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

NB/T 47020-2012

Replacing NB/T 4700-2000

Type and Specification for Pressure Vessel Flanges

压力容器法兰分类与技术条件

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Foreword

Compared with JB/T 4700-2000, the main changes in this Standard are as follows:

- Normative references have been updated;
- Material designations have been updated correspondingly;
- Flange materials Q235-A and 15MnVR is deleted;
- Forging material 14Cr1Mo for welding neck flange have been added;
- Dimension of welding neck flange has been further extended;
- Gasket specification has been added, and to be consistent with the welding neck flange series specification.

Appendix A in this Standard is normative.

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

Drafting organizations of this Standard: Hefei General Machinery Research Institute, Sinopec Engineering Incorporation, and Luoyang Petrochemical Engineering Corporation Ltd.

Drafting staff of this Standard: Yao Zuoquan, Feng Qingxiao, Guo Weimin, Qin Zongchuan, Xie Zhigang, Hu Qingjun, Pan Jianhua, Sang Rubao, and Chen Chonggang.

The National Technical Committee on Boilers and Pressure Vessels of Standardization Administration of China (SAC/TC 262) is in charge of the explanation of this Standard.

The previous editions of the standards replaced by this Standard are as follows:

- JB 4700-1992;
- JB/T 4700-2000.

Type and Specification for Pressure Vessel Flanges

1 Scope

This Standard specifies the classification and specification of pressure vessel flanges, the materials of flanges, studs and nuts, and their matching with the gaskets; it also specifies the maximum allowable working pressure, technical requirements and marking at all temperature levels.

This Standard is applicable to the flanges of carbon steel and low-alloy steel pressure vessels that the nominal pressure is 0.25MPa~6.40MPa and working temperature is -70 °C ~ 450°C.

2 Normative References

The following documents are indispensable for the application of this Standard. For dated references, only the dated edition is applicable to this document. For undated references, the latest editions of the normative documents (including all the amendments) are applicable to this document.

- | | |
|-------------|--|
| GB 150 | Pressure Vessels |
| GB/T 196 | General Purpose Metric Screw Threads-Basic Dimensions |
| GB/T 197 | General Purpose Metric Screw Threads-Tolerances |
| GB/T 539 | Oil-resisting Asbestos-rubber Sheets |
| GB/T 699 | Quality Carbon Structural Steels |
| GB/T 700 | Carbon Structural Steels |
| GB 713 | Steel Plates for Boiler and Pressure Vessels |
| GB/T 1801 | Geometrical Product Specifications (GPS) - Limits and Fits - Selection of Tolerance Zones and Fits |
| GB/T 1804 | General Tolerances-Tolerances for Linear and Angular Dimensions without Individual Tolerance Indications |
| GB/T 3077 | Alloy Structure Steels |
| GB/T 3098.2 | Mechanical Properties of Fasteners-Nuts-Coarse Thread |
| GB/T 3274 | Hot-rolled Plates and Strips of Carbon Structural Steels and High Strength Low Alloy Structural Steels |
| GB/T 3985 | Asbestos-rubber Sheets |
| GB/T 5779.2 | Fasteners - Surface Discontinuities - Nuts |
| GB/T 16938 | Fasteners-General Requirements for Bolts, Screws, Studs and Nuts |
| GB 24511 | Stainless Steel Plate, Sheet and Strip for Pressure Equipment |
| NB/T 47008 | Carbon Steel and Alloy Steel Forgings for Pressure Equipment |

breakdown list in the drawing.

For example: 16Mn (ring 06Cr19Ni10).

5.3.4 The material of the B-type flange nipple shall be the same with the flange material. If not the same, its strength level shall not be less than that of the flange material and it shall have a good weldability with the flange material, which shall be indicated in the breakdown column of the drawing with the marking method same as 5.3.3. For example: Q245R (nipple Q345R). The nipple can be lengthened. After lengthened, both the flange thickness δ and flange overall height H shall be indicated in the flange marking.

