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Safety Technical Regulations for Hydrogen Refueling Station

加氢站安全技术规范

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Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard was proposed and shall be under the jurisdiction of National Technical Committee 309 on Hydrogen Energy of Standardization Administration of China.

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Safety Technical Regulations for Hydrogen Refueling Station

1 Application Scope

This Standard specifies the safety technical regulations for hydrogen transmission, hydrogen production in station, hydrogen storage, compression, refueling and safety and fire protection and other aspects of hydrogen refueling stations for vehicles.

This Standard applies to the hydrogen refueling stations using all kinds of hydrogen supply methods, as well as two-station-combined or multiple-station-combined hydrogen refueling stations, such as hydrogen-oil refueling stations, hydrogen-gas refueling stations and hydrogen refueling-charging stations.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition dated applies to this document. For undated references, the latest edition of the referenced documents (including all amendments) applies to This Standard.

GB 4962, *Technical Safety Regulation for Gaseous Hydrogen Use*

GB 12358, *Gas Monitor and Alarms for Workplace – General Technical Requirements*

GB 16808, *Combustible Gas Alarm Control Units*

GB/T 18442.1, *Static Vacuum Insulated Cryogenic Pressure Vessel – Part 1: General Requirements*

GB/T 18442.2, *Static Vacuum Insulated Cryogenic Pressure Vessel – Part 2: Material*

GB/T 18442.3, *Static Vacuum Insulated Cryogenic Pressure Vessel – Part 3: Design*

GB/T 18442.4, *Static Vacuum Insulated Cryogenic Pressure Vessel – Part 4: Fabrication*

GB/T 18442.5, *Static Vacuum Insulated Cryogenic Pressure Vessel – Part 5: Inspection and Test*

GB/T 18442.6, *Static Vacuum Insulated Cryogenic Pressure Vessel – Part 6: Safety*

Device Requirements

GB/T 19773, *Specification of Hydrogen Purification System on Pressure Swing Adsorption*

GB/T 19774, *Specification of Water Electrolyte System for Producing Hydrogen*

GB/T 24499, *Technology Glossary for Gaseous Hydrogen, Hydrogen Energy and Hydrogen Energy System*

GB/T 29729, *Essential Requirements for the Safety of Hydrogen Systems*

GB/T 29781, *General Requirements for Electric Vehicle Charging Station*

GB/T 31138, *Compressed Hydrogen Dispenser for Vehicles*

GB 50016, *Code for Fire Protection Design of Buildings*

GB 50058, *Code for Design of Electrical Installations in Explosive Atmospheres*

GB 50116, *Code for Design of Automatic Fire Alarm System*

GB 50156, *Code for Design and Construction of Filling Station*

GB 50177, *Design Code for Hydrogen Station*

GB 50516, *Technical Code for Hydrogen Fuelling Station*

GB 50966, *Code for Design of Electric Vehicle Charging Station*

TSG 21, *Supervision Regulation on Safety Technology for Stationary Pressure Vessel*

3 Terms and Definitions

For the purposes of this Standard, the following terms and definitions and those defined in GB/T 24499 and GB/T 50516 apply.

3.1

hydrogen refueling station

A stationary special site which is used to fill hydrogen fuel for vehicle gas storage cylinders of hydrogen energy vehicles, including hydrogen cell vehicles or hydrogen internal combustion engine vehicles or hydrogen mixed fuel vehicles and so on.

3.2

combined hydrogen refueling station

4.7 When the hydrogen refueling stations are combined with charging stations, the design of charging process facilities shall be as specified in GB 50966 and GB/T 29781.

5 Site Selection

5.1 The hydrogen refueling stations and all kinds of combined stations shall conform to the town planning, which shall be located in places with convenient transportation; they shall not be located in places where there is much dust or corrosive gases or places which are low lying and possibly accumulate water.

5.2 A buffer distance or buffer area may preferably be provided between the hydrogen refueling stations combined with charging stations and municipal roads outside the stations for the convenience of access and waiting of electric vehicles.

5.3 The fire-protection distance between the process facilities of the hydrogen stations, hydrogen-gas combined refueling stations and hydrogen-oil combined refueling stations, and the buildings and structures outside the stations, shall be as specified in GB 51516.

5.4 The fire-protection distance between the hydrogen process facilities of the combined hydrogen stations combined with charging stations, and the buildings and structures outside the stations, shall be as specified in GB 51516.

5.5 The fire-protection distance between the charging process facilities of the combined hydrogen stations combined with charging stations, and the buildings and structures outside the stations, shall be as specified in GB 50016 and GB 50966.

6 Layout

6.1 The fire-protection distance between the facilities within the hydrogen refueling stations, hydrogen-gas combined refueling stations and hydrogen-oil combined refueling stations shall be as specified in GB 50516 and GB 50156.

