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ENERGY INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

NB/T 47010-2017

Replacing NB/T 47010-2010

Stainless and heat-resisting steel forgings for pressure equipment

承压设备用不锈钢和耐热钢锻件

(English Translation)

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009 "Directives for standardization - Part 1: Structure and drafting of standards".

This standard replaces NB/T 47010-2010 "Stainless and heat-resisting steel forgings for pressure equipment"; incorporates the relevant content of JB/T 9626-1999 "Specification for boiler forging". Compared with NB/T 47010-2010, the main technical changes are as follows:

- CANCEL the content about design pressure in the Scope;

- DETAIL the relevant requirements for order content;

- ADD the macroscopic inspection requirements;

components, ADD the metallographic inspection requirements;

- ADD the quality level requirements for ultrasonic testing of steel forgings;

- MODIFY the allowable criteria for welding repair;

- ADD the steel forgings designations of 3 valves and special components, including S32590, S42020, S42030, etc.;

- ADD the high temperature mechanical properties table of commonly used forging steel.

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

This standard was proposed by AND shall be under the jurisdiction of the National Boiler and Pressure Vessel Standardization Technical Committee (SAC/TC 262).

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1 Scope

This standard specifies the terms and definitions, order content, technical requirements, test methods, inspection rules, markings and quality certificates, of stainless steel and heat-resisting steel forgings for pressure equipment.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

3 Terms and definitions 3.1

Axisymmetric hollow forgings, which have an axial length L greater than its outer diameter D, as shown in Figure 1a). t is the nominal thickness.

Axisymmetric hollow forgings, which have an axial length L less than or equal to its outer diameter D, as shown in Figure 1 b). The smaller of L and t is the nominal thickness.

Axisymmetric solid forgings, which have an axial length L less than or equal to its outer diameter D, as shown in Figure 1c). L is the nominal thickness.

Axisymmetric forgings, which have a concave cross-section AND an axial length H less than or equal to its outer diameter D, as shown in Figure 1 d). The larger of t1 and t2 is the nominal thickness.

Axisymmetric hollow forgings, which have two outer diameters in the axial direction, as shown in Figure 1 e). The larger of t1 and t2 is the nominal thickness.

A solid forging, which has a circular cross-section AND an axial length L greater than its outer diameter D, as shown in Figure 1 f). D is the nominal thickness.

Forgings, which have a rectangular cross-section AND a length L greater than the lengths a and b on both sides, as shown in Figure 1 g). The smaller of a and b is the nominal thickness.

4 Order content

The order contract, which adopts this standard, shall include the following contents:

g) Delivery status (including heat treatment and surface requirements);

5.1 Smelting method

The steel, which is used for forgings, shall be killed steel, which is smelted in an electric furnace or oxygen converter AND refined outside the furnace. After negotiation between the supplier and the buyer, it may use the smelting methods, such as electroslag remelting.

5.2 Chemical composition

5.2.2

Refer to Appendix A, for steel designations and chemical compositions of the steels, which are used for forgings of matching valves and special components. 5.2.

5.3 Forging

5.3.1

Steel ingots, billets or rolled materials, which are used for forging, shall have a quality certificate from the melting organization.

5.3.2

When using steel ingot for forging, the head and tail of the steel ingot shall have enough removal, to ensure that there are no shrinkage holes, looseness, cracks, serious segregation, or other defects, that affect the forging quality.

5.3.3

When using steel ingots, billets or continuous casting billets for forging, the forging ratio, of the main section of the forging, shall not be less than 3. When using rolled material for forging, the forging ratio, of the main section of the forging, shall not be less than 1.6.

5.4 Forging level

5.4.1

Forgings are divided into four levels: I, II, III, IV. The inspection items and inspection quantities of each level shall meet the requirements of Table 2. 5.4.2 Level I forgings are only applicable to S11306, S11348, S30408 steel forgings, which have a nominal thickness less than or equal to 150 mm. II Tensile (Rm, Rp0.2, A) The forgings, which have the same smelting furnace number, heat treatment in the same furnace, forging process, forging ratio, similar nominal thickness, form a batch. For each batch, spot check the piece, which has the largest nominal thickness III Tensile (Rm, Rp0.2, A) Ultrasonic testing Inspection one by

one IV Tensile (Rm, Rp0.

6.1 Chemical analysis

Chemical analysis is in accordance with GB/T 223 or GB/T 11170, GB/T 20123, GB/T 20124. The arbitration test is in accordance with GB/T 223.

6.3 Hardness test

The hardness test is in accordance with GB/T 231.1.

6.4 Macroscopic inspection

The macroscopic inspection shall be in accordance with the provisions of GB/T 226.

6.5 Metallographic inspection

The grain size inspection is in accordance with the provisions of GB/T 6394. The inspection of non-metallic inclusions shall be graded in accordance with the method A in GB/T 10561. The microstructure inspection shall be in accordance with the provisions of GB/T 13298. For the phase ratio inspection of duplex steel, it may use GB/T 13305 to determine the ferrite content.

6.6 Ultrasonic testing

Ultrasonic testing is in accordance with NB/T 47013.3.

6.7 Visual inspection

The appearance inspection of forgings shall be visually inspected, under sufficient lighting conditions.

7.1 Inspection

The inspection of forgings is carried out by the supplier's inspection department.

7.2 Specimen requirements

7.2.2

The tensile specimen shall be the No. R4 specimen in GB/T 228.1. If limited by the sampling size, according to the agreement between the supplier and the buyer, it may also use the No. R7 specimen in GB/T 228.1.

7.2.3

The hardness test of level I forgings can be carried out, on the rough surface of the forging blank AND at the sampling position, as shown in Figure 2. The hardness test specimens of