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Replacing JB/T 1268-2002 (part), JB/T 7029-2004

Mn18Cr5 series nonmagnetic retaining ring forgings for turbine generator - Technical specification

汽轮发电机 Mn18Cr5 系无磁性护环锻件技术条件

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard replaces JB/T 1268-2002 “Specification for nonmagnetic retaining ring forgings for 50MW to 200MW turbine generators” and JB/T 7029-2004 “Specification for nonmagnetic retaining rings forgings used below 50MW turbine generator”.

This standard is based on JB/T 1268-2002 and incorporates part of JB/T 7029-2004. As compared with JB/T 1268-2002, the main technical changes of this standard are as follows:

- In the manufacturing process, ADD the expression of welding, forgings cannot be welded during the manufacturing process (see 4.5);

- In accordance with the provisions of the new standard, MODIFY some symbols in the mechanical properties of Table 2, RE-MODIFY the forging grades and performance indicators, ADD the mid-section of the table (see 5.2; 4.3 of 2002 version);

- CHANGE the residual stress on the forgings not exceeding the lower limit of the yield strength specified in Table 2 from 20% to 10%, ADD the concept of absolute residual stress (see 5.3; clause 4.4 of 2002 version);

- MODIFY the grain size specification (see 5.4; 4.5 of 2002 version);

- MODIFY the technical requirements for the disappearance of bottoms due to defect when using longitudinal wave detection in the ultrasonic testing (see 5.5.3.5; 4.6.3.5 of the 2002 version);

- With reference to the technical conditions of foreign orders, CHANGE the magnetic permeability of the forged piece shall not be greater than 13.8 x 10^{-7} to the relative permeability μ_r of the forged piece shall not be greater than 1.05 (see 5.6; 4.7 of the 2002 version);

- DELETE the 1Mn18Cr18N forgings, INCLUDE the forgings into the “Mn18Cr18N series nonmagnetic retaining ring forgings for turbine generator - Technical specification” (see 4.2 and 4.6 of 2002 version).

This standard was proposed by China Machinery Industry Federation.

This standard shall be under the jurisdiction of the National Standardization Technical Committee for Casting and Forging Parts (SAC/TC 506).

Drafting organizations of this standard: Harbin Institute of Electrical Engineering, Erzhong Group (Deyang) Heavy Equipment Co., Ltd., Dongfang Motor Co., Ltd.,

Mn18Cr5 series nonmagnetic retaining ring forgings for turbine generator - Technical specification

1 Scope

This standard specifies the ordering requirements, manufacturing process, technical requirements, inspection rules and test methods, quality certificates and marking for the Mn18Cr5 series nonmagnetic retaining ring forgings for turbine generator.

This standard applies to the ordering, manufacturing and inspection of Mn18Cr5 series nonmagnetic retaining ring forgings for turbine generator.

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) are applicable to this standard.

GB/T 222 Permissible tolerances for chemical composition of steel products

GB/T 223 (all parts) Steel and alloy chemical analysis method

GB/T 228.1 Metallic materials - Tensile testing - Part 1: Method of test at room temperature

GB/T 3656 Method of coercivity measurement for magnetically soft materials by pull out procedure

GB/T 4336 Carbon and low-alloy steel - Determination of multi-element contents - Spark discharge atomic emission spectrometric method (routine method)

GB/T 6394 Metal - Methods for estimating the average grain size

GB/T 20124 Steel and iron - Determination of nitrogen content - Thermal conductimetric method after fusion in a current of inert gas

JB/T 4010 Ultrasonic examination of turbine - Generator steel retaining rings

ASTM E165 Standard practice for liquid penetrant examination for general

industry

3 Ordering requirements

3.1 The purchaser shall specify in the ordering contract or technical agreement the standards adopted, material grades, forging strength grades, corresponding technical requirements and inspection items, and other additional instructions.

3.2 When ordering, the purchaser shall provide the supplier with a roughing pattern (if necessary, provide the finishing size), and shall also indicate the sampling position on the pattern.

