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

GB/T 15468-2020

Replacing GB/T 15468-2006

Fundamental technical requirements for hydraulic turbines

水轮机基本技术条件

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Table of Contents

1	Scope
2	Normative references
3	Terms and definitions
3.1	Characteristic water level of hydropower station
3.2	Gross head of hydropower station
3.3	Turbine head
4	Technical requirements
4.1	General requirements
4.2	The structure and materials of the main components
4.2.1	General requirements for structural design
4.2.2	Working stress and safety factor
4.3.4	Impulse turbine
5	Performance guarantee
5.2	Steady-state hydraulic performance
5.4	Vibration
5.5	The stable operating range of turbine
5.7	Water leakage of guide vanes or nozzles
6	Basic functions of turbine control system
7	Scope of supply and spare parts
7.1	Scope of supply
8	Data and drawings
8.2	Key items
9	Factory inspection and testing
10	Nameplate, packaging, transportation and storage...

1 Scope

GB/T 15468-2020 is the Chinese national standard on fundamental technical requirements for hydraulic turbines, in the field of energy and heat transfer engineering. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 2 June 2020 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since

1 January 2021. Classification: ICS 27.140, CCS K55. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This standard specifies the performance guarantee, technical requirements, scope of supply, inspection and test items for the design and manufacture of hydraulic turbine products; proposes the requirements to be followed, for its packaging, transportation, storage, installation, operation, maintenance. This standard applies to hydraulic turbine products, that meet one of the following conditions.

- a) The rated power is 10 MW and above;
- b) For Francis and impulse turbines, the nominal diameter of the runner is 1.0 m and above;
- c) For Kaplan, Deriaz and bulb turbine, the nominal diameter of the runner is 3.0 m and above.

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.

GB/T 191 Packaging - Pictorial marking for handling of goods (GB/T 191- 2008, ISO 780.1997, MOD)

GB/T 2900.45 Electrotechnical terminology - Hydroelectric powerplant machinery (GB/T 2900.45-2006, IEC/TR 61364.1999, MOD)

GB/T 3323.1 Non-destructive testing of welds - Radiographic testing - Part 1: X-and gamma-ray techniques with film

GB/T 8564 Specification for installation of hydraulic turbine generator Unit

GB/T 9239.1 Mechanical vibration - Balance quality requirements for rotors in a constant (rigid) state - Part

1.Specification and verification of balance tolerances (GB/T 9239.1-2006, ISO 1940-1.2003, IDT)

GB/T 9797 Metallic coatings - Electroplated coatings of nickel plus chromium and of copper plus nickel plus chromium (GB/T 9797-2005, ISO 1456.2003, IDT)

3 Terms and definitions

The terms and definitions as defined in GB/T 2900.45, as well as the following terms and definitions, apply to this document.

3.3 Turbine head

3.3.1 Head The effective head of the hydraulic turbine, which is the total unit energy of the high and low pressure reference cross-section of the turbine.

Note. The unit is meter (m).

4.1 General requirements

4.1.1 The design and manufacture of hydraulic turbines shall be based on the characteristics and basic parameters of the hydropower station, to optimize the type and main parameters of the turbine, to ensure the safe, reliable, stable, efficient operation of the turbine.

4.1.4 For the design of hydraulic turbine, it shall provide the type, layout, model, as well as the following basic parameters.

4.1.5 The following technical documents shall also be given for the design of the turbine.

4.1.6 The efficiency correction of the reaction turbine is to be corrected, according to the formula in Appendix A. The efficiency of the impulse turbine is generally not corrected; however, if correction is required, it shall be carried out in accordance with Appendix B.

4.2.1 General requirements for structural design

4.2.1.6 The standard parts and components of hydraulic turbines shall ensure their universality, for example, use runner whose torque is transmitted by friction; nozzles, needles shall be interchangeable.

4.2.1.7 The allowable continuous running time of the turbine, at the maximum runaway speed, shall not be less than the allowable runaway time of the supporting generator. Meanwhile, it shall be ensured that the rotating parts of the turbine NEITHER produces harmful deformation NOR causes collision and damage. Facilities shall be provided to prevent the turbine from exceeding the allowable runaway time.

4.2.1.22 The metal volute of the reaction turbine and the water distribution pipe of the impulse turbine, may be subjected to a pressure test, according to the requirements of the contract.

4.2.2 Working stress and safety factor

4.2.2.7 Unless otherwise specified, where there is no prestressing requirement, the

pre-tightening force shall not be less than

2.0 times the maximum working load of the connected object, under normal working conditions and transitional working conditions, which is converted to the axial load of the bolt.

4.3.4 Impulse turbine

4.3.4.1 It shall be possible to assemble, disassemble, replace the runner of the impulse turbine, without disassembling the generator.

4.3.4.2 The runner shall be subjected to dynamic response analysis, to avoid resonance.

5 Performance guarantee

5.1 Warranty period The warranty period of the product is two years, from the date when the turbine is put into commercial operation, OR three years, from the date of delivery of the last batch of goods, whichever expires first.

5.2 Steady-state hydraulic performance

5.3.3 When the content of sediment in the water is high, the abrasion damage of the turbine shall be guaranteed.

5.5 The stable operating range of turbine

5.5.1 Within the range of maximum and minimum heads, which are specified in 4.1.4, the power range for stable operation of the turbine is in accordance with Table 5.

5.7 Water leakage of guide vanes or nozzles

5.7.1 Under the rated water head, for the newly commissioned unit, the water leakage of the guide vanes of the cylindrical arrangement shall not be greater than 0.3% of the rated flow of the turbine; the water leakage of the guide vanes of the conical arrangement shall not be greater than 0.4% of the rated flow of the turbine.

5.8 Noise When the turbine is operating normally within the stable operating range, the noise, which is measured 1 m above the enclosure of the impulse turbine, shall not be greater than 85 dB(A). The noise, which is measured within 1 m around the runner chamber of the bulb turbine, shall not be greater than 90 dB(A). The noise, which is measured 1 m above the floor of the turbine pit for other types of units, shall not be greater than 95 dB(A). The noise, which is measured 1 m away from the manhole of the tail water tube, shall not be greater than 95 dB(A).

5.9 Water thrust For the reaction turbine, it shall guarantee the maximum forward water thrust and maximum reverse water thrust, under normal working conditions and transitional