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

GB/T 28545-2023

Replacing GB/T 28545-2012

**Directives for rehabilitation and performance improvement for
hydraulic turbines, storage pumps and pump-turbines**

水轮机、蓄能泵和水泵水轮机更新改造和性能改善导则

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents" Drafting:

This document replaces GB/T 28545-2012 "Guidelines for the Renovation and Performance Improvement of Water Turbines, Storage Pumps and Water Pump Turbines" and is

consistent with Compared with GB/T 28545-2012, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

- a) The scope of application has been changed, and the Pelton turbine has been changed to Pelton turbine (see Chapter 1, Chapter 1 of the:2012 edition);
- b) The term "modern technological transformation" is deleted (see 3.4 of the:2012 edition);
- c) Added the term "replacement" and its definition (see 3.4);
- d) Added abbreviations (see Chapter 4);
- e) The reasons for the transformation have been changed, and the 7 main reasons for the transformation have been described in detail (see 5.2~5:8, Chapter 4 of the:2012 edition chapter);
- f) The determination of the plan has been changed, and the options are compared and confirmed from the aspects of transformation scope, cost, schedule, benefit, risk management and economic analysis:

The regulations have been refined (see 6.2:2~6:2:7, 5:2:3:1~5:2:3:6 of the:2012 version);

- g) Added a typical routine checklist (see Table 2);
- h) Added content for evaluation of temperature, noise, stainless steel galvanic corrosion and scratching (see 7.3:2:2:5~7:3:2:2:7);
- i) Increases the impact of the roughness of the flow channel itself and its adjacent components on efficiency (see 7.3:3:3:2);
- j) Added the evaluation of the impact of the sealing gap of the anti-leak ring on the hydraulic performance (see Table 3);
- k) Increased expected efficiency after replacing the runner of the Francis turbine (including improving the airfoil, restoring the surface condition and reducing the loss of the anti-leak ring) the improvement value (see Table 4);
- l) Increased the potential efficiency improvement of the turbine after modifying/replacing other components of the Francis turbine flow path (see Table 5);
- m) The modification plan of extending the blades of the lower ring of the runner into the upper part of the draft tube tapered tube has been deleted (see 6.3:4:5:3 of the:2012 edition);
- n) Delete the plan for ultra-long guide vane design (see 6.3:4:5:3 of the:2012 edition);
- o) Added assessment of the impact on the power grid (see 7.4:9);
- p) The content of the feasibility study of the renovation project has been changed (see B:4, A:1:4 of the:2012 version):