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MACHINERY INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

JB/T 56078-1996

Replacing JB/DQ 1230-87

Large Hydraulic Turbine - Grading of Product Quality

大型水轮机 产品质量分等

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Foreword

This Standard was drafted on the basis of “Large Hydraulic Turbine - Grading of Product Quality” issued by former Electrical Bureau of National Machinery Industry Committee in 1987, and has become an industrial standard (for internal use). Four references of this Standard have been upgraded as national standards. Therefore, the level of this Standard is higher than the previous edition.

Compared with the previous edition, the main technical changes are as follows:

Column 6 “Cavitation guarantee” in Table 1 is modified to “Cavitation erosion guarantee”. The “1” in column “Qualified product” is modified to “Cavitation erosion guarantee” period shall comply with requirements in “Cavitation pitting evaluation in reaction hydraulic turbine”; The “2” modified to “Cavitation damage amount” shall comply with the requirements in “Cavitation pitting evaluation in reaction hydraulic turbine”. The “2” in column “First-class product” is modified to “Cavitation damage amount” shall comply with 4/5 of the requirements in “Cavitation pitting evaluation in reaction hydraulic turbine”. The “2” in column “Excellence product” is modified to “Cavitation damage amount” shall comply with 3/4 of the requirements in “Cavitation pitting evaluation in reaction hydraulic turbine”. It is used to determine the extent of anti-cavitation of hydraulic turbine.

In Table 4, “mixed-flow and axial-flow blade profile checking” is modified to “mixed-flow and axial-flow blade profile shall be checked by blade’s front and back combination sample-plate or blade’s front combination sample-plate. The back shall be checked in the method that is used for blade thickness measurement or single sample-plate. For the column “its gap or design value’s difference”, qualified product is modified to $0.15\%D_1$, first-class product is modified to $0.12\%D_1$, and excellent product is modified to $0.1\%D_1$, so as to ease the manufacturing workload of combination sample-plate and ensure the accuracy of blade shape.

This Standard is a grading standard for large hydraulic turbine quality that is derived from GB 15468-95 “Fundamental Technical requirements for hydraulic turbine”.

Since the implementation of this Standard, this Standard replaces JB/DQ 1230-87.

This Standard was proposed by and shall be under the jurisdiction of Harbin Institute of Large Machinery Research.

Large Hydraulic turbine - Grading of Product Quality

1 Scope

This Standard is applicable to the mixed-flow hydraulic turbine, ramp-flow hydraulic turbine, axial-flow hydraulic turbine (tubular hydraulic turbine refers to axial-flow) and scoop hydraulic turbine of which the power exceeds 10 MW; the butterfly valve of which the nominal diameter is 1000~8000 mm; and the rotary valve of which the nominal diameter is 500~2400 mm.

2 Normative references

The following standards contain the provisions which, through reference in this Standard, constitute the provisions of this Standard. At the time of publication, all editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

GB/T 14478-95 Basic technical conditions of large hydraulic turbine inlet valve

GB/T 15468-95 Fundamental technical requirements for hydraulic turbine

GB/T 15469-95 Cavitation pitting evaluation in reaction hydraulic turbine

GB/T 15613-95 Specification for acceptance test of hydraulic turbine model

GB/T 10969-1996 Specifications for water passage components of hydraulic turbine

JB 1270-93 Hydro turbine shaft forging technical conditions

JB/DQ 1222-87 Hydroelectric generating set packaging, transportation, storage and technical conditions

3 Principle

3.1 This Standard is used as a reference for corporation's product quality assessment, product classification and grading, state overall-inspection and product quality supervision.

3.2 Since machine assembly and comprehensive test of hydraulic turbine product cannot be conducted in manufacturing plant, the comprehensive assessment on product performance, including product installation quality, shall be determined after being operated for a period of time by power plant.

4 Product quality grading

4.1 Qualified product

4.1.1 Performance and structure

Product performance shall meet current standard requirements through design review and product identification.

4.1.2 Operating performance

Product's main performances shall meet the guidelines of stipulated qualified products in Table 1 and Table 2. Other performances shall comply with provisions in relevant technical standards and technical conditions.

4.1.3 Reliability and lifetime

In compliance with the relevant provisions of the user installation, use and maintenance conditions, the product's forced outage rate, overhaul interval period, life expectancy shall meet the guideline of qualified products specified in Table 1.

4.1.4 Complete set

4.1.4.1 Auxiliary products including speed governor, automation components and products for supporting member must meet the requirements for qualified products.

4.1.4.2 Accompanying spare parts shall be interchangeable with the product. Spare parts, special tools and accompanying documents shall be complete.

4.1.5 Packaging

Product packaging, transport and storage must comply with the provisions in JB/DQ 1222.

4.1.6 Parts processing and assembly quality

Hydraulic turbine wheel's blade profile and surface roughness shall meet the guidelines for qualified products specified in Table 3 and Table 4. Examination-items' pass-rate of main components shall not be less than 85% of examination-items specified in Table 5. In which, for unqualified items, it is allowed to reuse

products for supporting member must meet requirements for first-class products.

4.2.5 Parts processing and assembly quality

Hydraulic turbine wheel's blade profile and surface roughness shall meet the guidelines for first-class products specified in Table 3 and Table 4. Examination-items' pass-rate of main components shall not be less than 90% of examination-items specified in Table 5. In which, for unqualified items, it is allowed to reuse under the condition that they do not affect the product performance and safe use AND after taking certain measures and approval procedures. However, all key items must be all qualified.

4.2.6 User reviews and customer service

Product shall have good effect by user reviews, timely customer service and good competitiveness in domestic market.

4.3 Excellent product

In addition to requirements for first-class products, it shall meet the following requirements.

4.3.1 Performance and structure

Products must have good performance and advanced structure after being examined and determined through new technology, new principle, the use of new materials, economy, technique of product structure, standardization degree and human-machine relation, i.e., they shall be equivalent to contemporary international advanced level of similar products.

4.3.2 Operating performance

Product main performance shall meet the guideline requirements for excellent products specified in Table 1 and Table 2. Other performances shall comply with the provisions of relevant technical standards and product technical conditions.

4.3.3 Reliability and lifetime

In compliance with the relevant provisions of the user installation, use and maintenance conditions, the product's forced outage rate, overhaul interval period, life expectancy shall meet the guideline of excellent products specified in Table 1.

4.3.4 Complete set

Auxiliary products including speed governor, automation components and

products for supporting member must meet requirements for excellent products.

4.3.5 Parts processing and assembly quality

Hydraulic turbine wheel's blade profile and surface roughness shall meet the guidelines for first-class products specified in Table 3 and Table 4. Examination-items' pass-rate of main components shall not be less than 95% of examination items specified in Table 5. In which, for unqualified items, it is allowed to reuse under the condition that they do not affect the product performance and safe use AND after taking certain measures and approval procedures. However, all key items must be all qualified.

4.3.6 User reviews and customer service

Product shall have good quality by user reviews, international advanced level of similar products, and good competitiveness in international market.

5 Determination method

Hydraulic turbine quality grades shall be determined by 3 aspects - product quality inspection, quality inspection of the production process, user reviews and customer service. For those that are determined as excellent products, the evaluations must be excellent. For those that are determined as first-class products, the evaluations must be first-class or excellent.

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