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

中华人民共和国国家标准

GB/T 9222-2008
Replace GB/T 9222-1988

**Strength calculation of pressure parts for
watertube boilers
水管锅炉受压元件强度计算**

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China**

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Foreword

This standard replaces GB/T 9222 - 1988 "Strength calculation of pressure parts for watertube boilers". There have been some significant changes in this standard over GB/T 9222 - 1988 in the following aspects:

- Add foreword.
- Add scope.
- Add normative reference.
- Add terms and definitions.
- Add general provisions.
- Add or adjust elementary permissible stress for parts of usual materials of domestic boilers (table 1 of 1.3.1 in edition 1988; table 1 and 2 of 5.3.1 in this edition).
- Add elementary permissible stress for parts of usual materials of overseas boilers (Appendix B of this edition).
- Modify scope and value of compensation factor of elementary permissible stress for boiler barrel body and end socket (Note 2 of Table 2 in edition 1988; Note of Table 3 of this edition).
- Modify selection method of calculating wall temperature (1.4.2 of edition 1988; 5.4.2 of this edition).
- Modify definition for thickness of boiler barrel body (2.2.1 of edition 1988; 6.2.1 of this edition).
- Extend application scope of β_L in computing formula for boiler barrel body's theory thickness, permissible minimum attenuation coefficient and maximum permissible design pressure (2.2.4 of edition 1988; 6.2.4 of this edition).
- Modify value-taking method of supplementary pressure designed for boiler outlet (2.3.1 of edition 1988; 6.3 of this edition).
- Add calculation method for equivalent diameter of ladder pore of faulty fusion through welding (6.4.9 of this edition).
- Modify computing formula for additional thickness of boiler barrel body (2.5.1 of edition 1988; 6.5.1 of this edition).

- Modify rules for selecting processing reduction of boiler barrel body and additional thickness of thickness lower deviation negative value (2.5.3 of edition 1988; 6.5.3 and 6.5.4 of this edition).
- Modify controlling value of difference between maximum inside diameter and minimum inside diameter of same cross section in parts of high pressure boiler barrel body 2.10.1 of edition 1988;6.10.1 of this edition).
- Modify provisions about expanded joint pore on boiler barrel body; centralize position of down pipe pore and other welded pipe pore (2.10.2, 2.10.3 of edition 1988; 6.10.2, 6.10.3 of this edition).
- Modify computing formula for minimum nominal thickness of pipe head of boiler barrel whose rated pressure is larger than 2.5 MPa; Cancel limit to minimum nominal thickness of pipe head of boiler barrel whose rated pressure is not larger than 2.5 MPa(2.10.4 of edition 1988; 6.10.4 of this edition).
- Modify definition for thickness of header tank body (3.2.1 of edition 1988; 7.2.1 of this edition).
- Modify computing formula for additional thickness of header tank body (3.5.1, 3.5.5 of edition 1988; 7.5.1, 7.6.1 of this edition).
- Modify computing formula for technology reduction amount of header tank body and thickness lower deviation negative addition thickness(3.5.3, 3.5.4 of edition 1988; 7.5.3, 7.6.3 of this edition).
- Modify maximum permissible thickness of non-insulation header tank and anti-scorching tank body (table 12 of 3.6.2 in edition 1988; table 12 of 7.7.2 in this edition).
- Modify division method and roundness value of maximum permissible roundness for cross section of circular arc header tank (table 13 of 3.9.1 in edition 1988; table 13 of 7.10.1 in this edition).
- Modify definition for thickness of pipe (conduit) and computing formula of thickness (4.2.1 of edition 1988; 8.2.1 of this edition).
- Modify computing formula for design calculation addition thickness of pipe (conduit) (4.5.1, 4.5.3, 4.5.4, 4.5.5 of edition 1988; 8.5.1, 8.5.3, 8.5.4 of this edition).
- Modify computing formula for check calculation effective thickness of pipe (conduit) Add definition for check calculation addition thickness of pipe (conduit) (4.2.2, 4.5.6 of edition 1988; 8.2.2, 8.6 of this edition).
- Modify definition for convex head thickness (5.2.1 of edition 1988; 9.2.1 of this edition).
- Modify conditions convex head structure shall satisfy (5.2.3 of edition 1988;

9.2.3 of this edition).

- Modify applicable conditions for computing formula of convex head (5.2.3 of edition 1988; 9.2.3 of this edition).
- Modify computing formula for convex head addition thickness; add definition for addition thickness of convex head check calculation;
- Modify reduction value of end socket's stamping technology; make sure value-taking method for reduction value of convex head's stamping technology (5.2.8 of edition 1988; 9.2.8 of this edition)
- Modify conditions shall satisfy for convex head nominal thickness (5.2.9 of edition 1988; 9.2.9 of this edition).
- Modify provisions for minimum thickness control of convex head (5.2.10 of edition 1988; 9.2.10 of this edition).
- Delete the provision about "newly manufactured end socket is requested not to be oblate (5.2.13 of edition 1988).
- Add requirements radial minimum residual thickness shall satisfy at kerfs part of convex head's manhole sealing surface (9.3 of this edition).
- Modify definition for flat-end cover thickness (6.2.1 of edition 1988; 10.2.1 of this edition).
- Delete no. 5 structural shape in table 18 of primary standard, add a full-penetration structural shape; modify provisions about rated pressure and size applicable to no. 6 structural shape in table 18 of primary standard (6.2.3 of edition 1988; 10.2.3 of this edition).
- Modify definition and computing formula for cover board thickness (6.3.1 of edition 1988; 10.3.1 of this edition).
- Add structural shape of cover board and its structural property factor K; modify value-taking method for calculating dimension (6.3.4 of edition 1988; 10.3.4 of this edition).
- Add method to determine maximum allowable pressure of hydraulic test for cover board (10.3.8 of this edition).
- Add structural style that can be treated as reinforcing structure (7.3 of edition 1988; 11.3 of this edition).
- Definition and computing formula for δ_0 , δ_{10} of computation of reinforcement for modify pore (7.4.4 of edition 1988; 11.4.4 of this edition).
- Add application scope and condition for pore and bridge reinforcement (7.5.3 of edition 1988; 11.5.4 of this edition).

