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GB/T 16507.4-2013

Partial replace GB/T 16507-1996, GB/T 9222-2008

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

**水管锅炉**

**第 4 部分：水管锅炉**

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## Foreword

GB/T 16507 *Water Tube Boiler* includes the following 8 part:

- Part 1: General
- Part 2: Materials;
- Part 3: Structure design;
- Part 4: Calculation of strength of pressure components;
- Part 5: Manufacturing;
- Part 6: Inspection, test and acceptance;
- Part 7: Safety accessories and meters;
- Part 8: Installation and operation.

This is Part 4 of GB/T 16507.

This part is drafted according to the rules given by GB/T 1.1-2009.

This part replaces GB/T 16507-1996 and GB/T 9222-2008, compared with GB/T 16507-1996 and GB/T 9222-2008, main changes of technical contents are as follows:

- This part is based on GB/T 9222-2008, makes the materials and allowable stress table and relevant requirements in GB/T 9222-2008 be included in Part 2 of this standard (GB/T 16507.2), makes the structure requirements related to process be included in Part 3 of this standard (GB/T 16507.3), makes the rest contents be included in this part, meanwhile integrates the relevant contents of GB/T 16507-1996. This part divides the section according to the calculation process, including 16 chapters and 4 annexes;
- Amend some symbols, page number and other symbols of the original standard;
- Amend the allowable stress correction coefficient table, only retains the correction coefficient of allowable stress to the materials of the working conditions of components, other allowable stress correction coefficients related to structure are obsolete, the equivalent correction is considered in calculation of thickness of component, amend the structure coefficient of corresponding components, and cancel the 0.95 allowable stress correction coefficient of boiler cylinder and head with the

rated pressure more than or equal to 16.7 MPa;

- Amend the determination method for calculating the pressure, and request that the calculation pressure should be more than or equal to the sum of working pressure and additional pressure of relief valve setting design clearly. Cancel the mandatory provisions for the additional pressure of relief valve setting design, and the additional pressure of relief valve setting design may refer to the informative Annex B;
- Amend the welding seam weakening coefficient table, and identify the welding seam weakening coefficient determined by the welding seam groove form and non-destructive testing;
- Amend the way to determine the additional thickness of process, cancel the mandatory provisions to the additional thickness of process, and the additional thickness of process, may refer to the informative Annex C;
- Give the thickness calculation formula of outside arc, middle arc and inside arc of bending tube and elbow, and regulate that the bending or elbow with the outside diameter more than 100 mm should be verified the calculation thickness of inside arc;
- Amend the regulations to calculate the thickness of tube with small diameter and external pressure, and add the terms of calculation by referring GB 150 standard;
- Adjust and add some flat cap structure forms;
- Amend the terms related to the stress analysis validation method, and give the general steps of the stress analysis validation method.

This part is proposed and under the jurisdiction of National Boiler Pressure Vessel Standardization Technical Committee (SAC/TC 262).

This part is drafted by: Shanghai Power Equipment Research Institute.

The participants of this part include: Harbin Boiler Company Limited, Dongfang Boiler Group Co., Ltd. of Dongfang Electrical Group, Shanghai Boiler Co., Ltd., Wuhan Boiler Co., Ltd., Wuxi Huaguang Boiler Co., Ltd., Babcock & Wilcox Beijing Company LTD, Hangzhou Boiler Group Co., Ltd., Power Equipment National Engineering Research Center, Sichuan Chuanguo Boiler Co., Ltd., Jinan Boiler Group Co., Ltd.

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This Part replaces the following historical editions issued:

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

# Water tube boiler

## Part 4: Calculation of strength of pressure components

### 1 Scope

This part of GB/T 16507 regulates the calculation method, designed allowable stress of materials of strength of pressure components of water tube boiler and determines the verification method of maximum allowable working pressure of components.

This part is applied to the pressure components of water tube boiler defined by the range of GB/T 16507.1, including the boiler cylinder body, header cylinder body, tube, pipe in the range of boiler, convex end socket, flat end cover and cover plate, tee joint and other shaped components.

### 2 Normative references

The articles contained in the following documents have become this document when they are quoted herein. For the dated documents so quoted, all the modifications (Including all corrections) or revisions made thereafter shall be applicable to this document.

GB/T 150 Pressure vessels

GB/T 16507.1 Water-tube boilers—Part 1: General requirement

GB/T 16507.2 Water-tube boilers—Part 2: Materials

GB/T 16507.5 Water-tube Boilers—Part 5: Fabrication

DL/T 5366 Technical Code for Stress Calculating of Steam/water Piping in Fossil Fuel Power Plant

JB/T 6734 Calculation methods for strength of boiler fillet weld

### 3 Terms and definitions

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

#### 3.1

##### Corrosion allowance thickness

During the use period of pressure components, need to consider the additional thickness for corrosion thinning.

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