DRAFT INTERNATIONAL STANDARD ISO/DIS 16380

ISO/TC **22**/SC **25** Secretariat: **UNI**

Voting begins on **2013-01-12** Voting terminates on **2013-04-12**

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Road Vehicles — Blended Fuels Refuelling Connector

Véhicules routiers — Pistolet de remplissage pour les mélanges de carburants gazeux

ICS 75.200

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

Contents

Page

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

ISO 16380 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 25, *Vehicles using gaseous fuel,* JWG5 *Fuel system components of vehicles propelled by gaseous hydrogen or by blends of hydrogen and methane*

Annexes A and B are for information only. Annex C forms an integral part of this part of ISO 16380.

Introduction

A nozzle certified to this International Standard will be functionally compatible from a safety and performance perspective with all listed receptacles of compatible profile and system pressure. Similarly, a receptacle certified to this standard will be functionally compatible from a safety and performance perspective with all listed nozzles of compatible profile and system pressure.

A there may eventually be many different kinds of nozzles and receptacles available from a variety of manufacturers which, for safety reasons, shall all be compatible with each other, this International Standard specifies a series of receptacle profiles. These standard profiles incorporate the design specifications (mating materials, geometry and tolerances) which may be considered in the certification of a submitted nozzle or receptacle.

The construction and performance of nozzles and receptacles are based on the observation that four main parameters affect user safety and system compatibility.

1) There exist two different sizes of refuelling systems. As there is the size1 and size 2.

   Size 1 should suit the need of smaller vehicles with a limited tanks size. Therefore the flow diameter is limited by the inner front diameter of the receptacle – in this case Ø7.8mm +-0.2mm.

   Size 2 should suit the need of commercial vehicles like busses and trucks. Therefore the flow diameter is limited by the inner front diameter of the receptacle – in this case Ø12mm+-0.2mm.

   Also the profile of the two different sizes is so different that no cross connection between the sizes is possible.

2) Working Pressure (=1.25 times Service Pressure). All nozzles and receptacles are designed to have a working pressure of:

Code	Service Pressure	Working Pressure
Size 1		
M200	20 MPa	25 MPa
M250	25 MPa	31.25 MPa
M350	35 MPa	43.75 MPa
Size 2		
N200	20 MPa	25 MPa
N250	25 MPa	31.25 MPa

3) Design Life. Frequency of use is the second parameter to be considered. Since frequency of use will differ with the nozzle/receptacle application (i.e., public sector, fleet employee and residential), all receptacles will be tested at 10 000 connect/disconnect cycles for compliance with this standard. In addition, all nozzles shall be tested according to the following frequency use classifications, as applicable:

— Class A Nozzle - This class specifies high frequency use, with a cycle life of 100 000. This equates to approximately 100 fills per day for three years.

— Class B Nozzle - This class specifies medium frequency use, with a cycle life of 20 000 cycles. This equates to approximately 10 fills per day for five years.

4) Training. Operator training required is in accordance with national requirements.

Road Vehicles — Blended Fuels Refuelling Connector

1 Scope

1.1 This International Standard applies to Compressed Blended Fuels vehicle nozzles and receptacles hereinafter referred to as devices, constructed entirely of new, unused parts and materials. Compressed Blended Fuels fuelling connection nozzles consist of the following components, as applicable:

a) Receptacle and protective cap (mounted on vehicle) (see clause 7).

b) Nozzle (mounted on dispenser side) (see clause 5).

1.2 This International Standard applies to devices which have a Service Pressure of 20MPa, 25MPa and 35MPa hereinafter referred to in this International Standard as (see 9.1c):

Size 1: M200, M250 and M350

Size 2: N200 and N250

1.2.1 This standard refers to Service Pressures of 20MPa, 25MPa and 35MPa for size 1 and 20MPa and 25MPa for size 2.

1.3 This International Standard applies to devices with standardised mating components (see subclause 5.8 and subclause 7.7).

1.4 This International Standard applies to connectors which:

1) prevent blended fuels vehicles from being fuelled by dispenser stations with Working Pressures higher than the vehicle fuel system Working Pressure, and

2) allow blended fuels vehicles to be fuelled by dispenser stations with Working Pressures equal to or lower than the vehicle fuel system Working Pressure, and

3) allow blended fuels vehicles to be fuelled by dispenser stations for compressed natural gas

4) allow blended fuels vehicles to be fuelled by compressed natural gas dispenser stations with Working Pressures equal to or lower than the vehicle fuel system Working Pressure.

