Compressed natural gas vehicles - Refueling connectors

1 Scope

This standard specifies receptacles for compressed natural gas vehicles with maximum filling pressure of 20.0 Mpa and 24.8 MPa.

Remark: All references to pressures in this standard are to be considered gauge pressures, unless otherwise specified.

2 Normative references

The following standards contain which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standard indicated below shall be applied.

JIS B 0100 Glossary of terms for valves
JIS B 0116 Glossary of terms for packings and gaskets
JIS B 0142 Glossary of terms for oil hydraulics and pneumatics
JIS K 2001 Industrial liquid lubricants - **ISO** viscosity classification
JIS K 6253 Hardness testing methods for rubber vulcanized or thermoplastic
JIS K 6257 Rubber, vulcanized or thermoplastic - Determination of heat ageing properties
JIS K 8085 Ammonia solution (reagent)
JIS R 6111 Artificial abrasives
JIS Z 2329 Methods for bubble leak testing
JIS Z 2371 Methods of salt spray testing
ANSI/AGA CGA NGV1 COMPRESSED NATURAL GAS VEHICLES FUELING CONNECTION DEVICES (hereinafter referred to as **NGV1 standard**)
ASTM B154 Standard Test Method for Mercurous Nitrate Test Copper and Alloys
SAE AS 568A AEROSPACE SIZE STANDARD FOR O-RINGS

3 Definitions

Definitions of main terms used in this standard shall be as follows, as well as specified by **JIS B 0100, JIS B 0116** and **JIS B 0142.**

a) Receptacle
Receptacle for refueling. A check valve, receptacle protective cap, joint to connect to the tubing, hardware to mount it to the vehicle body, etc. are included.

b) Receptacle main body
Main component of the receptacle and the constitutive part of a connecting part to the nozzle. An O-ring is included.

c) Nozzle
Part of the refueling device to connect to the receptacle of the vehicle

d) Check valve
Check valve specified by **JIS B 0100**

e) Dry air (dry nitrogen)
Air (nitrogen) 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

f) Inlet
Side to connect to the receptacle nozzle, with respect to the check valve of the receptacle

g) Outlet
Side to connect to the tubing, with respect to the check valve of the receptacle (exit side)

4 Types

There shall be following 2 types of receptacles according to the maximum filling pressure.

Documents
Document Sharing Hub

Full document details: JSAE E203 2005

Table 1 Types of receptacles

Maximum filling pressure	Symbol
20.0 MPa	**J20**
24.8 MPa	**J25**

5 Requirements

A receptacle shall conform to the specifications described in **5.1** to **5.4** below.

5.1 Performance

5.1.1 Leakage at room pressure

See **Table 2** for leakage at room pressure.

Table 2 Leakage at room pressure

Condition	Performance	Test item
Apply pressure with the nozzle coupled	The receptacle shall be either bubble-free or have a leak rate of < 20 cm^3/h (A.N.R.). (1)	**6.1 a)**
Apply pressure with the nozzle coupled and then remove the nozzle	The check valve of receptacle shall be either bubble-free or have a leak rate of < 20 cm^3/h (A.N.R.).	**6.1 b)**

Note: (1)

A.N.R. denotes standard conditions of 20 °C, 101.3 kPa absolute pressure, and 65 % relative humidity.

5.1.2 Hydrostatic strength

See **Table 3** for hydrostatic strength.

Table 3 Hydrostatic strength

Condition	Performance	Test item
Uncoupled receptacle	An uncoupled receptacle and coupled nozzle and receptacle shall not rupture when tested under specified conditions.	**6.2**
Coupled receptacle and nozzle		

5.1.3 Abnormal loads

See **Table 4** for abnormal loads.

Table 4 Abnormal loads

Condition		Performance	Test item
Tensile load N	Moment N·m		
1350	**120**	No distortion or damage shall be allowed.	**6.3**
2700	**240**	The specifications of **5.1.1** for leakage at room pressure shall be satisfied.	

5.1.4 Rocking/Twisting

The receptacle and its mounting hardware shall not be loosened or damaged when tested according to **6.4**. Thereafter, the specifications of **5.1.1** and **5.1.2** shall be satisfied.

