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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 44262-2024

**Technical requirements for the sampling of hydrogen for proton
exchange membrane fuel cell vehicles**

质子交换膜燃料电池汽车用氢气采样技术要求

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1 Scope

GB/T 44262-2024 sets the technical requirements for sampling the hydrogen used in fuel cell vehicles, and it is the standard the whole fuel quality regime rests on. Fuel cell hydrogen has to be extraordinarily pure, with limits on carbon monoxide, sulfur compounds and ammonia in the parts per billion, because those species poison the catalyst irreversibly; at those levels the sample is far more easily contaminated than the fuel, and a badly taken sample fails a good batch or passes a bad one. The standard specifies the sampling point and the sampling adapter at the dispenser, the materials and the passivation of the sampling vessel and the lines, the purging procedure and the number of purge cycles, the sampling conditions of pressure, temperature and flow, the volume required for each analysis, the labelling, transport and storage of the sample and its holding time, the blank and control samples, and the records. Its companions GB/T 44238, GB/T 44242 and GB/T 44243 analyse what it collects. For a station operator, a gas supplier or a laboratory in China, this is the procedure.

This document specifies the requirements for hydrogen sampling equipment, pre-sampling preparation, sampling steps and sampling record for proton exchange membrane fuel cell vehicles. This document is applicable to the sampling of hydrogen in hydrogen refueling stations with a pressure level not greater than 70 MPa. The sampling of hydrogen for proton exchange membrane fuel cells in the production, storage and transportation sites may take this as a reference.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document

through the normative references in the text. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 1226 General Pressure Gauge

GB/T 1227 Accurate Pressure Gauge

GB/T 8979 Pure Nitrogen and High Purity Nitrogen and Ultra Pure Nitrogen

GB/T 12244 General Requirements for Pressure Reducing Valves

GB 12358 Gas Monitors and Alarms for Workplace - General Technical Requirements

GB/T 21465 Terminology for Valves

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

GB/T 26779 Hydrogen Fuel Cell Electric Vehicle Refueling Receptacle

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

GB/T 37244 Fuel Specification for Proton Exchange Membrane Fuel Cell Vehicles - Hydrogen

GB/T 43306 Gas Analysis - Sampling Guidelines

GB/T 43674 General Requirements of Hydrogen Fueling Stations

GB 50156 Technical Standard of Fueling Station

3 Terms and Definitions

The terms and definitions defined in GB/T 21465, GB/T 24499 and GB/T 43306 are applicable to this document.

4.1 Hydrogen Sampling Device

4.1.1 General requirements The hydrogen sampling device shall satisfy the following requirements:

---The design of the hydrogen sampling device shall comply with the relevant provisions of GB 50156, GB 50516 and GB/T 43674;

---Materials in contact with hydrogen in the hydrogen sampling device shall comply with the relevant provisions of GB/T 29279;

---The hydrogen sampling device shall not contaminate the sample, and the materials in contact with hydrogen in the sampling device shall not adsorb the collected components.

The overall performance shall be subject to a quality assessment in accordance with GB/T 43306.

4.1.2 Basic composition The hydrogen sampling device should be equipped with sampling source port, stop valve, pressure gauge, pressure reducing valve, inlet valve, outlet valve, sampling gas cylinder, bypass valve, safety valve, check valve, venting component and grounding component. It is advisable to choose valves with a small dead volume. The schematic diagram of the hydrogen sampling device is shown in Figure 1. Hydrogen sampling devices with the same functions as shown in the Figure may also adopt this Figure. Each sample source port of the hydrogen sampling device shall be equipped with a separate stop valve, and the nominal pressure of the stop valve shall be greater than the maximum allowable working pressure of the sample source port.

4.1.3.3 Pressure gauge The pressure gauge shall comply with the provisions of GB/T 1226 or GB/T 1227. The measuring range of the sample source pressure gauge should be 1.5 ~ 3.0 times the maximum allowable working pressure of the sample source port, and the measuring range of the output pressure gauge should be 1.5 ~ 3.0 times the design sampling pressure.

4.1.3.4 Pressure reducing valve The pressure reducing valve shall comply with the provisions of GB/T 12244 and GB/T 43306. Its material should be stainless steel and subject to inert treatment, and the dead volume should be as small as possible. The nominal pressure shall be greater than the maximum allowable working pressure of the sample source port. The outlet pressure shall be adjustable to the design sampling pressure.

4.1.3.5 Inlet valve, outlet valve and bypass valve The inlet valve, outlet valve and bypass valve shall be valves that are easy to open and close (for example, ball valves), and the nominal pressure shall be greater than the set pressure of the safety valve.

4.1.3.6 Sampling gas cylinder The sampling gas cylinder shall comply with the relevant provisions of special equipment and be exclusively used. Its nominal working pressure shall not be lower than the maximum design sampling pressure. The sampling gas cylinder should be a double-valve type. For sampling gas cylinder used for adsorbent impurity detection, the inner wall, inlet valve and outlet valve of the gas cylinder shall be subject to the inert treatment.

4.1.3.7 Safety valve The safety valve should be a full-open safety valve, and the set pressure should be 1.05 ~

1.15 times the maximum design sampling pressure of the hydrogen sampling device.

4.1.3.8 Check valve The opening pressure of the check valve should be greater than 69 kPa.

5 Pre-sampling Preparation

5.1 Before sampling, in accordance with the demands for sample testing, determine the sampling volume, sampling pressure and specifications of the sampling gas cylinder.

5.2 Before sampling, the sampling gas cylinder shall be cleaned to remove air, moisture and other contaminants. When the hydrogen retained in the sampling gas cylinder complies with the provisions of GB/T 37244 and the pressure is not less than

0.2 MPa (gauge pressure), the sampling gas cylinder does not need to be cleaned.

5.3 Before sampling, nitrogen that complies with the provisions of high purity nitrogen in GB/T 8979 shall be used to blow the hydrogen sampling device, so as to remove air and moisture. During blowing, the sampling device shall not be equipped with a sampling gas cylinder. After blowing is completed, all valves of the sampling device shall be closed to prevent air from entering. Water, isopropyl alcohol or other solvents shall not be used to clean the hydrogen sampling device. NOTE: the residual nitrogen here can be easily removed when the system is blown in accordance with

6.3 and will not affect subsequent sample analysis.

6 Sampling Steps

NOTE: when the sampling device is equipped with multiple sample source ports and stop valves, the stop valve described in this Chapter refers to the stop valve corresponding to the sample source port to be sampled, and the stop valves corresponding to the other sample source ports are closed throughout the process. accessories of the hydrogen sampling device are replaced or re-connected, leak detection shall be performed again.

6.3 System Blowing

6.3.1 General rules The system blowing shall be carried out in accordance with

6.3.2 or 6.3.3. When sampling the hydrogen refueling nozzle outlet, it shall be carried out in accordance with 6.3.2.

6.3.2 Continuous blowing displacement method The continuous blowing displacement method is carried out in accordance with the following steps:

- a) When confirming that the stop valve A is closed, open the sample source hydrogen valve;
- b) Slowly open the stop valve A and adjust the pressure reducing valve B to the sampling pressure;
- c) Successively open the inlet valve D, sampling gas cylinder inlet valve E, sampling gas cylinder outlet valve F and outlet valve G to allow the blown hydrogen to flow through the