activated

NOTE The device resets automatically when the excess flow condition is no longer present.

3.5
activation pressure
differential pressure flow or other condition specified by the manufacturer at which the excess flow valve is activated

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 operating specifications (working pressure, temperature range, excess flow valve type, activation flow or ΔP, maximum flow when activated).

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 data code;

— reference to this part of ISO 15500.

NOTE 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.

5 Construction and assembly

The excess flow valve 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.

6 Tests

6.1 Applicability

There are many types of excess flow valves available. This part of ISO 15500 provides requirements for two different designs: internal and external excess flow valves. A valve of either design could be one of two different types: shut-off or flow-limiter. A shut-off valve should have a means of resetting after activation. As excess flow valve designs vary, so will the tests required.

The function of an excess flow valve can be achieved in other ways. For example, instead of using a mechanical device, an electronic system can be adopted to ensure the closing or limiting of the gas flow from the cylinder in an accident.

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

Table 1 — Applicable tests

Test method	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	X (see 6.3)
Excess torque resistance	X	X	X (see 6.4)
Bending moment	X	X	X (see 6.5)
Continued operation	X	X	X (see 6.6)
Corrosion resistance	X	X	
Oxygen ageing	X	X	
Non-metallic material immersion	X	X	
Vibration resistance	X	X	
Brass material compatibility	X	X	
Operation	X		X (see 6.7)
Pressure impulse	X		X (see 6.8)

6.2 Hydrostatic strength

The purpose of the hydrostatic strength test is to establish the strength of the housing.

Test the excess flow valve according to the procedure for testing hydrostatic strength specified in ISO 15500-2. For internal or external excess flow valves, the test pressure shall be 2,5 times the working pressure.

6.3 Leakage

The internal leakage test shall be conducted on shut-off type excess flow valves. Test the excess flow valve according to the procedure for leakage test as specified in ISO 15500-2 at the temperatures and pressures given in Table 2.

Table 2 — Test temperatures and pressures

Temperature °C	**Pressure** Factor × working pressure (WP)	
	First test	Second test
−40 or −20 as applicable	0,6 × WP	Activation pressure
20	Activation pressure	1,2 × WP
85 or 120	Activation pressure	

6.4 Excess torque resistance

The excess torque resistance test shall be conducted only on external excess flow valves. The test procedure shall be carried out according to ISO 15500-2.

6.5 Bending moment

The bending moment test shall be conducted only on external excess flow valves. The test procedure shall be carried out according to ISO 15500-2.

6.6 Continued operation

6.6.1 The excess flow valve shall be subjected to 20 cycles at a differential pressure equal to working pressure. One cycle shall consist of one opening and one closing. Upon completion of the test, the valve shall comply with 6.3 and 6.7.

6.6.2 Following cycling, operation and leakage testing, perform the hydrostatic test in accordance with 6.2 of this part of ISO 15500.

6.7 Operation

Measure the activation flow or ΔP and the flow of the excess flow valve when it activates. Perform the test using the activation conditions stated by the manufacturer; the measured flows and pressures shall meet the manufacturer's specified flow and pressure.

6.8 Pressure impulse

The excess flow valve shall withstand 100 pressure pulses, as follows.

a) If the excess flow valve is external, connect both inlet and outlet to a pipe or tube of the type specified by the manufacturer and of at least 1 m in length each.

b) If the excess flow valve is internal, the valve containing the excess flow valve to be tested shall be connected securely by a suitable fitting to a pressurized source of dry air, nitrogen or natural gas. Connect the outlet to a pipe or tube of the type specified by the manufacturer and of at least 1 m in length.

c) Both the outlet and inlet of the excess flow valve shall be conditioned at atmospheric pressure.

d) Working pressure shall be instantaneously applied to the valve inlet.

e) c) and d) shall be repeated 100 times.

f) Test the component in the same way with reverse flow direction.

Following the pressure impulse test, conduct an operation test according to 6.7.

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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