

Task Force 2 – Receptacles

Recommendation for Part I: Statement of technical rationale and justification

E. Rationale for paragraph 5

2. Vehicle fuel system requirements and safety needs

(a) In-use requirements

<Proposal>

(i) The fuelling receptacle rationale for paragraphs 5.2.1.1

76. The fuelling receptacle shall be designed to ensure that the fuelling pressure is appropriate for the vehicle storage system. Examples of receptacle designs can be found in ISO 17268:2020 and SAE J2600 (2019). A label shall be affixed close to the fuelling receptacle to inform the fueller/driver/owner of the type of fuel (liquid or gaseous hydrogen), NWP, and date for removal of the storage containers from service. Contracting parties may specify additional labelling requirements.

Specifying the fuelling receptacle profile ensures that vehicles of lower NWP are not fuelled at hydrogen dispensers operating at a higher NWP, and that vehicles fuelled by hydrogen are not fuelled by other gaseous fuel dispensers.

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(i) Fuelling receptacle rationale for paragraphs 5.2.1.1

76. The vehicle fuelling receptacle should be designed to ensure that the fuelling pressure is appropriate for the vehicle storage system. Examples of receptacle designs can be found in ISO 17268, SAE J2600 and SAE J2799. A label shall be affixed close to the fuelling receptacle to inform the fueller/driver/owner of the type of fuel (liquid or gaseous hydrogen), NWP, and date for removal of storage containers from service. Contracting parties may specify additional labelling requirements.

Recommendation for Part II: Text of the regulation

5. Performance requirements

5.2 Vehicle fuel system

5.2.1.1 Fuelling receptacle requirements

<Proposal>

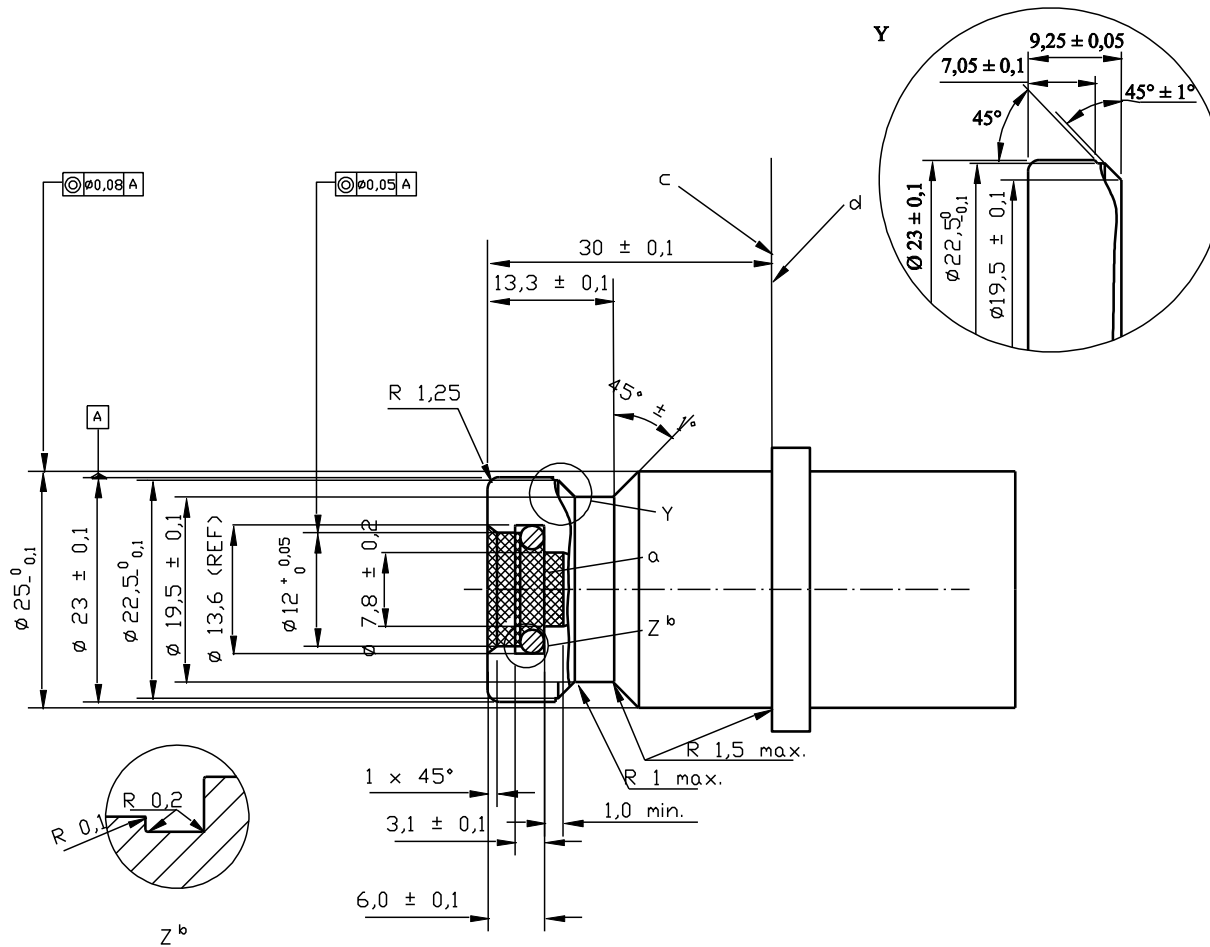
5.2.1.1.1 The fuelling receptacle shall prevent reverse flow to the atmosphere. Test procedure is by visual inspection. The geometry of the fuelling receptacle shall be designed as specified in figures 1-4. [Alternatively, another design can be chosen if the receptacle geometry design provides, at a minimum, the same level of safety and interoperability as the design shown in ISO 17268:2019.] In that case it shall also be ensured, e.g., by additional means, that fueling with a higher NWP nozzle cannot be made with lower NWP receptacle designs.