- Modify definition and computing formula for thickness of welding trifurcated connector (4.2.1 of edition 1988; 12.2.1 of this edition).
- Adjust application of computing formula for theory thickness, maximum permissible design pressure of welding trifurcated connector's main pipe and branch pipe (8.2.3 of edition 1988; 12.2.3 of this edition).
- Revise attenuation coefficient of some welding trifurcated connector φ_r (8.2.6 of edition 1988; 12.2.6 of this edition).
- Cancel primary standard 8.2.11.
- Modify open pore provision for welding trifurcated connector and determine principles of attenuation coefficient (8.2.12 of edition 1988; 12.2.11 of this edition).
- Modify taking principle for hydrostatic test pressure of welding trifurcated connector (8.2.13 of edition 1988; 12.2.12 of this edition).
- Modify open pore provision for hammering trifurcated connector and determine principles of attenuation coefficient (8.3.5 of edition 1988; 12.3.5 of this edition).
- Add calculation method for hot extrusion trifurcated connector (12.4 of this edition).
- Add application scope for calculation of equal-diameter Y-tube (12.5.1 of this edition).
- Add finite element stress analysis and calculation to determine method of component's maximum permissible design pressure (13.6 of this edition).
- Cancel appendix A and appendix C of primary standard.
- Appendix B of primary standard is changed to appendix C, appendix D of primary standard is changed to appendix A.

Appendix A of this standard is normative; appendix B and appendix C are informative.

This standard was proposed and is under the jurisdiction of China Standardization Committee on Boilers and Pressure Vessels.

This standard is revised by subcommittee on boiler (SC 1) of China Standardization Committee on Boilers and Pressure Vessels.

This standard is drafted by Shanghai Generating Set Package Design Research Institute.

Organizations and staff drafting this standard (sequence is arranged according to chapters and articles):

- Shanghai Generating Set Package Design Research Institute: Li Liren, Zhang Rui, Zhang Qingjiang, Wu Xiangpeng, Sheng Jianguo, Chen Wei, Yang Wenhui;
- Wuhan boiler Co.,Ltd: Xiao Huifang, Tao Shengzhi; Cui Jinxian;
- Dongfang Boiler Group Co., Ltd: Lin Hongshu, Zhang Yuyin, Shen Qiyan, Li Houyi, Zhai Yaozhong;
- Harbin Boiler Company Limited: Liang Jianping, Cao Leisheng;
- WuXi Huaguang Boiler Co., Ltd.: Yao Meichu;
- Shanghai Boiler Works Co., Ltd.: Feng Jingyuan, Xu Qin, Wu Rusong, Jiang Shenglong, Shi Yingquan;
- National Engineering Research Center for generating set: Zhao Weimin;
- Shanghai Industrial Boiler Research Institute: Yu Dezu, Tian Yaoxin;
- Thermal Power Research Institute of State Power Corporation: Liang Changqian, Liu Shutao;
- Hangzhou Boiler Group Co., Ltd.: Jin Ping;
- Sichuan Boiler Works: Li Lin;
- Shanghai Si Fang Boiler Works: Guan Xuefang;
- Jinan Boiler Group Company, Ltd: Zhang Qiangjun.

Specially invited expert advisors drafting this standard are: Li Zhiguang, Liu Furen, Huang Naizhi, Chen Jirong, Xiao Zhonghua, Wu Rusong.

Issuance of all previous editions replaced by this standard:

- DZ 173-1962 "Tentative specifications for strength calculation of pressure parts for watertube boilers"
- JB 2194-1977 "Strength calculation of pressure parts for watertube boilers"
- GB/T 9222-1988 "Strength calculation of pressure parts for watertube boilers".

Strength calculation of pressure parts for watertube boilers

1 Scope

This standard specifies strength calculation method, structure, material requirements and material permissible stress of pressure parts for watertube boiler; and also offers verification method for determining maximum permissible gauge pressure of parts.

This standard is applicable to pressure parts, whose rated pressure shall be no less than 0.10 MPa¹⁾, of fixed type water pipe steam boiler and fixed type water pipe hot water boiler hot-water boiler, such as: boiler barrel body, header tank body, pipes, pipes in range of boiler, convex head, flat-end cover, cover board and abnormal parts.

2 Normative reference

The following documents contain provisions which, through reference in this standard, constitute provisions of this standard. For dated reference, subsequent amendments to (excluding corrigenda contents), or revisions of, any of these publications do not apply. however, all concerned sides make terms according to this standard are encouraged to research whether latest edition of these documents are available. For undated references, the latest edition of the normative document referred to applies.

- GB 713 steel plates for boilers (GB 713-1997, neq ISO 5832-4; 1996)
- GB 3087 Seamless steel tubes for low and medium-pressure boiler(GB 3087-1999, neq ISO 9329-1; 1989)
- GB/T 3274 Hot-rolled heavy plates and steel strips for carbon structure steel and low-alloy structure steel
- GB 5310 Seamless steel tubes and pipes for high-pressure boiler
- GB/T 8163 Seamless steel tubes for liquid service (GB/T 8163-1999, neq ISO 559; 1991)
- JB/T 6734 Strength calculation method for boiler fillet weld
- Technical Supervision Regulation for Safety of Steam Boilers (issued by former Department of Labor in 1996)

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