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Road vehicles — Compressed natural gas (CNG) refuelling connector —

Part :
20 MPa (200 bar) connector

Véhicules routiers — Connecteur de remplissage en gaz naturel comprimé (GNC) —

Partie : Connecteur 20 MPa (200 bar)

ICS: 43.060.40

Reference number
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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 14469was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 25, *Road vehicles using natural gas*.

Introduction

This International Standard was developed to use in the examination, testing and certification of newly produced compressed natural (CNG) gas vehicle fuelling nozzles and receptacles and, as such, applies only to the nozzles and receptacles used in CNG fuelling systems, and not to the system itself.

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 certified receptacle will be functionally compatible from a safety and performance perspective with all listed nozzles of compatible profile and system pressure.

As there may eventually be many different kinds of nozzles and receptacles available from a variety of manufacturers which, for safety reasons, must all be compatible with one another, 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. This International Standard refers only to one working pressure and one application.

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

a) Working pressure

All nozzles and receptacles are designed to have a working pressure of either 20 MPa (200 bar) for B200 and C200 connectors or 25 MPa (250 Bar) for B250 and C250 connectors

b) 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 International Standard. In addition, all nozzles will be tested according to the following frequency use classifications, as applicable:

1) Class A Nozzle, specifying high frequency use, with a cycle life of 100 000 cycles and equating to approximately 100 fills per day for three years;

2) Class B Nozzle, specifying medium frequency use, with a cycle life of 20 000 cycles and equating to approximately 10 fills per day for five years.

c) Training

Operator training required is in accordance with national requirements.

Road vehicles — Compressed natural gas (CNG) refuelling connector —

1 Scope

This International Standard specifies CNG refuelling nozzles and receptacles constructed entirely of new and unused parts and materials, for road vehicles powered by compressed natural gas. A CNG refuelling connector consists of, as applicable, the receptacle and its protective cap (mounted on the vehicle) and the nozzle.

This International Standard is applicable only to such devices designed for a service pressure of 20 MPa (200 bar) and 25 MPa (250 bar),, to those using CNG in accordance with ISO 15403 parts 1 and 2 and having standardized mating components, and to connectors that prevent natural gas vehicles from being fuelled by dispensers with service pressures higher than that of the vehicle, while allowing them to be fuelled by dispensers with service pressures less than or equal to the vehicle fuel system service pressure.

This International Standard refers to service pressures of 20 MPa and 25 MPa for:

- size 1: B200 and B250
- size 2: C200 and C250

NOTE All references to pressures, given in megapascals and bar (1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2) are to be considered gauge pressures, unless otherwise specified.

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 188:1982, *Rubber, vulcanized — Accelerated ageing or heat-resistance tests*

ISO 1817:1985, *Rubber, vulcanized — Determination of the effect of liquids*

ISO 9227:1990, *Corrosion tests in artificial atmospheres — Salt spray tests*

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

ISO/TR 15403-2 Natural Gas - Natural gas for use as a compressed fuel for vehicles – Part 2: Specification of the quality

ISO 15501-1, *Road vehicles — Compressed natural gas (CNG) fuel systems — Part 1: Safety requirements*

3 Terms and definitions

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

3.1
dry air
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 CNG refuelling connector can be expected to withstand in actual service

3.4
service pressure
settled pressure of 20 MPa (200 bar) at a uniform gas temperature of 15 °C for B200 and C200 connectors or 25 MPa (250 Bar) for B250 and C250 connectors

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

3.7
CNG refuelling receptacle
device connected to a vehicle or storage system which receives the CNG refuelling nozzle and permits safe transfer of fuel, hereafter referred to as receptacle

3.8
CNG refuelling connector
joined assembly of CNG refuelling nozzle and receptacle, hereafter referred to as connector

4 General construction requirements

4.1 Nozzles and receptacles manufactured in accordance with this International Standard shall be designed in accordance with reasonable concepts of safety, durability and maintainability.

4.2 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.

4.3 Nozzles and receptacles shall be

— designed to minimize the possibility of incorrect assembly,

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

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

4.4 Nozzles and receptacles shall be manufactured of materials suitable and compatible for use with CNG at the pressure and the temperature ranges to which they will be subjected (see Clause 1).

The minimum temperature range shall be selected by the manufacturer between the following ranges:

−40 °C to 85 °C or 120°C as applicable

−20 °C to 85°C or 120 °C as applicable

Note1 :The lower temperature limit depends on whether the component is to be used for mild or cold weather

Note 2: The high temperature limit depends on whether the component will be installed inside the engine compartment (120°C) or outside of the engine compartment (85°C).

4.5 Nozzles and receptacles constructed of brass shall use brass alloys with a copper mass content ≤ 70 %. This will ensure proper material compatibility with all the constituents of natural gas.