[Figure 5 is presented as an example countermeasure against nozzle-receptacle freezing issues.]

5.2.1.1.2 A label shall be affixed close to the fuelling receptacle; for instance inside a refilling hatch, showing the following information: fuel type, NWP, date of removal from service of containers.

5.2.1.1.3 The receptacle shall be protected from tampering and the ingress of dirt and water (e.g. installed in a compartment which can be locked). Test procedure is by visual inspection.

5.2.1.1.4 The fuelling receptacle shall not be mounted within the external energy absorbing elements of the vehicle (e.g. bumper) and shall not be installed in the passenger compartment, luggage compartment and other places where hydrogen gas could accumulate and where ventilation is not sufficient. Test procedure is by visual inspection.

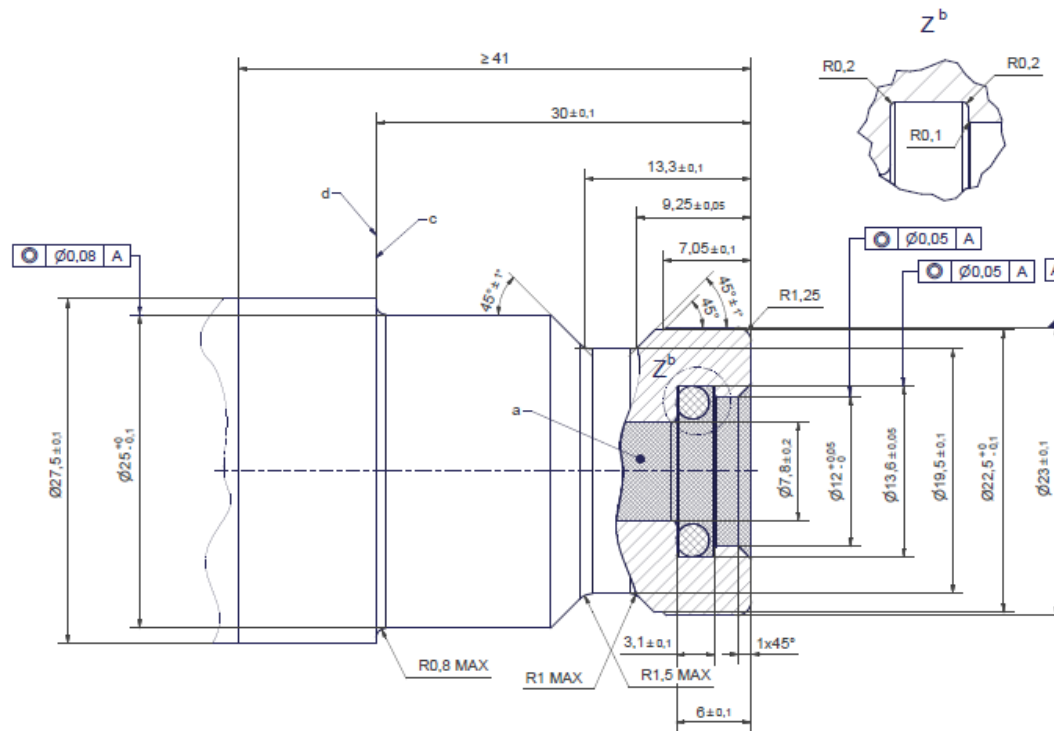


Key

- a Shaded area represents an area, which shall be kept free of all components except for the seal. Surface finish Ra shall be $0,8 \mu\text{m} \pm 0,05 \mu\text{m}$.
- b Reference sealing material surface to a no. 110 O-Ring with the following dimensions: internal diameter: $9,19 \text{ mm} \pm 0,13 \text{ mm}$; width: $2,62 \text{ mm} \pm 0,08 \text{ mm}$.
- c Nozzle side: No part of the nozzle assembly shall extend beyond the receptacle stop ring.
- d Vehicle side: The stop ring shall have a continuous shape that has an effective diameter of 30 mm or more and a thickness greater than 5 mm.

