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

GB/T 20801.5-2025

Pressure piping code - Part 5: Hydrogen piping and pipelines

压力管道规范 第5部分：氢用管道

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1 Scope

GB/T 20801.5-2025 is the Chinese national standard covering piping for hydrogen - the materials and the hardness limits that keep embrittlement away, the joint design and the welding qualification, the leak tightness of a molecule that escapes through what holds natural gas, the fire and detection provisions, and the inspection. At 42,500 words, and it is a new part rather than a revision: hydrogen piping did not have its own code before. First edition, in force from 1 May 2026. Issued on 31 October 2025, it has been in force since 1 May 2026.

1.1 This document specifies the basic requirements, materials, design and calculation, fabrication and installation, inspection and testing, and safety protection for hydrogen piping and pipelines. For gaseous hydrogen transmission pipelines, it also specifies the technical requirements for commissioning, trial operation, piping use and maintenance, and piping emergency repairs. For gaseous hydrogen utility pipelines, it also specifies the technical requirements for safe operation and maintenance. NOTE

1. Hydrogen piping and pipelines refer to all types of piping transporting hydrogen, including gaseous hydrogen industrial piping, gaseous hydrogen transmission pipelines, and gaseous hydrogen utility pipelines, as well as liquid hydrogen piping. NOTE

2. The portions extending into the boundaries of hydrogen production plants, hydrogen stations, hydrogen supply stations, city gas gate stations, gas storage facilities, and gas-fired power plants, as well as gaseous hydrogen piping and pipelines connecting between plants, shall be governed by the provisions for gaseous hydrogen transmission pipelines or gaseous hydrogen industrial piping.

1.2 This document is applicable to gaseous hydrogen piping and pipelines with a maximum operating pressure greater than or equal to

0.1 MPa (gauge pressure) and a nominal diameter greater than or equal to DN

50. Other gaseous hydrogen piping and pipelines shall refer to this document for application.

1.3 The applicable conditions for gaseous hydrogen industrial piping, gaseous hydrogen transmission pipelines, and gaseous hydrogen utility pipelines in this document are as follows:

a) Gaseous hydrogen industrial piping. Transport industrial gaseous hydrogen with a design pressure less than or equal to 41 MPa.

b) Gaseous hydrogen transmission pipelines. Land-based pipelines transporting gaseous hydrogen with a volumetric content greater than or equal to 3%, and a design pressure less than or equal to 12 MPa and a design temperature less than or equal to 150°C.

c) Gaseous hydrogen utility pipelines. 1) Gaseous hydrogen with a volumetric content greater than 60% and a maximum operating pressure less than or equal to

1.6 MPa; 2) Gaseous hydrogen with a volumetric content greater than 3% and less than or equal to 60% and a maximum operating pressure greater than

0.4 MPa and less

b) The scope of non-applicability for gaseous hydrogen utility pipelines is as follows: 1) Piping within hydrogen plants and stations; 2) Gaseous hydrogen piping and pipelines within industrial users (defined by plant boundaries); 3) Gaseous hydrogen piping and pipelines within commercial and residential users (bounded by the service pipe valve).

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through 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 231.1 Metallic materials - Brinell hardness test - Part

3 Terms and Definitions

The terms and definitions defined in GB/T 20801.1-2025, GB/T 34275-2024, and GB/T 38942- 2020, as well as the following terms and definitions, are applicable to this document.

3.1 Piping A system assembled from piping components, used for transporting, distributing, mixing, separating, discharging, metering, or shutting off fluid flow. NOTE. In addition to piping components, this includes piping supports, but excludes supporting structures such as building frames, pipe racks, pipe galleries, and bases (pipe piers or foundations).

3.2 Gaseous Hydrogen Piping and Pipelines Piping used for transporting gaseous hydrogen and hydrogen mixtures. NOTE. The gaseous hydrogen piping and pipelines mentioned in this document include gaseous hydrogen industrial piping, gaseous hydrogen transmission pipelines, and gaseous hydrogen utility pipelines.