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

4.7 Nozzles and receptacles shall be operated either to connect or disconnect without the use of tools.

4.8 The receptacle shall be mounted on the vehicle in accordance with ISO 15501-1.

4.9 Jointing components shall provide gas-tight sealing performance.

5 Nozzles

5.1 Nozzles shall be one of the three types according to a), b) and c). See also Annex A.

a) Type 1 is a nozzle for use with dispensing hoses that remain fully pressurized 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 that the vent valve is in the open position before the release mechanism can be operated and that the gas located between the nozzle shut-off valve and the receptacle check valve is safely vented prior to nozzle disconnection (see 10.2).

b) Type 2 is a nozzle for use with dispensing hoses that remain fully pressurized 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 10.2).

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

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

— Class A, specifying high frequency use, with a cycle life of 100 000;

— Class B, specifying low frequency use, with a cycle life of 20 000.

5.2 Venting or de-pressurization of all nozzle types is required prior to disconnection. Disconnection of all nozzles shall be able to be accomplished in accordance with 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 (e.g. conical threads).

5.4 The three-way valve exhaust 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.

5.5 The portions of a nozzle which are held by the user for connection or disconnection may be thermally insulated.

5.6 A Type 1 nozzle shall bear a marking indicating the direction of the open and shut operation if it contains a rotating actuation mechanism .

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 10.11.5 and 10.15).

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

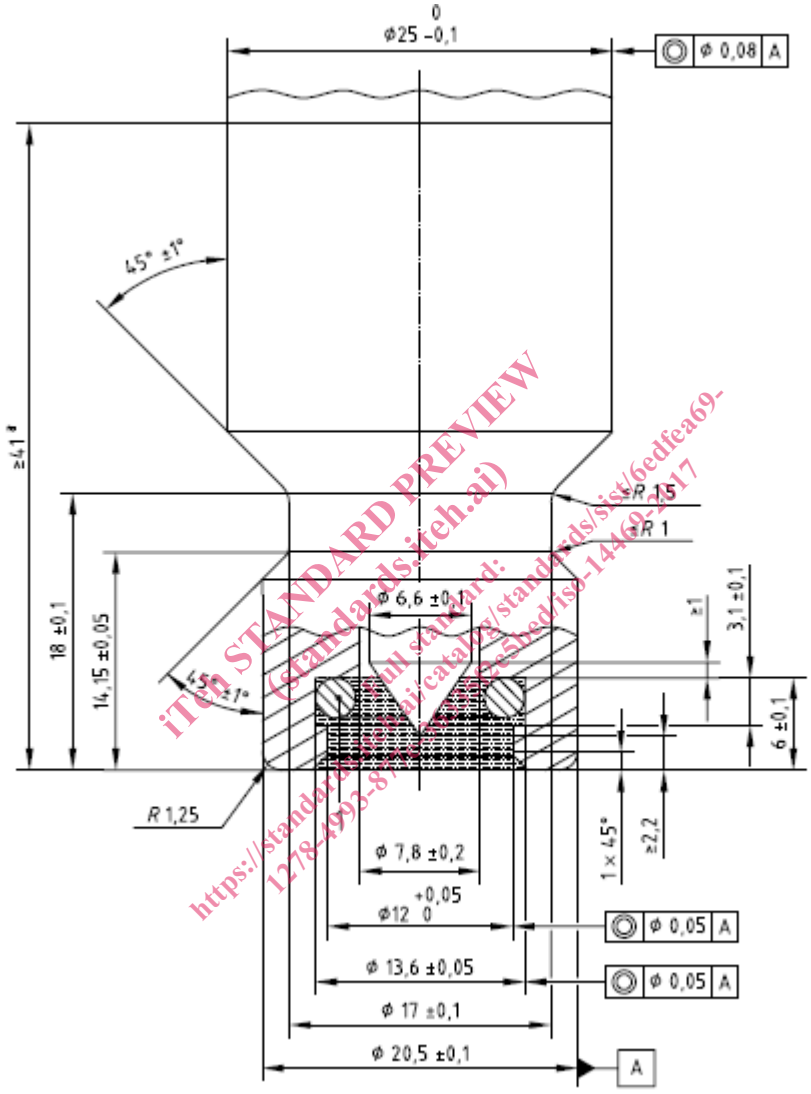
5.8 Nozzles shall comply with the performance requirements of Clause 10 to ensure interchangeability.

6 Standard receptacle dimensions

6.1 Standard receptacle dimensions Size 1 (B200, B250)

A receptacle size 1 shall comply with the design specifications shown in Figure 1 and 2.

Dimensions in millimetres
Surface roughness ⌴ Ra 3,2 µm



Key

This area shall be kept free of all components.