NOTE Material shall demonstrate hydrogen compatibility as described in 4.5 and a minimum hardness of 80 Rockwell B (HRB). Unless otherwise specified, surface finish Ra shall be $0,4 \mu\text{m}$ to $3,2 \mu\text{m}$.

Figure 1 — H35 Hydrogen receptacle

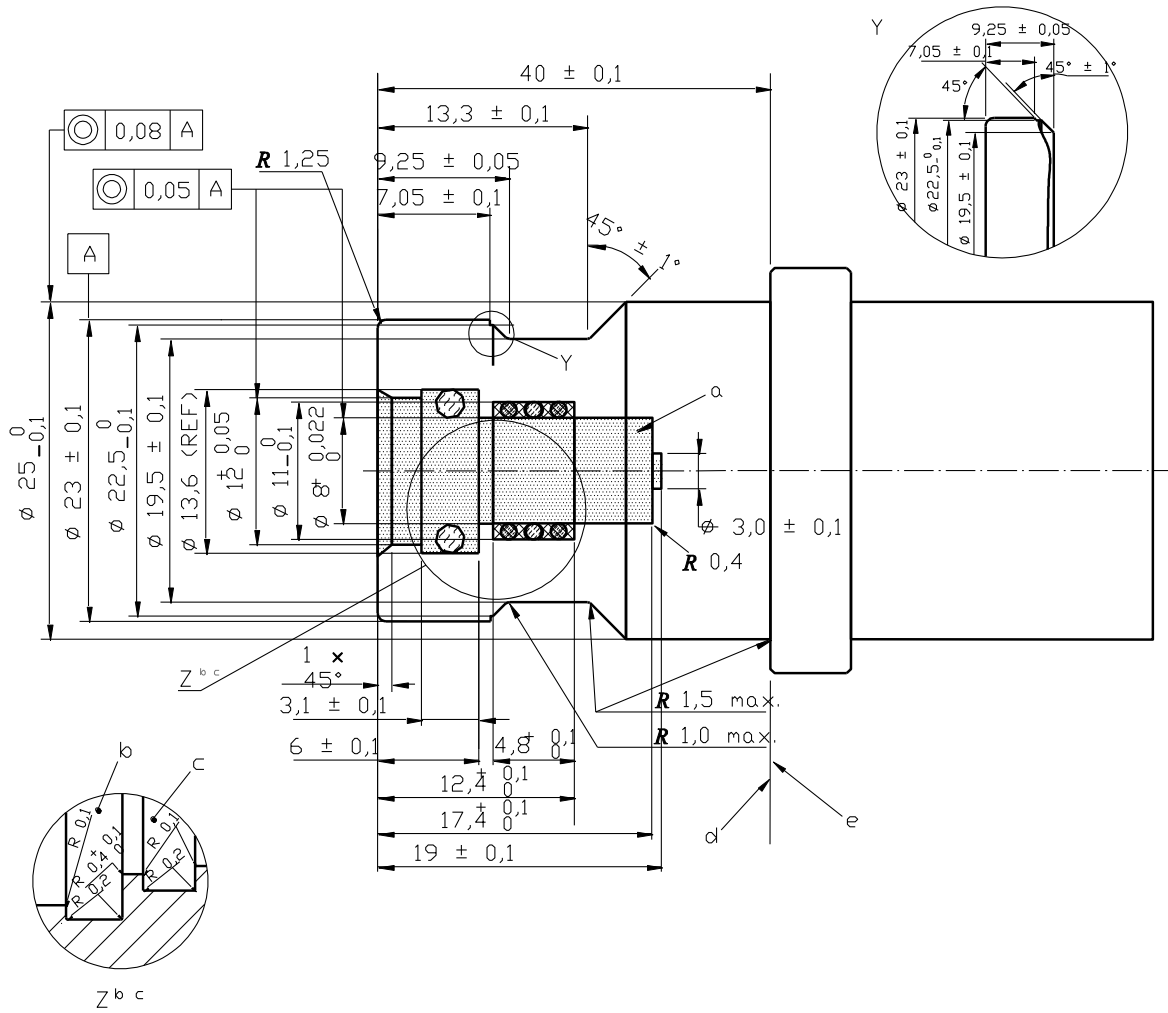


Key

- a Shaded area represents an area, which shall be kept free of all components except for the seal. Surface finish Ra shall be $0,8 \mu\text{m} \pm 0,05 \mu\text{m}$.
- b Reference sealing material surface to a no. 110 O-Ring with the following dimensions: internal diameter: $9,19 \text{ mm} \pm 0,13 \text{ mm}$; width: $2,62 \text{ mm} \pm 0,08 \text{ mm}$.
- c Nozzle side: No part of the nozzle assembly shall extend beyond the receptacle stop ring.
- d Vehicle side: The stop ring shall have a continuous shape that has an effective diameter of 30 mm or more and a thickness greater than 5 mm.