5) prevent blended fuels vehicles size 1 being refuelled on blended fuels dispenser stations equipped with a size 2 nozzle and vice versa.

6) prevent Natural Gas vehicles from being fuelled by blended fuels station dispensers

7) prevent Pure Hydrogen vehicles from being fuelled by blended fuels station dispensers

1.5 This International Standard is applicable to:

Mixtures of Hydrogen from 2% to 30% in volume and compressed natural gas containing:

1) natural gas in accordance with ISO15403 Part 1 and 2

2) pure Hydrogen as per ISO 14687-1 or ISO/TS 14687-2

1.6 All references to pressures (MPa) throughout this International Standard are to be considered gauge pressures unless otherwise specified.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard 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.

EN 10204, *Metallic products - Types of inspection documents*

ISO 188, *Rubber vulcanized — Accelerated ageing or heat-resistance tests*.

ISO 1431-1, *Rubber, vulcanized or thermoplastic - Resistance to ozone cracking - Part 1: Static and dynamic strain testing*

ISO 1817, *Rubber vulcanized — Determination of the effect of liquids*.

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*.

ISO 14687-1, *Hydrogen fuel - Product specification* - Part 1: All applications except proton exchange membrane (PEM) fuel cell for road vehicles.

ISO/TS 14687-2, Hydrogen Fuel — Product Specification — Part 2: Proton exchange membrane (PEM) fuel cell applications for road vehicles.

ISO 15403-1, Natural gas - Natural gas for use as a compressed fuel for vehicles - Part 1: Designation of the quality

ISO TR 15403-2, *Natural gas - Natural gas for use as a compressed fuel for vehicles - Part 1: Specification of the quality*

ISO 15501-1, *Road vehicles — Compressed natural gas fuelling systems — Part 1: Safety requirements.*

ISO 15501-2, Road vehicles - Compressed natural gas (CNG) fuel systems - Part 2: Test methods

ISO TR 15916, Basic considerations for the safety of hydrogen systems

ISO CD 17268, Compressed hydrogen surface vehicle refuelling connection devices

ISO 11114-4, Transportable gas cylinders - Compatibility of cylinder and valve materials with gas contents - Part 4: Test methods for selecting metallic materials resistant to hydrogen embrittlement

ISO 14175, Welding consumable - Gases and gas mixture for fusion welding and allied processes

SAE J2600, Compressed Hydrogen Surface Vehicle Refuelling Connection Devices

SAE J2601, Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles

SAE J2719, Information Report on the Development of a Hydrogen Quality Guideline for Fuel Cell Vehicles

SAE J2799, 70 MPa Compressed Hydrogen Surface Vehicle Fueling Connection Device and Optional Vehicle to Station Communications

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1 air, dry

air with moisture content such that the dew point of the air at the required test pressure is at least 11 °C below the ambient test temperature.

3.2 hydrostatic pressure

pressure to which a component is taken to verify the structural strength of the component

3.3 working pressure

maximum pressure that a connector may be expected to withstand in actual service (calculatory base: Service Pressure times 1.25)

3.4 service pressure

settled pressure of 20MPa, 25MPa and 35MPa at a uniform gas temperature of 15 °C

3.5 positive locking means

feature which requires actuation of an interlocking mechanism to allow connection/disconnection of the nozzle from the receptacle

3.6 compressed blended fuels refuelling nozzle

device which permits quick connection and disconnection of fuel supply hose to the Compressed Blended Fuels receptacle in a safe manner, hereafter referred to as Compressed Blended Fuels nozzle

3.7 compressed blended fuels refuelling receptacle

device connected to a vehicle or storage system which receives the Compressed Blended Fuels nozzle and permits safe transfer of fuel, hereafter referred to as receptacle

3.8 compressed blended fuels refuelling connector

joint assembly of Compressed Blended Fuels nozzle and receptacle, hereafter referred to as connector

3.9 non-sparking materials:

A stainless steel material can be considered as non-sparking when the alloy content of Chromium and Nickel is above 22%.

3.10 hydrogen embrittlement

is the process by which various metals, most importantly high-strength steel, become brittle and crack following exposure to hydrogen.

3.11 compressed blended fuels

A blended fuel is a mixture out of Hydrogen from 2% to 30% in volume and Natural Gas which is used as a vehicular fuel at a specified pressure as in the Introduction point 2.