3.3 Gaseous Hydrogen Industrial Piping Piping used for transporting industrial gaseous hydrogen in various process units, hydrogen stations, hydrogen supply stations, and other facilities. NOTE. Industrial hydrogen refers to gaseous hydrogen that meets the requirements of Table 1 in GB/T 3634.1-2006.

3.4 Gaseous Hydrogen Transmission Pipelines Gas transmission pipelines used to transport gaseous hydrogen or hydrogen-blended gas among production sites, storage facilities, and users. Hydrogen existing in a liquid state. NOTE. Liquid hydrogen is a colorless, transparent, low-temperature liquid with a normal boiling point of

4.1 General Provisions

4.1.1 The materials, design, calculations, fabrication and installation, inspection and testing of gaseous hydrogen industrial piping shall comply with the relevant provisions of this document and GB/T 20801.1-2025. In case of any inconsistency between GB/T 20801.1-2025 and this document, the provisions of this document shall prevail.

4.1.2 The materials, design, calculations, construction and installation, inspection and testing, safety protection, trial operation and commissioning, use and maintenance, and emergency repair of gaseous hydrogen transmission pipelines shall comply with the provisions of this document and GB/T 34275-2024 concerning gas transmission pipelines. In case of any inconsistency between GB/T 34275-2024 and this document, the provisions of this document shall prevail.

4.1.3 The materials, design, calculations, construction and installation, inspection and testing, safety protection, trial operation and commissioning, use and maintenance, and emergency repair of gaseous hydrogen utility pipelines shall comply with the provisions of this document and GB/T 38942-2020 concerning gas pipelines. In case of any inconsistency between GB/T 38942-2020 and this document, the provisions of this

document shall prevail.

4.1.4 Unless otherwise specified, all pressures mentioned in this document refer to internal pressure (gauge pressure).

4.2 Gaseous Hydrogen Pressure Piping Classification The gaseous hydrogen piping and pipelines conforming to the scope of the Special Equipment Catalogue shall be classified as follows:

a) The gaseous hydrogen industrial piping is classified into two levels. GC1 and GC2. The gaseous hydrogen piping and pipelines with design pressures greater than or equal to

4.0 MPa are classified as GC1, and the rest as GC2.

b) The gaseous hydrogen transmission pipelines are classified into two levels. GA1 and GA

5.1 General Provisions

5.1.1 The materials used in gaseous hydrogen industrial piping, gaseous hydrogen transmission pipelines, and gaseous hydrogen utility pipelines shall meet strength requirements and possess good plasticity, toughness, machinability, and economy. Material selection shall meet the relevant requirements of GB/T 20801.1-2025, GB/T 34275-2024, and GB/T 38942-2020, respectively.

5.1.2 The materials selected for gaseous hydrogen piping and pipelines shall meet the hydrogen compatibility requirements.

5.1.3 The gaseous hydrogen piping and pipelines shall use verified or mature metallic materials with good hydrogen compatibility. When using unverified or new materials, hydrogen compatibility testing shall be conducted.

5.1.4 Piping materials may be used for gaseous hydrogen piping and pipelines if the hydrogen compatibility test results meet the following requirements.

a) The slow strain rate tensile test shall comply with the relevant provisions of GB/T 34542.2, and the hydrogen embrittlement sensitivity coefficient of the base material should not exceed 40%. NOTE. Hydrogen embrittlement sensitivity coefficient = (Reduction of area of specimen in inert gas atmosphere - Reduction of area of specimen in hydrogen atmosphere) / Reduction of area of specimen in inert gas atmosphere.

a) Low-strength carbon steel and low-to-medium alloy steel materials are preferred;

b) The design pressure of piping and components shall not exceed 21 MPa;

c) For materials with a design temperature greater than or equal to 177°C, see D.5.5 in GB/T 20801.1-2025.

5.2.2 When the piping design pressure is greater than 21 MPa, austenitic stainless steel 022Cr17Ni12Mo2 (S31603) or other materials with proven good hydrogen compatibility are