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

GB/T 16507.2-2022

Replacing GB/T 16507.2-2013

Water-tube boilers - Part 2: Materials

水管锅炉 第2部分：材料

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1 Scope

GB/T 16507.2-2022 is the Chinese national standard on water-tube 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 principles and requirements for the selection of materials for pressure and non-pressure elements of water-tube boilers, stress components, the application range (temperature and pressure) and allowable stress of materials, as well as the general requirements for boiler steel structures and welding materials. This document is applicable to the selection and use of materials for pressure elements and non-pressure elements, stress components, boiler steel structures and welding materials of water-tube boilers defined in GB/T 16507.1

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 2: Materials

GB/T 699, Quality carbon structure steels GB/T 700, Auto immediate

GB/T 711, Hot-rolled quality carbon structural steel plates sheets and strips

GB/T 713, Steel plates for boilers and pressure vessels

GB/T 983, Covered electrodes for manual metal arc welding of stainless and heat-resisting steels

GB/T 984, Hard facing electrodes for shielded metal arc welding

GB/T 1220, Stainless steel rod

GB/T 1221, Heat-resistant steel bars

GB/T 1348, Spheroidal graphite iron castings

GB/T 1591, High strength low alloy structural steels

GB/T 2900.48, Electrotechnical terminology of boilers

GB/T 3077, Alloy structure steels

GB/T 3087, Seamless steel tubes and pipes for low and medium pressure boiler

4 Basic requirements

4.1 The steel of the pressure element and the load-bearing member welded with the pressure element shall be killed steel.

4.2 Elements not specified in the material standards shall not be added to the material without the consent of the boiler manufacturer.

4.3 Boiler manufacturers shall conduct acceptance inspection for boiler materials according to the items specified in JB/T 3375. They can only be used after passing the acceptance inspection.

4.4 Materials that meet one of the following conditions may not be subject to physical and chemical and corresponding non-destructive testing re-inspection during acceptance:

a) The acceptance personnel shall conduct acceptance inspection at the material manufacturer according to the procurement technical requirements. Witness signature confirmation on the inspection report or relevant quality certification documents;

b) For carbon steel and carbon-manganese steel materials for boilers with rated working pressure less than 3.8MPa, the identification of the physical object is clear and complete. It has a material quality certificate that meets the requirements of 4.6. The quality certificate is consistent with the actual object.

4.5 In the boiler manufacturing process, if there is a process of thermal processing with a heating temperature exceeding the phase transition point or the overall heat treatment of the component, the raw material of the component does not require the material manufacturer to guarantee the heat treatment state. However, it shall be clearly stipulated in the ordering technical conditions.

4.6 Manufacturers of special steel plates, steel pipes and forgings for boilers shall ensure the quality of materials and provide material quality certificates. The material quality certificate shall meet the following requirements:

a) The material manufacturer shall provide the user with the original quality certificate in accordance with the corresponding material standards and the provisions of the order contract. The content of the material quality certificate shall be complete. It shall be printed with traceable information logo. It shall be stamped with the quality inspection seal of the material manufacturer.

b) When the boiler materials are not directly provided by the material manufacturer, the material operator shall provide the original material quality certificate, or a copy of the material quality certificate stamped with the official seal of the material operator and the signature (seal) of the responsible person.

4.7 The elongation after fracture (A) of steel plates, steel pipes and forging materials used for pressure elements at room temperature in the longitudinal direction shall not be less than 18%.

4.8 The room temperature Charpy V-notch impact absorption energy (KV2) of steel plates, steel pipes and forgings used for pressure elements shall not be less than 27J. Austenitic steel can be exempted from the impact test.

4.9 When steel plates, steel pipes and forgings used for pressure elements are directly rolled and forged by casting billets (including die casting and continuous casting), the deformation ratio shall not be less than 3.0.

4.10 After the material standard version is updated, if the performance indicators or technical requirements of the material have not been adjusted, it will not affect the use of stock materials. Otherwise, it shall be verified whether the quality of the stock material meets the requirements of the new version of the standard.

5.1 Pressure element

5.1.1 The selection of materials is based on the operating conditions (pressure,

temperature and other environmental factors) of the pressure element of the boiler. At the same time, consider the processing technology and equipment conditions of the manufacturer.

5.1.2 Metal materials used for pressure elements shall have sufficient strength, good tissue stability and corrosion resistance. Materials for components subject to alternating loads or alternating cold and heat shall have good fatigue resistance.

5.1.3 The materials used for boiler pressure elements shall be the designations specified in this document. If materials other than those specified are used, they shall comply with the relevant requirements of this document. Materials and new materials of foreign designations shall meet the requirements of Annex A.

5.1.4 The calculated temperature (wall temperature) of the pressure element or the wall temperature of the outer wall shall not exceed the limit value of the material specified in this document.

5.1.5 Lugs, fins and similar non-pressure elements welded to pressure elements shall be of material compatible with the material to which they are to be joined.

5.1.6 Substitute materials shall meet the strength, structure and process requirements of the original design. They shall be approved by the technical department (including the design and process department) of the material substitute organization. requirements of NB/T 47018 (all parts).

6.1 Steel plate

6.1.1 The applicable range of working pressure and wall temperature of carbon steel and low alloy steel plates shall comply with the provisions in Table 1.

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

6.1.3 Steel plates with a thickness greater than 30mm shall be ultrasonically tested one by one according to NB/T 47013.3. The ultrasonic testing quality level is:

- a) For Q245R and Q345R steel plates with a thickness greater than 30mm and not greater than 36mm, it is not lower than level II;
- b) For Q245R and Q345R steel plates with a thickness greater than 36mm, it is not lower than level I;
- c) For other alloy steel plates, not lower than level I.

6.1.4 For carbon steel and low-alloy steel plates that require normalizing, normalizing plus tempering or quenching and tempering heat treatment during the boiler manufacturing process, the delivery status of the steel plate manufacturer may be different from the provisions in Table 2. The samples for exit-factory inspection and enter-factory inspection can be taken from the heat-treated steel plate sample blocks.