3.12 leak test gas

Gas used for leak testing purposes.

3.13 cycle life

connections and disconnections to a nozzle

3.14 service life

operations of the check valve

4 General construction requirements

4.1 Compressed blended fuels nozzles and receptacles shall be well fitted and manufactured in accordance with good engineering practice. All construction requirements may be met by either the construction specified in this International Standard or another construction that gives at least equivalent performance.

4.2 Compressed blended fuels nozzles and receptacles shall be:

— designed to minimise the possibility of incorrect assembly;

— designed to be secure against displacement, distortion, warping or other damage;

— constructed to maintain operational integrity under normal and reasonable conditions of handling and usage.

4.3 Nozzles and receptacles shall be manufactured of materials suitable and compatible for use with compressed blended fuels at the pressure and the temperature ranges to which it will be subjected.

4.3.1 The temperature ranges shall be:

Table 1 — Temperature ranges

	Location on board	
	Location a	**Location b**
Cold	**- 40°C to 120°C**	**- 40°C to 85°C**
Moderate	**- 20°C to 120°C**	**- 20°C to 85°C**

Location a: inside the engine compartment in case of Internal Combustion engine vehicle.

Location b: elsewhere in case of Internal Combustion engine vehicle.

4.4 Compressed Blended Fuels nozzles and receptacles shall be constructed out of materials which have to be proven for the intend of withstanding a blended fuels mixture at the given pressures, temperatures and contents of the fuel that can be expected in this system.

4.5 Separate external three-way valves shall be constructed and marked so as to indicate clearly the open, shut, and vent positions.

4.6 Compressed Blended Fuels nozzles and receptacles shall be operated either to connect or disconnect without the use of tools.

4.7 Jointing components shall provide gas tight sealing performance.

4.8 Unless otherwise specified, all tests shall be conducted using dry hydrogen, helium or blends of nitrogen with a minimum 5% of hydrogen. Test shall be performed by qualified personnel and appropriate safety measures shall be taken. The dew point of the test gas at the test pressure shall be at the temperature at which there is no icing, or hydrate or liquid formation. The dew point of the test gas at the test pressure shall be at the temperature at which there is no icing, or hydrate or liquid formation.

5 Nozzles

5.1 Nozzles shall be one of three types as described in a) to c). (Also see Annex A)

a) Type 1, which is a nozzle for use with dispensing hoses that remain fully pressurised at dispenser shutdown. The nozzle shall not allow gas to flow until a positive connection has been achieved. The nozzle shall be equipped with an integral valve or valves, incorporating an operating mechanism which first stops the supply of gas and safely vents the trapped gas before allowing the disconnection of the nozzle from the receptacle. The operating mechanism shall ensure the vent valve is in the open position before the release mechanism can be operated and the gas located between the nozzle shut-off valve and the receptacle check valve is safely vented prior to nozzle disconnection (see subclause 10.2).

b) Type 2, which is a nozzle for use with dispensing hoses that remain fully pressurised at dispenser shutdown. A separate three-way valve connected directly, or indirectly, to the inlet of the nozzle is required to safely vent trapped gas prior to nozzle disconnection. The nozzle shall not permit the flow of gas if unconnected. Venting is required prior to disconnection of the nozzle (see subclause 10.2).

c) Type 3, which is a nozzle for use with dispensing hoses which are automatically depressurised (0,5 MPa and below) at dispenser shutdown (see subclause 10.2).

In addition, nozzles shall be classified in terms of cycle life as follows:

— CLASS A - This class specifies high frequency use, with a cycle life of 100 000.

— CLASS B - This class specifies low frequency use, with a cycle life of 20 000.

5.2 Venting or de-pressurisation of all nozzle types is required prior to disconnection. Disconnection of all nozzles shall be capable of being accomplished in accordance with subclause 10.2.

5.3 The method for attaching the nozzle to the fuel dispensing system hose shall not rely on the joint threads between the male and female threads for sealing, such as conical threads.

5.4 The three-way valve vent port of Type 1 and Type 2 nozzles shall be protected from the ingress of foreign particles and fluid which would hamper the operation of the valve. It has to be considered that the vented gas has to be lead into a safe direction.

5.5 The portions of a nozzle which are held by the user for connection or disconnection may be thermally insulated or it shall be assured that no abnormal dangerous temperatures can be transferred to the user.

