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**Fuel cell electric vehicles -
Safety requirement of fuel cell stack**

燃料电池电动汽车 燃料电池堆安全要求

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Fuel cell electric vehicles - Safety requirement of fuel cell stack

1 Scope

This Standard specifies the safety requirements for fuel cell stack for fuel cell electric vehicles in terms of hydrogen safety, electrical safety, and mechanical structure, etc.

This Standard applies to the proton exchange membrane fuel cell stack for vehicles. This Standard only deals with hazards to the outside of the human body and fuel cell stacks, and does not involve protection of the interior of the fuel cell stack, assuming that such internal damage does not pose a hazard to the outside of the fuel cell.

2 Normative references

The following documents are indispensable for the application of this document. For the dated references, only the versions with the dates indicated are applicable to this document. For the undated references, the latest version (including all the amendments) are applicable to this document.

GB/T 18384.1 Electrically propelled road vehicles - Safety specifications - Part 1: On-board rechargeable energy storage system (REESS)

GB/T 18384.3 Electrically propelled road vehicles - Safety specifications - Part 3: Protection of persons against electric shock

GB/T 20042.2-2008 Proton exchange membrane fuel cell - General technical specification of fuel cell stacks

GB/T 24548 Fuel cell electric vehicles - Terminology

GB/T 28816 Fuel cell - Terminology

3 Terms and definitions

What defined in GB/T 24548 and GB/T 28816 and the following terms and definitions are applicable to this document.

3.1 Fuel cell stack for vehicle

5.2 Safety requirement of airtightness

USE pressure drop method to test the airtightness of fuel cell stack. The result shall not be lower than 85% of the initial pressure.

5.3 Electrical safety requirements

5.3.1 Requirement of insulation property

When the fuel cell stack is filled with coolant and the coolant is in a cold cycle state, the ground insulation of positive and negative electrodes shall not be lower than 100 Ω/V .

5.3.2 Requirement for protection of persons against electric shock

The requirement for protection of persons against electric shock of fuel cell stack shall comply with the relevant provisions of GB/T 18384.3.

5.3.3 Requirement of ground protection

When the output voltage of fuel cell stack is higher than 60 V, the fuel cell stack needs to have a grounding point. The resistance between the grounding point and all bare metals shall be less than 0.1 Ω .

6 Test methods

6.1 Mechanical shock

After the fuel cell stack is installed and fixed, in 3 axial directions: X direction, Y direction, and Z direction, PERFORM shock test with a shock acceleration of 5.0 g. The mechanical shock pulse is a half sinusoidal waveform and lasts for 15 ms, once in each direction.

Note: The X direction is the vehicle's heading direction. The Y direction is the lateral direction. The Z direction is the vertical direction.

6.2 Airtightness

The fuel cell stack is in a cold state. CLOSE the hydrogen exhaust port, air exhaust port, and coolant outlet of the fuel cell stack; and at the same time, ADD helium-nitrogen mixed gas to the hydrogen flow channel, air flow channel, and coolant flow channel. The helium concentration shall not be less than 10%. The pressure shall be set at the normal working pressure (gauge pressure). After the pressure is stabilized, the inlet valve is closed; and the pressure is maintained for 20 min.

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