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

GB/T 30370-2022

**Guide of primary frequency control test and performance
acceptance for thermal power generating units**

火力发电机组一次调频试验及性能验收导则

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part

1. Structure and Drafting Rules of Standardization Documents" drafted. This document replaces GB/T 30370-2013 "Guidelines for Primary Frequency Modulation Test and Performance Acceptance of Thermal Power Generating Sets", and GB/T 30370- Compared with.2013, except for structural adjustment and editorial changes, the main technical changes are as follows:

- a) The main technical indicators of a frequency modulation test are added (see 5.5);
- b) Added a frequency modulation test condition (see Chapter 6);
- c) Added a frequency modulation test requirements and methods (see
- d) Added the primary frequency modulation characteristic diagram of thermal power generating units (see Appendix A);
- e) A frequency modulation test load condition and disturbance quantity configuration table is added (see Appendix C);
- f) Modified a frequency modulation test analysis calculation table (see Appendix D, Appendix B of the.2013 edition). Please note that some content of this document may be patented. The issuing agency of this document assumes no responsibility for identifying patents. This document is proposed by China Electricity Council. This document is under the jurisdiction of the National Power Plant Process Monitoring and Information Standardization Technical Committee (SAC/TC376). This document is drafted by: North China Electric Power Research Institute Co., Ltd., State Grid Zhejiang Electric Power Co., Ltd. Electric Power Research Institute, Jiangsu Future Smart Information Technology Co., Ltd., Xi'an Thermal Engineering Research Institute Co., Ltd., State Grid Liaoning Electric Power Co., Ltd. Electric Power Research Institute, State Grid Gansu Electric Power Company Electric Power Research Institute, State Power Investment Group Inner Mongolia Baiyinhua Coal and Electricity Co., Ltd. Hangkou Power Generation Branch, Shaanxi Yanchang Petroleum Fuxian Power Generation Co., Ltd., Datang Yangcheng Power

Generation Co., Ltd., Beijing Huake Tonghe Technology Co., Ltd., Inner Mongolia Dai Hai Power Generation Co., Ltd., Inner Mongolia Jinglong Power Generation Co., Ltd. The main drafters of this document. Yang Zhenyong, Li Weihua, Kang Jingqiu, Zhang Jiangfeng, Wei Xiang, Gao Haidong, Liu Lei, Qin Tianmu, Zhao Jinyu, Gao Aiguo, Gao Ming, Shang Yong, Liang Jinming, Li Jun, Wang Li, Chen Zhenshan, Gao Mingshuai, Li Jianjun, Xing Zhiwei, You Mo, Zhang Shun, Pang Zhanzhou, Sun Peixin. The previous versions of this document and its superseded documents are as follows:

---First published in 2013 as GB/T 30370-2013;

---This is the first revision. The first frequency modulation test of thermal power generator set and Performance Acceptance Guidelines

1 Scope

China's national guide to primary frequency control testing and performance acceptance for thermal power generating units, and the current edition of GB/T 30370, replacing the 2013 edition. It specifies the main technical requirements and the methods for the primary frequency control test and for performance acceptance, and it applies to thermal generating units of 100 MW and above, with units of other capacities able to follow it as a reference. Primary frequency control is the fastest layer of a power system's defence against a frequency excursion. When a large generator or a large load is suddenly lost, system frequency moves within seconds, long before any dispatch centre can respond, and what arrests that movement is every governor on the system responding on its own to the frequency it measures at its own terminals - each machine changing its output in proportion to the deviation, automatically and without instruction. Whether the system survives the first ten seconds depends entirely on how those thousands of independent local responses add up, and each unit's contribution is set by three parameters: its dead band, its droop, and how quickly and completely it can actually move its output. On a coal-fired unit the last of those is not a control question but a thermodynamic one, because the boiler cannot produce more steam on demand and the response comes initially from stored energy. That is why the response has to be tested rather than assumed. The 2022 revision aligns the document with GB/T 1.1-2020, refines the terminology around dead band, response time and droop, and reworks the test conditions, procedure and acceptance criteria, with informative annexes giving the characteristic curves, a typical functional schematic, the load and disturbance configuration table, and the acceptance form. Issued on 12 October 2022 and in force since 1 May 2023.

This document specifies the main technical requirements and methods for the primary frequency modulation test and performance acceptance of thermal power generating units. This document is applicable to thermal power generating units with a single unit capacity of 100MW and above, and thermal power generating units of other capacity levels. Carry out.

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, dated citations documents, only the version corresponding to that date applies to this document; for undated references, the latest edition (including all amendments) applies to this document.

GB/T 26863 Terminology of monitoring system for thermal power station DL/T 657
Acceptance test procedure for analog quantity control system of thermal power plant

3 Terms and Definitions

The terms and definitions defined in GB/T 26863 and the following apply to this document.

3.1 The speed of each generator set is adjusted by the speed governor of each prime mover, so that the driving torque varies with the system frequency. [Source: GB/T 26863-2011, 6.29.1.5]

3.2 The primary frequency modulation regulation system is insensitive to the speed difference or frequency difference near the rated speed.

3.3 From the last time the speed difference or frequency difference exceeds the frequency modulation dead zone to the time when the unit load starts to change in the correct frequency modulation direction time.

3.4 The allowable range from the last time the speed difference or frequency difference exceeds the frequency modulation dead zone to the last time when the unit load reaches the target value within the time required.

3.5 Speed droop droop The slope of the static characteristic curve of the steam turbine control system. Usually, the ratio of the speed difference corresponding to the empty load and full load to the rated speed expressed as a percentage. [Source: GB/T 26863-2011, 6.29.4.15]