5.1.5 Deformation

The receptacle shall be without distortion or damage when tested according to **6.5**. Thereafter, the specifications of **5.1.1, 5.1.2** and **5.1.7** shall be satisfied.

5.1.6 Mounting hardware torque

The receptacle shall be without distortion or damage when tested according to **6.6**.

5.1.7 Low and high temperatures

See **Table 5** for low and high temperatures.

Table 5 Low and high temperatures

Condition	Performance	Test item
Apply pressure with the nozzle coupled	The receptacle shall be either bubble-free or have a leak rate of < 20 cm^3/h (A.N.R.).	**6.7 a)**
Apply pressure with the nozzle coupled and then remove the nozzle	The check valve of receptacle shall be either bubble-free or have a leak rate of < 20 cm^3/h (A.N.R.).	**6.7 b)**
-	Gas shall be provided properly when tested under specified conditions.	**6.7 c)**

5.1.8 Corrosion resistance

The specifications of **5.1.1** shall be satisfied when tested according to **6.8**.

5.1.9 Durability

AVA Documents
Document Sharing Hub
Full document details: JSAE E203 2005

See **Table 6** for durability.

Table 6 Durability

Condition	Performance	Test item
Check valve durability	The specifications of **5.1.1** and **5.1.7** shall be satisfied when the specified test is conducted.	**6.9 a)**
Abrasion resistance	The specifications of **5.1.1** shall be satisfied when the specified test is conducted. In addition, J20 receptacle shall not allow coupling with P36 (2) nozzle specified in the **NGV1 standard**.	**6.9 b)**
Excess flow durability	Specifications of **5.1.1** shall be satisfied when the specified test is conducted.	**6.9 c)**

Note: (2)

P36 is the symbol to represent the operating pressure of 24.8 Mpa {3600 psi}.

5.1.10 Oxygen ageing

The rubber parts shall be without cracking or functionally hazardous deterioration when tested according to **6.10**.

5.1.11 Seal material compatibility

The rubber parts and plastics parts used as seal material of the receptacle shall either satisfy the specifications shown in **Table 7** or have been evaluated and guaranteed for applicability to the receptacle by the manufacturers.

Table 7 Seal material compatibility

Condition	Performance	Test item
Natural gas resistance	After conducting the specified test, the test samples shall not exhibit evidence of shredding. In addition, the samples shall not swell by more than 25 %, shrink by more than 1% or incur a mass loss in excess of 10 %.	**6.11 a)**
Compressor oil resistance	After conducting the specified test, no volume change or mass change to cause functional problems shall be allowed.	**6.11 b)**
Low and high temperatures	When subjected to the specified test, the test sample shall either bubble-free or have a leak of < 20 cm^3/h (A.N.R.) at the noted test temperature. In addition, the samples shall not swell by more than 25 %, shrink by more than 1%, change by more than $\pm 5°$ Shore D specified in **JIS K 6253**, or incur a mass loss in excess of 10 %.	**6.11 c)**

5.1.12 Season cracking

No cracking shall be allowed for the parts made of brass when tested according to **6.12**.

5.1.13 Non-igniting evaluation

Materials of the receptacle main body shall not ignite when tested according to **6.13**.

However, testing is not required for stainless steel with brass and carbon mass contents of 0.030 % or less.

5.1.14 Receptacle protective caps

There shall be no permanent distortion or damage to any receptacle protective cap and receptacle main body when tested according to **6.14**.

5.1.15 Electrical resistance

The electrical resistance of the coupled receptacle and nozzle shall not be greater than 0.1 Ω when tested according to **6.15**.

5.2 Structure

5.2.1 Check valve

The receptacle main body shall be equipped with a non-contact type check valve, opening by differential pressure only, inside of it or attached not through the tubing but directly to it.

5.2.2 Receptacle protective caps

Receptacles shall have a protective cap to prevent the ingress of fluids and foreign matter. The protective cap shall have a structure to be fixed to the vehicle so as not to get lost when it is removed from the receptacle main body.

5.2.3 The method for attaching

The method for attaching the tubing shall not rely on the joint between the male and female threads for sealing.

AVA Documents
Document Sharing Hub

Full document details: JSAE E203 2005