5.6 A Type 1 nozzle shall bear a marking in accordance with clause 9, indicating the direction of the open and shut operation of the actuating mechanism, if necessary.

5.7 The interface surface of the nozzle shall be constructed of material having a hardness > 75 Rockwell B (HRB 75) and shall be non-sparking and conductive (see subclause 10.11.5 and subclause 10.15).

A proof for adequate hardness can be a Mil Sheet or an EN10204-3.1 certificate or a similar acceptable certificate if hardness is mentioned on there.

The exposed surfaces of the nozzles shall be made of non-sparking materials (see subclause 10.11.5 and subclause 10.15).

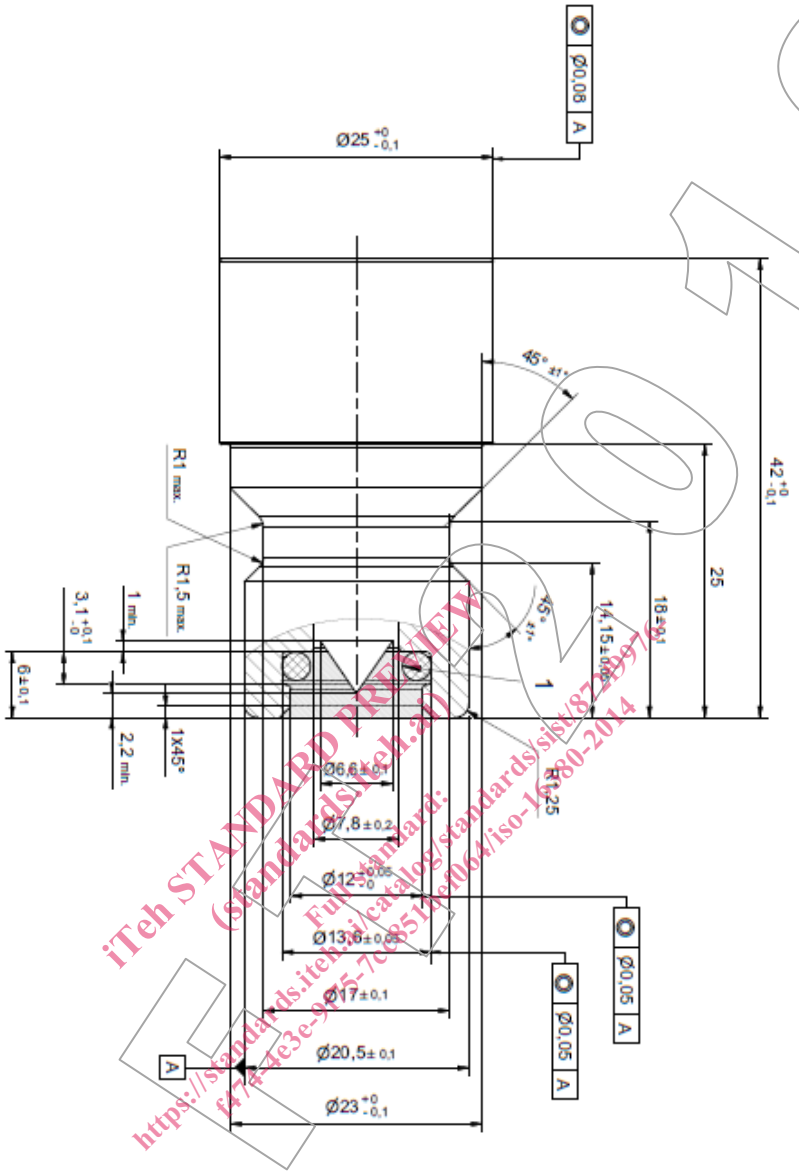
5.8 Nozzles shall comply with the performance requirements of clause 10 to ensure interchangeability.

5.9 The vent line of Type 1 and 2 nozzles must withstand max. working pressure at full flow conditions.

6 Standard receptacle dimensions

6.1 Standard receptacle dimensions Size 1 (M200, M250; M350)

A receptacle size 1 shall comply with the design specifications detailed in Figures 1-3.



Key

This area shall be kept free of all components.

1 Sealing surface equivalent to No. 110 O-ring of dimensions:
9,19 mm ± 0,127 mm ID
2,62 mm ± 0,076 mm width

Sealing surface finish: 0,8 µm to 0,05 µm
Material hardness: 75 Rockwell B (HRB 75) minimum

Figure 1 — Size 1 - M200 Receptacle