ICS 71.100.20
CCS G 86

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 3634.1-2025

Replacing GB/T 3634.1-2006

Hydrogen - Part 1: Industrial hydrogen

氢气 第1部分：工业氢

Issued on: October 31, 2025 **Implemented on: May 1, 2026**

Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC

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1 Scope

GB/T 3634.1-2025 is the Chinese national standard covering industrial grade hydrogen as sold - the purity and the oxygen, nitrogen, carbon monoxide and moisture limits, and the sampling and test methods behind each figure. Part 1 of the series. It replaces GB/T 3634.1-2006, in force from 1 May 2026. Issued on 31 October 2025, it has been in force since 1 May 2026, replacing GB/T 3634.1-2006.

This Document specifies the technical requirements, sampling, inspection rules, marking, accompanying documentation, packaging, filling, transportation, and storage requirements for industrial hydrogen. It describes methods for determining the impurity content in industrial hydrogen and provides safety information for hydrogen. This Document applies to industrial hydrogen produced from fossil fuels, water electrolysis, biomass, other hydrogen-containing substances, and industrial hydrogen obtained through the recovery and purification of industrial by-product hydrogen.

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in this Document. For the dated documents, only the versions with the dates indicated are applicable to this Document; for the undated documents, only the latest version (including all the amendments) is applicable to this Document.

GB 190 Packing symbol of dangerous goods

GB/T 191 Packaging - Pictorial Marking for Handling of Goods

GB/T 3634.2 Hydrogen - Part

3 Terms and Definitions

For the purposes of this Document, there are no terms and definitions apply.

4 Technical Requirements

4.1 The technical requirements for industrial hydrogen shall comply with the provisions of Table 1.

4.2 The chlorine and alkali content and test methods in industrial hydrogen produced by salt electrolysis shall be negotiated by the supplier and the purchaser.

5 Sampling

The sampling of industrial hydrogen shall comply with the provisions of GB/T 43306.

6 Test Methods

Warning. During the determination, there shall be measures for treating hydrogen tail gas to prevent safety risks associated with hydrogen.

6.1 Calculation of industrial hydrogen purity The chlorine, alkali, and moisture content in industrial hydrogen is not included in the purity calculation. The purity of industrial hydrogen is calculated according to Formula (1). Where. x - purity of industrial hydrogen (mole fraction); x1 - nitrogen content (mole fraction); x2 - (oxygen + argon) content (mole fraction).

6.2.1 Thermal conductivity gas chromatography

6.2.1.1 Overview of method A gas chromatograph equipped with a thermal conductivity detector (TCD) was used, with high-purity hydrogen as the carrier gas. The TCD operates based on the thermal conductivity effect, i.e., different substances have different thermal conductivities. Industrial hydrogen was 7 - Sample gas inlet; 8 - Tail gas outlet; 9 - Thermal conductivity detector; 10 - Chromatographic column; 11 - Balance gas flow controller. Figure 1 -- Schematic diagram of thermal conductivity gas chromatography flow chart

6.2.1.3 Reagents and materials 6.2.1.3.1 Carrier gas High-purity hydrogen shall meet the requirements of GB/T 3634.2. 6.2.1.3.2 Chromatographic column A stainless-steel tube approximately 6000 mm long and 2 mm in inner diameter, packed with modified calcium molecular sieve (referred to as "5A molecular sieve") with a particle size of

0.25 mm to

0.40 mm; or other equivalent chromatographic columns. 6.2.1.3.3 Gas standard sample The content of the component shall be as close as possible to that of the content of the tested

component. Hydrogen shall be used as the equilibrium gas.

6.2.1.4 Measurement conditions 6.2.1.4.1 Carrier gas flow rate It is recommended to be 40 mL/min, or refer to the instrument manual. 6.2.1.4.2 Bridge current It is recommended to be 150 mA, or refer to the corresponding instrument manual. 6.2.1.4.3 Other conditions Refer to the instrument manual.

6.2.1.5 Measurement procedure After the instrument has stabilized, perform the measurement according to the instrument manual. Measure the gas standard sample and sample gas in parallel for at least three times, until the difference between two consecutive measurements is no greater than 5% of the arithmetic mean of these three measurements. Take the arithmetic mean of these three measurements as the final measured value. A typical chromatogram is shown in Appendix A.

6.2.1.6 Processing of the results The nitrogen and (oxygen + argon) content (xs,i) in the sample gas is calculated according to Formula (2). Where. xs,i - the content (mole fraction) of target component i in the sample gas; s,i - the arithmetic mean of the response values of target component i in the sample gas; r,i - the arithmetic mean of the response values of target component i in the gas standard sample/standard substance; xr,i - the content (mole fraction) of target component i in the gas standard sample/standard substance.

6.2.2 Equivalent methods Other equivalent methods may be used to determine the nitrogen and oxygen + argon content in industrial hydrogen. In case of disagreement over the determination results, the method specified in

6.2.1 shall be used as the arbitration method.

6.3 Determination of moisture content The determination of moisture content in industrial hydrogen with a purity of 99.95% shall be performed in accordance with the provisions of GB/T 5832.2.Other equivalent methods may also be used to determine the moisture content in industrial hydrogen. In case of disagreement over the determination results, the method specified in GB/T5832.2 shall be used as the arbitration method.