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# Hydrogen fuel cell electric vehicle refueling receptacle

燃料电池电动汽车加氢口

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# Hydrogen fuel cell electric vehicle refueling receptacle

## 1 Scope

This Standard specifies types, marks, requirements and test methods for hydrogen fuel cell electric vehicle refueling receptacle.

This Standard is applicable to the hydrogen fuel cell electric vehicle refueling receptacle that uses compressed hydrogen as working medium, the rated filling pressure does not exceed 70MPa, the working temperature is -40°C~85°C.

## 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.

GB/T 1690-2010, *Rubber, vulcanized or thermoplastic - Determination of the effect of liquids*

GB/T 10125, *Corrosion tests in artificial atmospheres - Salt spray tests*

GB/T 24548, *Fuel cell electric vehicles - Terminology*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 24548 as well as the followings apply.

### 3.1 receptacle

a component assembly connected to the hydrogenation gun on the vehicle

### 3.2 nominal working pressure

in the standard state, the designed rated filling pressure

## 4 Model

The receptacle model consists of the following four parts:

After the temperature resistance test of the check valve of receptacle is completed, carry out the durability test according to the method specified in 6.6. There shall be no abnormal wear after the test. And it shall meet the requirements for air tightness in 5.2.1 and the requirements for hydrostatic strength in 5.2.8.

**5.2.5 Oxygen aging resistance**

For the seals in contact with hydrogen at the receptacle, carry out the oxygen aging test according to the method specified in 6.7. There shall be no obvious deformation, deterioration, spots, cracks and so on.

**5.2.6 Ozone aging resistance**

For the seals in contact with air at the receptacle, carry out the ozone aging resistance test according to the method specified in 6.8. There shall be no obvious deformation, deterioration, spots, cracks and so on.

**5.2.7 Compatibility**

For the non-metal parts in contact with hydrogen at the receptacle, carry out the compatibility test according to the method specified in 6.9. Its volume expansion rate shall not be greater than 25%. The volume shrinkage rate shall not be greater than 1%. The mass loss rate shall not be greater than 10%.

**5.2.8 Hydrostatic strength**

The pressure-bearing parts of the receptacle shall be subjected to the hydrostatic strength test according to the method specified in 6.10. There shall be no cracks or permanent deformation.

**5.2.9 Salt spray corrosion resistance**

Test according to the method specified in 6.11. The receptacle shall not show signs of corrosion or peeling off the protective layer. The receptacle shall meet the air tightness requirements specified in 5.2.1.

**5.2.10 Temperature cycle resistance**

Test according to the method specified in 6.12. The gas pressure in the test shall not be lower than 70% of the nominal working pressure. After the test, the receptacle shall meet the air tightness requirements specified in 5.2.1 and the hydrostatic strength requirements specified in 5.2.8.

**5.2.11 Compatibility**

Only the receptacle with a nominal working pressure of 70MPa needs to be tested for compatibility. Carry out the compatibility test according to the method

If the receptacle is a symmetrical structure, it can only do vibration test in one direction. If the receptacle is not symmetrical, vibration tests shall be carried out in two directions perpendicular to each other, in no particular order.

### 6.5 Temperature resistance test

The check valve of the receptacle is closed. Fill the outlet end of the receptacle with a leak detection gas whose pressure is the nominal working pressure. Put it in an incubator. The temperature rises from room temperature to 85°C±2°C. Keep the temperature for 8h. Immerse in 85°C water for 1min. Record whether there are bubbles. Keep the temperature for 0.5h after returning to room temperature. Continue to cool down to -40°C±2°C. Keep the temperature for 8h. Immerse in the cooling liquid at -40°C for 1min. Record whether there are bubbles.

### 6.6 Durability test

The durability test is carried out according to the following steps. The total number of cycles is 15000.

a) The outlet end of the receptacle is closed. The inlet end is accessed with high-pressure gas source. The test pressure increased from 0MPa to 1.25 times the nominal working pressure. Make the check valve open.

b) The pressure relief at the inlet end is 0MPa. Make the check valve withstand 1.25 times the nominal working pressure and be in a closed state. Keep the time not less than 2s. Relieve the pressure at the outlet end to 0MPa~0.5MPa.

The check valve opens and closes once as a cycle. The opening and closing frequency of the check valve is not higher than 15 times/min.

### 6.7 Oxygen aging resistance test

The seals in contact with hydrogen at the receptacle shall be placed in oxygen at a temperature of 70°C±2°C and a pressure of 2MPa for 96h. Observe the changing state.

### 6.8 Ozone aging resistance test

The seals in contact with air at the receptacle shall be placed in the air at a temperature of 40°C±2°C and an ozone volume fraction of $5\times10^{-7}$ for 120h. Observe the changing state.

### 6.9 Compatibility test

After the non-metal parts in contact with hydrogen at the receptacle shall be

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