3.3 The purchaser shall mark the selected material grade on the pattern and mark the number of this standard and the selected forging grade on the technical conditions. And mark it as follows:

$$\frac{\text{Material grade}}{\text{Forging strength level x This standard number}}$$

4 Manufacturing process

4.1 Smelting

The steel used in forgings shall be subject to electric furnace plus external furnace refining; with the consent of the purchaser, it may also use other smelting methods that guarantee quality.

4.2 Forging

4.2.1 The upper and lower ends of the steel ingots for forgings shall have sufficient margin, to ensure that the forgings have no shrinkage or severe segregation.

4.2.2 Forgings shall be forged on a forging press with sufficient capacity, to ensure that the entire cross section of the forging is fully forged.

4.2.3 Forgings shall be deformed with appropriate methods at room temperature or slightly higher than room temperature, such as wedge reaming, hydraulic bulging and so on.

defect signal between the reference line and the 1/2 reference line shall not exceed 4 and the distance between any adjacent defects shall not be less than 50 mm.

5.5.3.3 The retaining ring which cannot differentiate the V-notch reflection signal from the noise level due to the coarse grain or microstructure shall be rejected.

5.5.3.4 In case of longitudinal wave testing, there shall be no defects with an equivalent diameter of more than 3 mm. In the full circumference range of any 100 mm width, the number of defects having an equivalent diameter of Φ2 mm ~ Φ3 mm shall not exceed 4.

5.5.3.5 When the longitudinal wave is used for the testing at the end face and the circumferential face, the forgings shall be regarded as unqualified when the bottom wave disappears due to the presence of a recording defect.

5.6 Magnetic permeability

When the magnetic field strength is $100O_e$ (Oester, $1O_e$ = 79.57 A/m), the relative magnetic permeability μ_r of the forging shall not be greater than 1.05.

5.7 Dimensions and surface roughness

Forging dimensions, tolerances, and surface finishes shall all meet the requirements of the ordering pattern.

6 Inspection rules and test methods

6.1 Chemical composition analysis

6.1.1 The supplier shall conduct smelting analysis for each molten steel, to determine the mass fraction of the elements specified in Table 1. Smelting analysis shall be sampled during molten steel casting.

6.1.2 The purchaser shall carry out the finished product review analysis. The sample shall be taken from any point of the 1/2 wall thickness of the forging extension, it may also be taken from the mechanical property sample.

6.1.3 Analysis of chemical composition shall be conducted in accordance with the methods specified in GB/T 223, GB/T 4336, GB/T 20124 or other methods that can guarantee the quality of analysis.

6.4.2 The grain size sample is taken from the mechanical property test ring and measured on a longitudinal section in the radial direction.

6.5 Non-destructive testing

6.5.1 Ultrasonic testing of forgings shall be carried out in accordance with JB/T 4010.

6.5.2 Liquid penetrant testing shall be conducted in accordance with ASTM E165.

6.6 Magnetic permeability testing

Magnetic permeability testing is carried out in accordance with the provisions of GB/T 3656.

6.7 Retest

6.7.1 If a result in the mechanical property test does not meet the requirements, two specimens may be taken on the forging adjacent to the original sample for retesting. The retest results of the two specimens shall all meet the specified requirements.

6.7.2 If the test results are not qualified due to cracks and white spots, it shall not perform retest.

7 Acceptance and quality certificate

7.1 The supplier shall test the forgings in accordance with this standard and the items specified in the contract. The testing results shall comply with the specified requirements. The certificate shall have the signature and chop of the quality testing person in charge of the supplier.

7.2 The purchaser may select certain items for retest in accordance with the provisions of this standard and the contract. After the forgings are accepted by the supplier, if the purchaser finds that the forgings do not meet the requirements in the retest, subsequent processing or inspection, the purchaser shall notify the supplier in a timely manner and be resolved through consultation between both parties.

7.3 The supplier shall provide the necessary conditions to the purchaser's acceptance personnel, so that the acceptance inspection personnel of the purchaser can perform site acceptance work. The inspectors of purchaser shall

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