6 Technical Specifications

6.1 The manufacturing, inspection and acceptance of flange shall not only meet the requirements of this Standard, but also shall meet the requirements indicated in the drawing.

Technical specifications such as the material performance of long welding neck flange with operating temperature equal to or less than -20°C and its auxiliary studs, nuts, forging grade, low temperature impact power index, manufacture and inspection shall meet the requirements of GB 150.

6.2 Material

6.2.1 The steel plates shall meet the requirements of GB 150, GB/T 3274 and GB 713.

6.2.2 Q235B steel plates shall not be used as pressure vessel flanges for highly or extremely toxic media.

6.2.3 Q245R and Q345R steel plates with the thickness greater than 50 mm for flange shall be used under normalized condition.

6.2.4 Butt welding is not allowed for long welding neck flanges but steel plate butt welding is allowed for other flanges. Post-weld stress relief heat treatment shall be carried out for spliced flanges.

6.2.5 The inspection and acceptance of forgings shall be carried out as per Grade II of NB/T 47008 or NB/T 47009 or as per the requirements of the drawing if there are special requirements.

6.2.6 Stainless steel material for lined ring shall comply with the requirements of GB 24511.

6.2.7 Rolled flanges shall meet the requirements of Appendix A (normative) and be selected according to those specified in Table A.1 and A.2.

6.3 Machining

6.3.1 The outer diameter tolerance of the male surface and female surface of concave-convex sealing surface flange, and the outer diameter tolerance of the tongue surface and groove surface of tongue and groove seal contact surface flange shall meet the requirements of GB/T 1801. The hole shall be H12 and the shaft shall be h12.

6.3.2 The permissible deviation of the pitch diameters of stud clearance holes and that of the chord lengths of the two adjacent stud clearance holes shall be $\pm 0.6\text{mm}$, and the permissible deviation of the chord lengths of two stud clearance holes shall meet the requirements of Table 10.

Appendix A

(Normative)

Specification and Selection of Rolling Flange

A.1 Rolling flange shall comply with the requirements of the purchase contract as well as those of this Appendix.

A.2 Section type and application scope shall meet the requirements in Table A.1 and Table A.2.

A.3 The types of steel commonly applied for flange rolling are 16Mn and No.20 Type. As for the rolling of other types of steel, the agreement shall be made separately by the supplier and the demander.

A.4 The chemical component and mechanical property shall meet the requirements of NB/T 47008 or NB/T 47009 Grade II or purchase contract.

A.5 Sampling and inspection requirements of rolling flange

A.5.1 Flanges of the same furnace/pot number, size, specification and heat treatment process compose a batch. Choose a piece of flange randomly, and cut one piece of sample for tensile test and three pieces of samples for impact test. The sampling location shall be determined by the manufacturing plant or according to the ordering requirements, but all the sampling directions shall be tangential.

A.5.2 Repeated test shall be conducted according to those specified in NB/T 47008 or NB/T 47009.

A.6 Appearance inspection

A.6.1 Inspection shall be conducted for the external dimension and surface quality of the flange piece by piece.

A.6.2 The circular degree and flatness of the flange shall not affect the finishing size.

A.6.3 Local defects on the flange surface are allowed, but the local defects shall be able to be removed by finishing.

A.7 If there is (are) local defect(s) on the flange, repair welding is allowed. The requirements of repair welding shall be according to those specified in NB/T 47008 or NB/T 47009.

A.8 The flange shall be delivered in normalized condition.

A.9 Product marks

Besides the manufacturing plant, the material, grade, nominal diameter and section type shall also be marked on the outer-circle of the rolling flange.

For example: manufacturing plant mark 16 Mn -III DN 800 M 20

A.10 When the products leaving factory, they shall be accompanied by quality certificate. Inspection results of such items as chemical component, mechanical property, etc. shall be filled in the quality certificate.

A.11 Selection

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