

3rd Meeting of the IWG on Hydrogen and
Fuel Cell Vehicles Global Technical
Regulation No. 13 (Phase 2)

June 26-28, 2018

Task Force 2 – Receptacles

Livio Gambone

Task Force 2 – Receptacles

Task Force 2 Members

A. Boerger (Volkswagen)

A. Ryan (Toyota)

A. Tchouvelev (Tchouvelev & Assoc.)

B. Hobein (Ford)

F. Yamanashi (Nissan)

G. Gissibl (BMW)

H. Tamura (JARI)

I. Yamashita (Honda)

J. Paul (Weh)

M. Treacy (Powertech)

M. Leavitt (GM)

N. Nguyen (DOT-NHTSA)

N. Hart (ITM Power)

N. Klein (Hyundai)

P. Dijkhof (KIWA)

S. Pfeifer (VDA)

S. Schmidt (Auto Alliance)

S. Chigusa (Tatsuno)

S.W. Kwon (KOTSA)

S. Quong (Quong & Assoc.)

W. Ji (Hyundai)

Y. Fujimoto (Toyota)

Task Force 2 – Receptacles

Task Force 2 Mandate

To recommend the treatment of fueling receptacles within the UN GTR Phase 2 document.

Specifically, determine how and where to reference the appropriate requirements (geometry and performance) for fueling receptacles.

Summarize the features of receptacle performance standards

Task Force 2 – Receptacles

Task Force 2 Proposal

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

(i) Fuelling receptacle rationale for paragraphs 5.2.1.1

76. The vehicle fuelling receptacle ~~should~~ shall be designed and selected 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.~~ Vehicle fuelling receptacle geometry and performance requirements are identified in ISO 17268:2018 and SAE J2600:XXXX. 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.

Task Force 2 – Receptacles

Task Force 2 Proposal (cont'd)

Recommendation for Part II: Text of the regulation

5. Performance requirements

5.2 Vehicle fuel system

5.2.1.1 Fuelling receptacle requirements

~~5.2.1.1.1 A compressed hydrogen fuelling receptacle shall prevent reverse flow to the atmosphere. Test Procedure is visual inspection.~~ A compressed hydrogen fuelling receptacle shall meet the requirements of ISO 17268:2018 or SAE J2600:XXXX and the NWP of the receptacle shall be equal to the NWP of the compressed hydrogen storage system.

~~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.

Task Force 2 – Receptacles

Task Force 2 Proposal Rationale

UN GTR 13 Phase 2 should mandate the receptacle profile and the receptacle performance for reasons of safety (by referencing the appropriate industry standards)

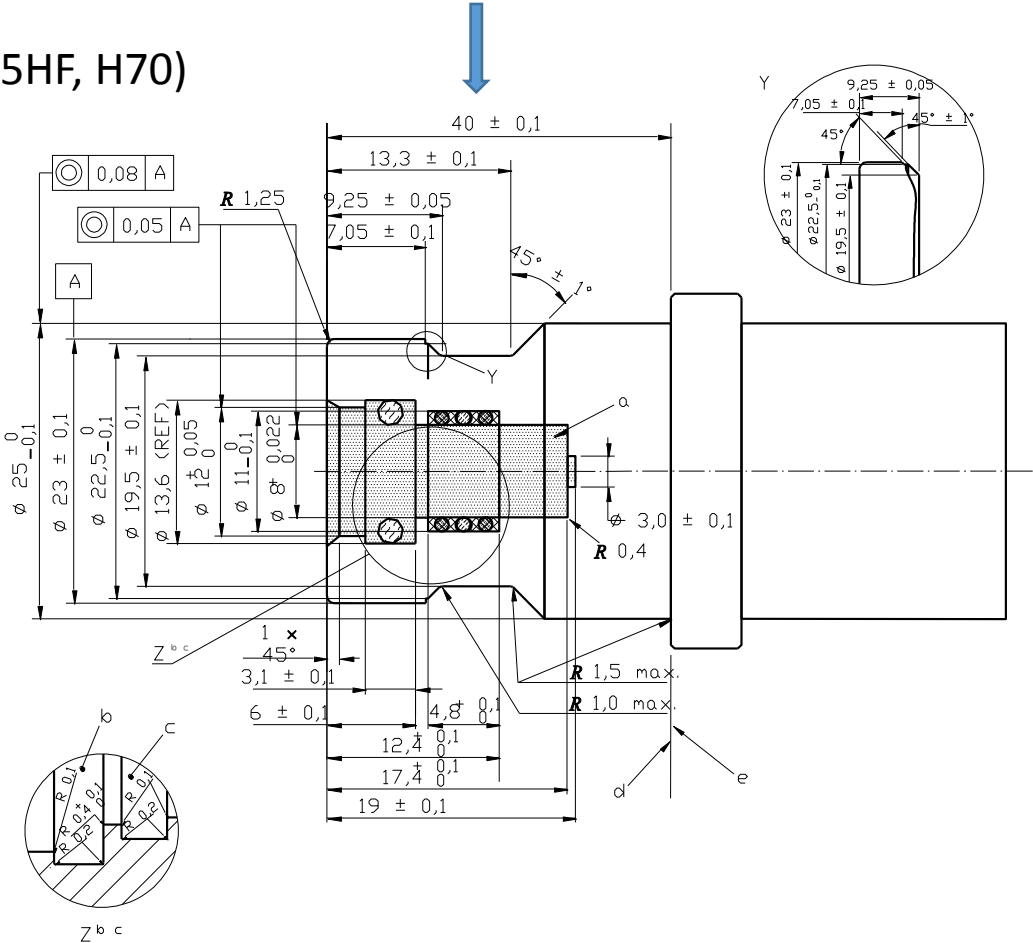
- Specifying the receptacle profile ensures that:
 - Vehicles of lower NWP are not fueled by stations operating at higher NWP
 - Vehicles fueled by other gaseous fuels are not fueled by hydrogen stations
- Specifying the receptacle performance ensures that the public’s primary “touch point” is safe
- Specifying the appropriate industry standards does not presume that every signatory country mandates these standards, and therefore avoids repeating worldwide CNG filling probe “free-for-all” experience prior to the publication of ANSI/CSA NGV 1 in 1994.
- Note: other standards are referenced in the document, including ASTM B117, ASTM D572, ISO 1431/1 and ASTM D1149 (without publication dates!)

Task Force 2 – Receptacles

ISO/DIS 17268 Features

Profiles for each NWP (H11, H25, H35, H35HF, H70)

Example shown: H70 profile



Task Force 2 – Receptacles

ISO/DIS 17268 Features

Performance Requirements

Leakage (RT, -40°C, +85°C)

Vibration Resistance

Abnormal Loads (axial and bending)

Check Valve Durability (15,000 cycles)

Receptacle Durability (connect, disconnect, 15,000 cycles)

Connected Durability (30 cycles)

Sealing Material Aging (Oxygen and Ozone)

Nonmetallic Material Hydrogen Resistance

Electrical Resistance (<1,000 ohms)

Hydrostatic Strength (3x MOP)

Corrosion Resistance (salt spray, 1,000h)

Deformation (150% assembly torque)

Contamination (salt, sand, dust)

Thermal Cycle (-40°C, +85°C, 100 cycles)

Pre-Cooled Hydrogen Exposure

Washout (H70 internal O-ring check)

User Abuse (500 rotations, 5kg load)

Freezing (disconnect, -40°C fuel)

Rocking (2,400 cycles, bending)