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

GB/T 16508.2-2022

Replacing GB/T 16508.2-2013

Shell boilers - Part 2: Materials

锅壳锅炉 第2部分：材料

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1 Scope

GB/T 16508.2-2022 is the Chinese national standard on shell boilers - part 2: materials, in the field of energy and heat transfer engineering. 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 9 March 2022 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 October 2022.

Classification: ICS 27.060.30, CCS J98. 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.

This document specifies the basic requirements, application range (temperature and pressure) and allowable stress of materials such as pressure elements and load-bearing

members of shell boilers, as well as selection requirements for welding materials. This document is applicable to the selection and use of materials for pressure elements, load-bearing members, as well as welding materials of shell boilers defined in GB/T 16508.1.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 150.2, Pressure vessels - Part

3 Terms, definitions and symbols

For the purposes of this document, the terms and definitions defined in GB/T 2900.48 and GB/T 16508.1 apply.

4.1 Basic requirements

4.1.1 The steel used for boiler pressure elements and load-bearing members welded with pressure elements shall be killed steel. Elements not specified in the material standards shall not be added to the material without the consent of the boiler manufacturer.

4.1.4 For steel plates, steel pipes, forgings used for boiler pressure elements, and round steel for suspenders, when cast billets (including die casting and continuous casting) are directly used for rolling or forging, the deformation ratio shall not be less than 3.0.

4.1.5 The material manufacturer shall ensure the quality of boiler steel and provide relevant information on material quality certification. Specific requirements are as follows:

4.1.6 Boiler manufacturer shall check and accept boiler materials according to the items specified in JB/T 3375. They can only be used after passing the test. Materials that meet one of the following conditions can be exempted from physical and chemical and corresponding non-destructive testing reinspection during acceptance.

4.1.7 After the version of the material standard is updated, if the performance index or technical requirements of the material are not modified, the use of the stock material will not be affected.

4.2 Pressure elements

4.2.1 The selection of materials is based on the operating conditions of the boiler (temperature, pressure and other environmental factors). At the same time, consider the processing technology and equipment conditions of the manufacturer.

4.2.2 Metal materials and welding materials for pressure elements shall have sufficient strength, plasticity, toughness and good corrosion resistance under service conditions. Materials for components with frequent changes in working conditions shall have good fatigue resistance.

4.2.6 The elastic modulus, thermal conductivity and average linear expansion coefficient of the material can be selected from Annex A.

4.3 Load-bearing members

4.3.1 The steel used in the load-bearing structure shall have the qualified guarantee of yield strength, tensile strength, elongation after fracture, sulfur and phosphorus content. A qualified guarantee for carbon equivalent shall be provided for the welded structure.

4.4 Welding materials

4.1.1 The model and performance of the welding rod or wire shall be compatible with the performance of the corresponding base metal.

5.1 Steel plate

5.1.1 The applicable range of working pressure and wall temperature (calculated temperature) for carbon steel and low alloy steel plates shall comply with the provisions in Table

1. The allowable stresses of commonly used steel plates are listed in Table 2.

5.1.5 For 13MnNiMoR steel plates with a thickness greater than 36 mm, the drop weight test can be added according to GB/T 6803. The acceptance index of non-plastic transition temperature (NDT) is stipulated in the design documents.

5.1.6 For steel plates with a calculated temperature higher than 300°C, the high temperature tensile test at this temperature may be specified in the design documents if necessary.

5.1.7 If the manufacturing process permits, the boiler shell (drum) can be directly made of controlled-rolled or hot-rolled steel plates with a Q345R plate thickness of 36 mm or less.

5.2 Steel pipe

5.2.1 The application scope for working pressure and wall temperature (calculated temperature) of the steel pipe shall comply with the provisions in Table

3. The allowable stresses of commonly used steel pipes are listed in Table 4.

5.4 Steel casting

5.4.1 The scope of application for steel castings shall comply with the provisions in Table

7. The allowable stresses for commonly used steel castings are listed in Table 8.

5.5 Iron casting

5.5.1 The scope of application for iron castings shall comply with the provisions in Table

9. The allowable stresses for commonly used iron casting materials (nominal thickness not greater than 30 mm) are listed in Table 10.

6.1 Suspenders and braces

6.1.1 Rolled or forged round steel can be used for boiler suspenders and bracing materials. The scope of application for round steel used for suspenders and braces shall comply with the provisions in Table 11.

6.2 Suspending device

6.2.1 The scope of application for steel used for the suspending devices (U-shaped clamps, pin shafts, etc.) is in accordance with the provisions in Table 13.

6.2.2 The allowable stress for the steel used for the suspending devices (U-shaped chuck, pin shaft, etc.) shall be in accordance with the provisions in Table 14.

7 Welding material

7.1 General requirements The procurement, marks, batching, quality certification and reinspection of welding materials shall meet the requirements of NB/T 47018.1. Storage and transportation shall meet the requirements of JB/T 3223.

7.2 Steel welding rod The steel welding rods are materials specified in NB/T 47018.2, GB/T 983, GB/T 984, GB/T 5117, GB/T 5118 and GB/T 32533.

7.3 Gas-shielded arc steel welding wire and filler wire

7.4 Submerged arc welding steel wire and flux Submerged arc welding steel wire and flux are materials specified in NB/T 47018.4, GB/T 5293, GB/T 12470 and GB/T 17854.