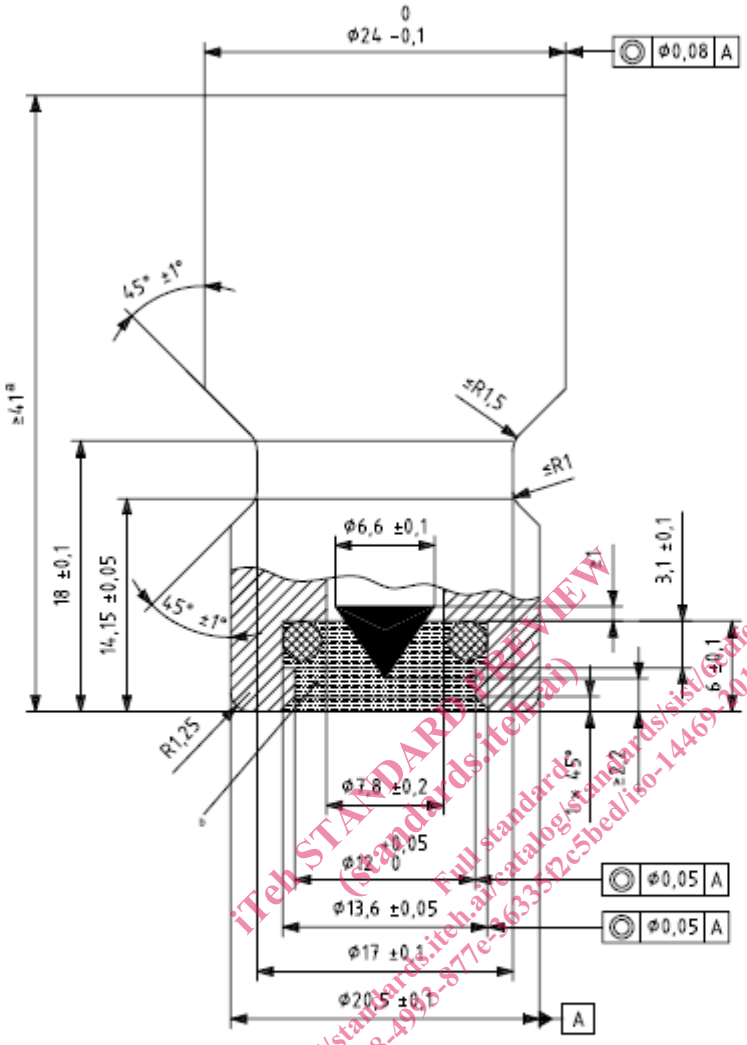
1 Sealing surface equivalent to No. 110 O-ring of dimensions:
9,19 mm ± 0,127 mm ID
2,62 mm ± 0,076 mm width

Material hardness: 75 Rockwell B (HRB 75) minimum

a Minimum length of the receptacle which is clear of provisions for attachment of receptacle or protective caps.

Figure 1 — B200 receptacle

Dimensions in millimetres



NOTES:

Sealing dimensions: ID 9,19 mm ± 0,127 mm; width 2,62 mm ± 0,076 mm.

Sealing surface finish: 0,8 µm to 0,05 µm

Material hardness: ⩾ HRB 75.

Surface finish range: ⩽ 3,2 µ.

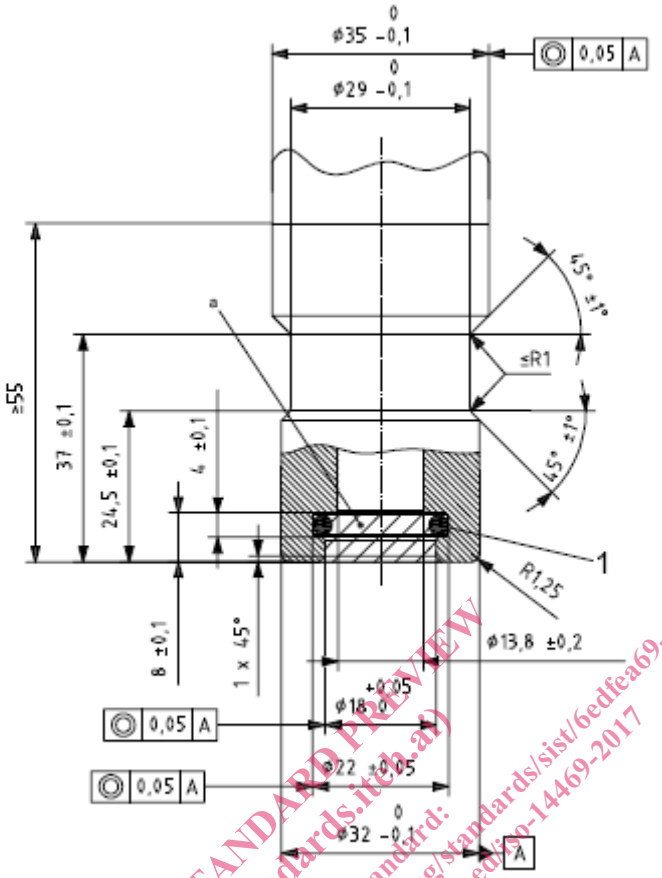
[a] Minimum length of the receptacle that is clear of provisions for attachment of the receptacle or protective caps.

[b] This shaded area shall be kept free of all components.

Figure 2 — B250 receptacle

6.2 Standard receptacle dimensions size 2 (C200, C250)

A receptacle size 2 shall comply with the design specifications detailed in Figures 3 and 4.



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

a Minimum length of the receptacle which is clear of provisions for attachment of receptacle or protective caps

Figure 3 — C200 receptacle