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

GB/T 150.1-2024

Replacing GB 150.1-2011

Pressure vessels - Part 1: General requirements

压力容器 第1部分：通用要求

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1 Scope

GB/T 150.1-2024 is the Chinese national standard on pressure vessels - part 1: general requirements, in the field of fluid systems and general-purpose components. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 24 July 2024 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 February 2025. Classification: ICS 23.020.30, CCS J74. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

1.1 This document specifies the general requirements for materials, design, fabrication, inspection and acceptance of metal pressure vessels.

1.2 The design pressure applicable to this document is.

- a) Steel vessels are not greater than 35 MPa;
- b) Other metal vessels are determined according to the corresponding reference standards.

1.3 The design temperature applicable to this document is.

- a) Design temperature range. $-269\text{ }^{\circ}\text{C} \sim 900\text{ }^{\circ}\text{C}$;
- b) The design temperature range of steel vessels is determined according to the allowable use temperature range of materials listed in GB/T 150.2;
- c) Other metal vessels are determined according to the allowable use temperature of materials listed in the corresponding reference standards of this document.

1.4 The structural forms applicable to this document are.

- a) The structural forms of steel vessels applicable to this document are determined according to the corresponding provisions of this document and GB/T 150.2 ~ GB/T 150.4.
- b) The structural forms and applicable scopes of the specific structural vessels and aluminum, titanium, copper, nickel, nickel alloy, zirconium vessels within the scope of application of this document shall comply with the corresponding requirements of the following standards. 1) GB/T 151 heat exchanger; 2) GB/T 12337 Steel spherical tanks; 3) JB/T 4734 Aluminium welded vessels; 4) JB/T 4755 Copper pressure vessels; 5) JB/T 4756 Nickel and nickel alloy pressure vessels;

2 Normative references

The contents of the following documents constitute the essential terms of this document through the normative references in the text. Among them, for the referenced documents with dates, only the versions corresponding to the dates are applicable to this document; for the referenced documents without dates, the latest versions (including all amendments) are applicable to this document.

GB/T 150.2 Pressure vessels - Part

3 Terms, definitions, symbols

3.1 Terms and definitions The terms and definitions as defined in GB/T 26929, as well as the following terms and definitions, apply to this document.

3.1.1 Pressure The force acting vertically on the unit surface area of the vessel.

Note. In this document, unless otherwise specified, pressure refers to gauge pressure.

3.1.2 Volume The geometric volume of the pressure vessel.

Note. Calculated from the dimensions marked on the design drawing (without considering fabrication tolerances) and rounded. Generally, it is necessary to deduct the volume of the internal parts permanently connected to the pressure vessel.

3.1.3 Operating pressure The maximum pressure that may be reached at the top of the

vessel, under normal working conditions.

4 Failure mode

The main failure modes usually considered in vessel construction are as follows:

a) Short-term failure mode. Brittle fracture, ductile fracture (such as plastic collapse, local overstrain), excessive deformation, buckling.

Note. Excessive deformation may cause leakage of medium or loss of other functions at flanges and other joints.

b) Long-term failure mode. Creep rupture, creep excessive deformation, buckling instability, corrosion and erosion, environmentally assisted cracking.

c) Cyclic failure mode. Ratcheting or progressive plastic deformation, alternating plasticity, fatigue, environmentally assisted fatigue.

5.1 General

5.1.1 In addition to complying with the provisions of this document and GB/T 150.2 ~ GB/T 150.4, the design, fabrication, inspection and acceptance of steel vessels shall also comply with relevant national laws, regulations, safety technical specifications. Pressure vessels constructed in accordance with the requirements of this document and GB/T 150.2 ~ GB/T 150.4 can meet the basic safety requirements of TSG

21. The standard declaration of conformity is in Appendix A. The overpressure relief device of the vessel shall be in accordance with Appendix B.

5.1.2 The design, fabrication, inspection and acceptance of special structure vessels and aluminum, titanium, copper, nickel, nickel alloy, zirconium vessels shall not only comply with the provisions of 5.1.1, but also meet the corresponding requirements of GB/T 151, GB/T 12337, NB/T 47041, NB/T 47042, JB/T 4734, JB/T 4755, JB/T 4756, NB/T 11270 and NB/T 47011. Low temperature vessels shall meet the corresponding requirements of GB/T 150.2 ~ GB/T 150.4.

5.1.3 The design and fabrication organizations of the vessel shall establish and improve the quality management system and operate it effectively.

5.1.4 The design and fabrication of pressure vessels under the jurisdiction of TSG 21 shall be subject to the supervision of the special equipment safety supervision agency.

5.2 Qualifications and responsibilities

5.2.1 Qualifications The design and fabrication organizations of pressure vessels under the jurisdiction of TSG 21 shall hold the corresponding special equipment production license.

5.2.2 Responsibilities

5.2.2.1 Responsibilities of the user or design client The user or design client shall perform the following responsibilities.

a) The user or design client of the vessel shall submit the User's Design Specification (UDS) to the design organization in a formal written form, which shall at least include the following contents. 1) The main standards and specifications on which the vessel design is based; 2) Operating parameters (including working pressure, working temperature range, alternating load conditions, liquid level, pipe load, etc.); 3) The place where the pressure vessel is used and its natural conditions (including ambient temperature, seismic fortification intensity, wind and snow load, etc.); 4) Medium components and characteristics; 5) Expected service life; 6) Geometric parameters and nozzle orientation; 7) The possibility and cause of overpressure during the service of the vessel; 8) Other necessary conditions required for the design.

b) The user or design client of the vessel shall comply with the following provisions. 1) Consider the possible overpressure risk of the vessel. 2) When the pressure source comes from outside the pressure vessel and is reliably controlled, the overpressure relief device may not be directly installed on the pressure vessel; when the overpressure relief device cannot be installed due to process or environmental factors, a system safety design method with reliability not less than that of the overpressure relief device shall be used, to prevent overpressure of the pressure vessel. 3) The user shall confirm that the overpressure relief device has been correctly installed in the designated position before the first operation of the vessel.

5.3.1 General provisions

5.3.1.1 The vessel design organization (designer) shall strictly design the vessel according to the vessel design conditions, which are provided by the user or the design client; consider all possible failure modes of the vessel during use; propose measures to prevent failure. The strength, stiffness, stability calculation of the pressure-bearing components of the vessel shall be in accordance with the provisions of GB/T 150.3, GB/T 151, GB/T 12337, NB/T 47041, NB/T 47042, JB/T 4734, JB/T 4755, JB/T 4756, NB/T11270 or NB/T 47011.

5.3.1.2 For vessels with successful use experience and subject to cyclic loads, the design may be carried out in accordance with this document with the approval of the technical director of the design organization; the fatigue analysis and assessment may be supplemented in accordance with Appendix C of GB/T 4732 (all parts), whilst meeting its relevant fabrication requirements.

5.3.2 Loads