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

GB/T 16507.4-2013

**Water-tube boilers -- Part 4: Strength calculation of pressure
parts**

水管锅炉 第4部分受压元件强度计算

(English Translation)

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Foreword

GB/T 16507 "Water-tube Boilers" includes the following eight parts.

- Part 1.General;
- Part 2.Materials;
- Part 3.Structural Design;
- Part 4.Strength Calculation of Pressure Parts;
- Part 5.Manufacture;
- Part 6.Inspection, Test and Acceptance;
- Part 7.Safety Appurtenances and Instruments;
- Part 8.Installation and Operation.

This part is Part 4 of GB/T 16507.

This part was drafted according to the rules specified in GB/T 1.1-2009.

This part partially replaces GB/T 16507-1996 and GB/T 9222-2008.The main technical differences are as follows.

- This part was formulated based on GB/T 9222-2008.The requirements regarding

the materials and permissible stress table in GB/T 9222-2008 were incorporated into Part 2 of this standard (GB/T 16507.2); the structural requirements on process were incorporated into Part 3 (GB/T 16507.3). This part contains the other contents in GB/T 9222-2008 and has integrated the relevant contents in GB/T 16507-1996. The chapters were divided according to the calculation process, including 16 chapters and 4 appendixes.

- Partial symbols, angle code and the like in the primary standard were modified;
- The permissible stress correction coefficient table was modified and only the correction coefficients of the material permissible stress related to the component operating condition were preserved. Others permissible stress correction coefficients regarding the structures were abolished. Equivalent correction was considered in calculation of component thickness. The structural coefficients of corresponding components were modified and permissible stress correction coefficient 0.95 for boiler drum and head of a rated pressure larger than or equal to 16.7MPa was cancelled;
- The determination method of calculation pressure was modified and the requirements that the calculation pressure shall be larger than or equal to the sum of the operating pressure and the additional pressure designed for safety valve setting were explicitly defined; the mandatory provision concerning the designed additional pressure for safety valve setting was cancelled, and the additional pressure value is optional by reference to informative Appendix B;
- The weld efficiency table was modified and the weld efficiency was determined according to the weld groove form and non-destructive testing scope;
- The determination method of additional process thickness was modified and the relevant mandatory provisions were cancelled. Appendix C (informative) can be referred for adoption of additional process thickness;
- The thickness calculation formulae for outer arc, middle arc and inner arc of bent tube or bend were provided, and specified that the required thickness of inner arc

of the bent tube or elbow with an outer diameter exceeding 100mm shall be checked;

- The thickness calculation specifications for the small-bore tube which is subject to external pressure were modified; and the provision about referring to the standard calculation stated in GB 150 was added;
- Partial structural forms of flat lid were adjusted and newly-added;
- Provisions related to the verification of stress analysis were added and the concerning general procedures were specified.

This part was proposed by and shall be under the jurisdiction of National Technical Committee on Boilers and Pressure Vessels of Standardization Administration of China (SAC/TC 262).

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The previous editions replaced by this part are as follows.

- GB/T 9222-2008;
- GB/T 16507-1996.

Water-Tube Boilers - Part 4.Strength

Calculation of Pressure Parts

1 Scope

This part of GB/T 16507 specifies the strength calculation of pressure parts used in water-tube boilers and the designed permissible stress of materials, and determines the method for verifying the maximum permissible working pressure of parts.

This part is applicable to the pressure parts of water-tube boilers defined in GB/T 16507.1, including boiler drum, header drum, tube, pipeline within the range of boiler, convex head, flat lid and cover plate, tee joint and other non-rectangular components.

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 150 Pressure Vessels

GB/T 16507.1 Water-tube Boilers - Part 1.General Provisions

GB/T 16507.2 Water-tube Boilers - Part 2.Materials

GS/T 16507.5 Manufacture

DL/T 5366 Technical Code for Calculating Steam/Water Piping Stress in Fossil Power Plants Code for Designing

JB/T 6734 Strength Calculation Method for Boiler Fillet Weld

3 Terms and Definitions

For the purposes of this document, the terms and definitions defined in GB/T 16507.1 and the following ones apply.

3.1 Corrosion allowance thickness

The additional thickness by considering the corrosion thickness thinning in the designed service life of pressure parts.