6.2 The installation locations of the charging process facilities of the combined hydrogen refueling stations combined with charging stations shall be more than 3 m from the boundary lines of the explosion hazard areas; and the classification of explosion hazard areas shall be as specified in GB 50516.

6.3 Cross arrangement of the process facilities of different media for hydrogen refueling, gas refueling, oil refueling, charging etc. within the hydrogen refueling stations and all kinds of combined hydrogen refueling stations is not advisable.

9.1.3 The direct current supply circuits of the water electrolysis hydrogen production equipment shall be made of copper conductors, which shall be laid in low places or trenches; and when bare bus bars must be used, measures shall be taken to prevent spark discharge.

9.1.4 Before starting the water electrolysis hydrogen production equipment, check all protective and safety facilities to ensure they are in sound conditions, such as pressure regulating devices, blow-down purging and analytical facilities, safety valves and all kinds of indication and regulating instruments. Before starting the systems, check and ensure the oxygen content in nitrogen entrained into the systems by purging replacement is less than 0.5%.

9.2 Hydrogen production by reforming natural gas and methyl alcohol

9.2.1 The design, manufacture and installation of the hydrogen production equipment by reforming natural gas and methyl alcohol shall be as specified in GB/T 19773 and GB 50177.

9.2.2 The hydrogen production equipment by reforming natural gas and methyl alcohol is preferably provided with instruments for the gas component analysis or purity analysis of raw gas, product hydrogen, desorbed gas and gas graded during the hydrogen production process, and shall be provided with necessary display instruments of pressure and process control systems.

9.2.3 The hydrogen purification equipment of the hydrogen production equipment by reforming natural gas and methyl alcohol is preferably arranged in the open air.

9.2.4 The hydrogen purification systems of the hydrogen production equipment by reforming natural gas and methyl alcohol shall be provided with purging replacement ports. Before starting the systems, check and confirm that the oxygen content in nitrogen entrained into the systems by purging replacement is less than 0.5%.

10 Hydrogen Storage Systems

10.1 The hydrogen storage systems and equipment shall be as specified in GB 50516.

10.2 The hydrogen storage equipment may be the multi-stage stationary hydrogen tanks or hydrogen storage cylinder groups and so on; and the pressure and capacity of their hydrogen stored shall meet the refueling requirements of the refueling stations.

10.3 When the hydrogen storage devices in the hydrogen storage systems are arranged by group and connected with each other, they shall be provided with protective measures to ensure the hydrogen storage containers will have no overpressure accidents.

10.4 Each independent storage container in the hydrogen storage systems shall be

shall be as specified in GB 50516.

12.3 The electric installations provided for the hydrogen compressors (including electric motors) shall be as specified in GB 50058.

12.4 During the trial runs of the hydrogen compressors, first use nitrogen for purging replacement before carrying out trial runs; and do not use hydrogen directly for trial runs. Before putting into mass production after the trial runs, use hydrogen for purging replacement.

13 Safety and Fire Protection

13.1 Combustible gas alarm

13.1.1 The combustible gas alarm systems shall be provided within the hydrogen refueling stations and all kinds of combined hydrogen refueling stations; and the combustible gas detection and alarm systems shall be equipped with uninterruptible power supplies. The combustible gas detectors shall be installed where it is most probable for hydrogen to accumulate; and the combustible gas alarms are preferably installed collectively in the control room or duty room.

13.1.2 When the combustible gas detection and alarm systems detect the content of hydrogen in the air achieves 0.4% in the hydrogen refueling stations and all kinds of combined hydrogen refueling stations, they shall trigger the acoustical-optical alarm signals; when the content of hydrogen in the air achieves 1%, they shall start the corresponding accident exhaust fans; and when the content of hydrogen in the air achieves 1.6%, they shall trigger the emergency cut-off systems of the hydrogen refueling stations.

13.1.3 The rooms where combustible gas leakage may occur within the hydrogen refueling stations and all kinds of combined hydrogen refueling stations, shall be provided with mechanical exhaust systems and subjected to the interlocking control along with the combustible gas detection and alarm systems. The frequency of natural ventilation shall not be less than 5 times/h; and the frequency of accident ventilation shall not be less than 15 times/h.

13.1.4 All detection and alarm devices and instruments of the combustible gas detection and alarm systems shall be tested regularly; and they shall be tested by a competent testing body who will provide corresponding test reports.

13.1.5 The alarm apparatus shall be selected based on the factors such as accuracy, reliability, maintainability, testing scope and response time, and shall be as specified in GB 12358 and GB 16808.

13.1.6 The acoustic-optical signals of the combustible gas alarm shall be manually eliminable; and when another alarm signal of the combustible gas alarm is input, they shall be started once again.

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