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

GB/T 16507.5-2022

Replacing GB/T 16507.5-2013

Water-tube boilers - Part 5: Fabrication

水管锅炉 第5部分：制造

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4 Basic requirements

- 4.1 The structure of the pressure components of the boiler should meet the requirements of GB/T 16507.3, and the strength calculation should meet the requirements of GB/T 16507.4.
- 4.2 The design and manufacturing process documents should conform to the production conditions of the unit.
- 4.3 Appropriate processes and methods shall be adopted for the manufacture of pressure components, and no additional stress or harmful defects affecting safety and use shall be produced.
- 4.4 The equipment, instruments and meters involved in the manufacture of boiler pressure components shall meet the specified accuracy, and shall be regularly verified or calibrated.
- 4.5 Raw materials should meet the requirements of GB/T 16507.2 and design drawings.

4.6 According to the design drawings approved by the nationally approved appraisal agency, the process and technical requirements of the manufacturing unit and the corresponding engineering practice practical experience in the manufacture and assembly of water tube boilers.

4.7 Boiler manufacturing shall be supervised and inspected by the supervisory inspection agency.

4.8 For the assembly of components such as pipes, temperature and pressure reduction devices, flow meters (shells), and factory-made prefabricated pipe sections within the scope of power plant boilers, the Manufacture supervisory inspection is required for boiler components or pressure piping component assemblies.

5.1 Material marking

5.1.1 The material identification procedure for materials used for pressure components and main load-bearing components shall be formulated.

5.1.2 Boiler pressure parts (boiler drum, start-up (steam-water) separator, water storage tank, header parts, pipes with a nominal outer diameter of not less than 219mm) Material marks should be traceable to the quality certificate of the material; other pressure parts (pipes with a nominal outer diameter less than 219mm) and non-load bearing The material marks of the pressure parts (drum, start-up (steam-water) separator, water storage tank, supporting parts on the header) should be easy to identify, so as to prevent the mixing of materials.

5.2 Migration of material marks Material marking shall be retained during the manufacturing process. The materials used for boiler pressure components shall be marked and transplanted before cutting and cutting, and shall be easy to identify.

5.3 Marking during manufacture Welder marks, non-destructive testing (RT testing) marks, and material marks requiring traceability shall be retained as permanent marks. Production process When the middle mark is covered or the mark is lost due to processing, the mark should be transplanted.

5.4 Marking method

5.4.1 The following marking methods or a combination of the following methods should be used.

- a) steel stamp (low stress steel stamp);
- b) vibration etching or other etching tools;
- c) Paint or mark with a marker.

5.4.2 The steel stamp shall not be used in the following situations.

- a) stainless steel pipe;
- b) In the inner and outer arc area of the pipe elbow;
- c) Customer requests that material not be stamped.

5.4.3 When the method in

5.4.1 cannot be used for marking, other methods that do not damage the safety of the boiler can be used for marking (such as positioning maps, stickers, etc.).

6.1 General requirements

6.1.1 The manufacturing unit shall ensure that the actual thickness of the pressure component after processing or forming is not less than the minimum required thickness required by the design.

6.1.2 When using cold forming, the cold brittleness of the steel used should be considered.

6.1.3 When warm forming is used, the temper brittle temperature zone of the steel should be avoided.

6.1.4 The material forming process should consider the strain of the material. The manufacturing method used for cold forming should not cause excessive deformation rate of the component (or strain), otherwise the corresponding post-forming heat treatment should be carried out.

6.1.5 The materials used to manufacture end covers, flanges, pipe fittings, etc. shall comply with GB/T 16507.2 and design drawings.

6.2 Division of materials

6.2.1 Select the method of dividing the material according to the material properties and specifications. The segmentation method adopted should ensure the processing accuracy required by the process, and should also Reduce or avoid deformation caused by blanking. If the deformation exceeds the allowable range after blanking, appropriate methods should be used to correct it.

6.2.2 Determine whether preheating is required for thermal cutting according to the type and thickness of the steel. See Table 1 for the recommended preheating requirements.

6.2.3 The thermally cut surface shall be machined or polished to remove all burnt metal, cutting slag, harmful nicks and excess metal, etc. For alloy steel, a machining allowance should be left after thermal cutting, unless it can be shown that the structure of the material is not damaged.

6.3 Drum, starting (steam-water) separator, water storage tank, header body and head forming

6.3.1 Steel plates are used to manufacture cylinders and heads. When forging or stamping is used for manufacturing, it shall be carried out according to the requirements of forging heating control, and shall be connected with the pot. The production conditions of the furnace manufacturing unit are consistent.

6.3.2 The hot forming or cold forming manufacturing of the head shall adopt the continuous forming process.

6.3.3 The requirements for heat treatment after forming are as follows:

--- Cold forming of steel plate is shown in Figure

1. When the deformation rate is greater than 5%, corresponding heat treatment should be carried out after forming to restore the properties of the material. in accordance with Chapter 9;

a) For the rolled or pressed cylinder and the pressed head, the oxide scales, depressions and scars on the inner and outer surfaces shall be removed, and when the depth does not affect the When the minimum required thickness required by the design is in a smooth transition, it may not be ground; if the bottom is sharp, it should be ground to a smooth transition. ferry. When the depth affects the minimum required thickness required by the design, welding repair and grinding shall be carried out according to the qualified welding repair process, and no Damage inspection passed.

b) After the edge of the manhole is processed, it should be inspected on the surface, and there should be no cracks.

6.4.1 General requirements

6.4.1.1 Pipe forming includes pipe bending and pipe end forming. If the cold forming of the pipe cannot meet the technical requirements of the product, hot forming should be used.

6.4.1.2 The requirements for heat treatment after forming of the pipe shall be in accordance with the provisions in

6.4.4 and Chapter 9.

6.4.2 Elbows

6.4.2.1 Thermoforming (that is, hot bending, including inner heating bends, inner heating bends, Hot extrusion forming and intermediate frequency induction heating bending, etc.) or cold forming (ie cold bending).

6.4.2.2 When hot bending is used, the heating specification and heating range shall be strictly controlled.

6.4.2.3 The bending process test should be carried out for the bent pipe to verify that the adopted bending process meets the technical requirements of the product. Bending