



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

GB/T 4732.2-2024

Pressure vessels design by analysis - Part 2: Materials

压力容器分析设计 第2部分：材料

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1. Structure and drafting rules for standardization documents" Drafting. This document is Part 2 of GB/T 4732 "Analysis and Design of Pressure Vessels". GB/T 4732 has been published in the following parts.

1. General requirements;

3. Formula method;

4. Stress classification method;

5. Elastic-plastic analysis methods;

6. Manufacturing, inspection and acceptance. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document is proposed and coordinated by the National Technical Committee for Standardization of Boilers and Pressure Vessels (SAC/TC262). This document was drafted by: Hefei General Machinery Research Institute Co., Ltd., China Special Equipment Testing and Research Institute, Sinopec Engineering Construction Co., Ltd., Sinopec Guangzhou Engineering Co., Ltd., Jiangsu Special Equipment Safety Supervision and Inspection Institute, Nanjing Iron and Steel Co., Ltd., (Deyang) Heavy Equipment Co., Ltd. The main drafters of this document are: Zhang Xiaohu, Yang Guoyi, Duan Rui, Zhang Guoxin, Chang Yanyan, Miao Chunsheng, Chen Zhiwei, Lu Daiding, Kong Weihai, Huo Songbo and Shen Guoqu.

GB/T 4732 "Analysis and Design of Pressure Vessels" provides the requirements for the construction of pressure vessels according to the analysis and design method. GB/T 150 is based on The rule design concept puts forward the requirements for the construction of pressure vessels. Pressure vessel design and manufacturing units can choose two construction methods according to the specific design conditions. One of the standards implements the construction of pressure vessels. GB/T 4732 consists of 6 parts.

1.General requirements. The purpose is to provide general requirements for pressure vessels built according to analysis and design, including relevant management requirements. Requirements, common terms and definitions, and basic requirements shared by other parts of GB/T 4732.

2.Materials. The purpose is to give the relevant requirements and material properties of steel materials in pressure vessels built according to analysis and design. Energy data, etc.

3.Formula method. The purpose is to give typical pressure components and structural design requirements of pressure vessels built according to analytical design. The thickness calculation formulas for commonly used container parts designed by the formula method are specifically given. GB/T 4732.3 can be used as The design basis of GB/T 4732.4 and GB/T 4732.5 can also be simplified and completed according to GB/T 4732.3. Analysis design.

4.Stress classification method. The purpose is to give the stress classification method used in pressure vessels built according to analysis and design. Design related regulations.

5.Elastic-plastic analysis method. The purpose is to give the elastic-plastic analysis method used in pressure vessels built according to analytical design. Relevant provisions for design in accordance with the law.

6.Manufacturing, inspection and acceptance. The purpose is to give the structural types of pressure vessels built according to analysis and design. Manufacturing, inspection and acceptance requirements for devices. GB/T 4732 includes the pressure vessel construction process based on the analysis and design method (i.e. materials, design, manufacturing, inspection, testing and verification). GB/T 4732 does not need to and cannot cover all the technical requirements and special prohibition regulations that need to be followed in the collection work. All technical details of the pressure vessel construction, therefore, under the premise of meeting the basic safety requirements specified in the safety technical specifications, there is no restriction There is no special mention of technical content in GB/T 4732.GB/T 4732 cannot be used as a technical manual for the construction of specific pressure vessels, nor can it be used as a technical manual for the construction of specific pressure vessels. Alternative training, engineering experience and engineering evaluation. An engineering evaluation is a review of a specific Technical evaluation of products. Engineering evaluation needs to comply with the relevant technical requirements of GB/T 4732. GB/T 4732 does not restrict the use of other advanced technical methods in actual

engineering construction, but engineering and technical personnel use advanced technical methods. Reliable judgment is needed when applying the law to ensure that it meets the requirements of GB/T 4732. GB/T 4732 neither requires nor restricts designers to use computer programs to analyze and design pressure vessels, but the use of computers is. When analyzing and designing the program, in addition to meeting the requirements of GB/T 4732, it is also necessary to confirm.

1 Scope

GB/T 4732.2-2024 is the materials part of the Chinese design-by-analysis pressure vessel series. Design by analysis pushes a material closer to its limits than rule-based design does, so the permitted grades, their supplementary requirements and above all their allowable stresses have to be settled separately and with more care; that is what this part does. It specifies the steel designations and standards permitted for pressure components, the additional technical requirements imposed on those steels beyond their product standards, the temperature and pressure range over which each may be used, the allowable stresses themselves, and the basic requirements for welding consumables. It covers steel plate, steel tube, forgings and bar for studs, bolts and nuts, each in its own clause, and it carries normative annexes with the supplementary provisions for steel and with the allowable stress tables, plus informative annexes on high-temperature yield strength and creep data. It applies to vessels at design temperatures from -269 degrees Celsius to 800 degrees Celsius and design pressures below 100 MPa, within the applicability set by GB/T 4732.1.

This document specifies the permitted grades and standards of steel materials for pressure components of steel pressure vessels designed using analytical design methods. Additional technical requirements for steel, scope of use of steel (temperature and pressure), allowable stress of steel, and basic requirements for welding materials. This document is applicable to pressure vessels with a design temperature of -269°C~800°C and a design pressure less than 100MPa. The scope of inapplicability of this document is the scope of inapplicability specified in GB/T 4732.1.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 228.1 Tensile test of metallic materials Part

3 Low alloy steels with specified low temperature properties

GB/T 713.4 Steel plates and strips for pressure equipment Part

4 Nickel alloy steels with specified low temperature properties

GB/T 713.5 Steel plates and strips for pressure equipment Part

5 High manganese steels with specified low temperature properties

GB/T 713.6 Steel plates and strips for pressure equipment Part

6 Quenched and tempered high-strength steel

GB/T 713.7 Steel plates and strips for pressure equipment Part

7 Stainless steel and heat-resistant steel

GB/T 1220 Stainless Steel Bars

GB/T 1221 Heat-resistant steel bars

GB/T 3077 Alloy structural steel

GB/T 3965 Determination of diffusible hydrogen in deposited metal

GB/T 4226 Stainless steel cold-worked bars

GB/T 4334 Corrosion of metals and alloys - Test method for intergranular corrosion of austenitic and ferrite-austenitic (duplex) stainless steels

GB/T 4732.1 Analysis and design of pressure vessels Part