NOTE Material shall demonstrate hydrogen compatibility as described in 4.5 and a minimum hardness of 80 Rockwell B (HRB). Unless otherwise specified, surface finish Ra shall be $0,4 \mu\text{m}$ to $3,2 \mu\text{m}$.

Figure 2 — H35HF Hydrogen receptacle (high flow for commercial vehicle applications)



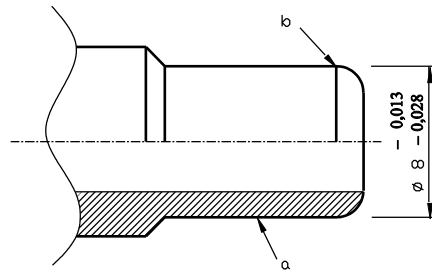
Key

- a Shaded area represents an area, which shall be kept free of all components except for the seals and anti-extrusion rings. Surface finish Ra shall be $0,8 \mu\text{m} \pm 0,05 \mu\text{m}$.
- b Reference sealing material surface to a no. 110 O-Ring with the following dimensions: internal diameter: $9,19 \text{ mm} \pm 0,13 \text{ mm}$; width: $2,62 \text{ mm} \pm 0,08 \text{ mm}$.
- c Reference sealing material surface to a no. 011 O-Ring with the following dimensions: internal diameter: $7,65 \text{ mm} \pm 0,13 \text{ mm}$; width: $1,78 \text{ mm} \pm 0,08 \text{ mm}$, mounted with two suitable anti extrusion rings. Unless otherwise specified, surface finish Ra shall be $0,4 \mu\text{m}$ to $3.2 \mu\text{m}$.
- d Nozzle side: No part of the nozzle assembly shall extend beyond the receptacle stop ring.
- e Vehicle side: The stop ring shall have a continuous shape that has an effective diameter of 30 mm or more and a thickness greater than 5 mm.

NOTE 1 Material shall demonstrate hydrogen compatibility as described in 4.5 and a minimum hardness of 80 Rockwell B (HRB).

NOTE 2 The seal part on the nozzle side shall meet the requirements of Figure B.6.

Figure 3 — H70 Hydrogen Receptacle



Key

- a Surface finish Ra shall be $0,8 \mu\text{m} \pm 0,05 \mu\text{m}$.
- b The leading chamfer of nozzle pin shall extend past rear anti-extrusion ring of the receptacle.

Figure 4 — Seal part on the 70 MPa nozzle side

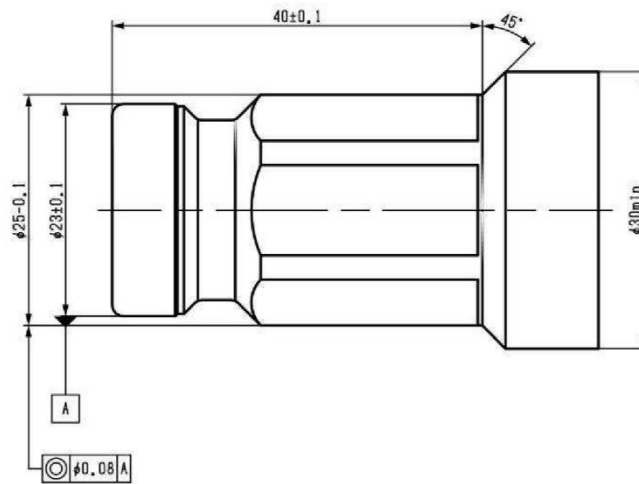


Figure 5 — Example hex design

Note: This design is an example countermeasure against freezing issues.

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5.2.1.1.1 A compressed hydrogen fuelling receptacle shall prevent reverse flow to the atmosphere. Test Procedure is visual inspection.

5.2.1.1.2 Fuelling receptacle label A label shall be affixed close to the fuelling receptacle; for instance inside a refilling hatch, showing the following information: fuel type, NWP, date of removal from service of containers.

5.2.1.1.3 The fuelling receptacle shall be mounted on the vehicle to ensure positive locking of the fuelling nozzle. The receptacle shall be protected from tampering and the ingress of dirt and water (e.g. installed in a compartment which can be locked). Test procedure is by visual inspection.

5.2.1.1.4 The fuelling receptacle shall not be mounted within the external energy absorbing elements of the vehicle (e.g. bumper) and shall not be installed in the passenger compartment, luggage compartment and other places where hydrogen gas could accumulate and where ventilation is not sufficient. Test procedure is by visual inspection.