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

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**Non-destructive testing - Ultrasonic testing and evaluation of
turbine blades in service**

无损检测 在役汽轮机叶片超声检测和评价方法

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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. Please note that some content in this document may be subject to patents. The publisher of this document assumes no responsibility for identifying patents. This document is proposed and coordinated by the National Nondestructive Testing Documentation Committee (SAC/TC56). This document was drafted by: Xi'an Thermal Engineering Research Institute Co., Ltd., Shanghai Materials Research Institute Co., Ltd., State Grid Zhejiang Electric Power Co., Ltd. Electric Power Research Institute, Jiangsu Fangtian Electric Power Technology Co., Ltd., China General Nuclear Power Engineering Co., Ltd., and Anhui Huatu Electric Power Technology Co., Ltd. The main drafters of this document. Cai Hui, Ding Jie, Zhang Jie, Ma Junpeng, Zhu Congbin, Li Dongjiang, Qin Chengpeng, Wang Peng, Hou Zhaotang, Zhao Lun, Li Zenrun, Wang Shuang. Non-destructive testing, ultrasonic testing of in-service steam turbine blades and Evaluation method

1 Scope

China's national method for the ultrasonic testing and evaluation of turbine blades in service. A steam or gas turbine blade in service is among the most demanding inspection targets there is. Its geometry is complex and curved, so a probe cannot be coupled uniformly and the sound path is not straight; it may be coated; and the defects sought are fatigue cracks at the root fixing and at the leading edge, in locations where the geometry itself produces reflections that look like defects. It is also an inspection with the highest stakes: a released blade at operating speed destroys the machine and, in a steam turbine, can breach the casing. The alternative to in-service inspection is removing the rotor, which costs weeks of outage, so a method that can be applied with the blades in place - and whose evaluation criteria distinguish a real indication from the geometry - is worth a great

deal.

This document specifies the general provisions, inspection, defect measurement and assessment for application of Type A pulse reflection ultrasonic testing of in-service steam turbine blades. requirements. This document is applicable to the in-service inspection of steam turbine blades (hereinafter referred to as "blade") without disassembly. It is not applicable to the inspection of coated blades. Measurement. Ultrasonic inspection of blades during the installation phase shall be performed with reference to this document.

2 Normative reference documents

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

GB/T 9445 Qualification and certification of non-destructive testing personnel

GB/T 12604.1 Non-destructive testing terminology Ultrasonic testing

GB/T 19799.1 Non-destructive testing ultrasonic testing No. 1 calibration test block

GB/T 27664.1 Performance and inspection of non-destructive testing ultrasonic testing equipment Part

3 Terms and definitions

The terms and definitions defined in GB/T 12604.1 and the following apply to this document.

0 The horizontal distance from the incident point of the sound beam of the oblique probe to the front face of the probe.

3.2 exposed height h

0 The height of the blade root of the exposed part of the assembled blade's rim.

Note. See Figure 1.