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

GB/T 45457.2-2025

**Heavy-duty gas turbine blades - Non-destructive testing - Part
2: Visual testing**

重型燃气轮机叶片无损检测 第2部分：视觉检测

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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 for standardization documents" Drafting. This document is Part 2 of GB/T 45457 "Nondestructive Testing of Heavy Gas Turbine Blades". GB/T 45457 has been published as follows part.

1. Radiographic testing;

2. Visual inspection. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document is proposed and coordinated by the National Technical Committee for Standardization of Nondestructive Testing (SAC/TC56). This document was drafted by: China United Heavy Duty Gas Turbine Technology Co., Ltd., Shanghai Materials Research Institute Co., Ltd., Suzhou Tianhe CEC Electric Power Engineering Technology Co., Ltd., Institute of Metal Research, Chinese Academy of Sciences, Northwestern Polytechnical University, Jiangsu Yonghan Special Alloy Technology Co., Ltd., Yingliu Hangyuan Power Technology Co., Ltd., Nantong Hitech Precision Materials Co., Ltd., China National Nuclear Power Plant Operation Service Technology Co., Ltd., China National Nuclear Corporation Nuclear Power Operation Management Co., Ltd. The main drafters of this document are: Shu Guogang, Ding Jie, Sun Jian, Jiang Jiansheng, Luo Jie, Liu Wei, Liu Shun, Wu Hong, Guo Yun, Ma Yaofei, Li Tianhao, Dong Jiasheng, Huang Chunjie, Ge Bingming, Fu Maohou, Li Qiuda, Lai Xinhua, Chen Hua, Xia Fengyuan, Mao Lizheng.

Blades are the core hot end components of heavy-duty gas turbines that convert thermal energy into mechanical energy. Their quality control is crucial to the safe operation of gas turbines. Nondestructive testing technology is the main means of quality control for

heavy-duty gas turbine blades. Heavy-duty gas turbine blades are hollow precision castings. The components are large in size, have complex internal cooling structures, and have large variations in shape, curvature, and thickness, making nondestructive testing difficult. Blade non-destructive testing, establish and unify the requirements for equipment, process, etc. for non-destructive testing of heavy-duty gas turbine blades, and formulate this series of standards. GB/T 45457 "Non-destructive testing of heavy-duty gas turbine blades" aims to establish non-destructive testing methods for heavy-duty gas turbine blades. GB/T 45457 is intended to consist of 2 parts.

1. Radiographic testing. The purpose is to determine the radiographic testing method for heavy-duty gas turbine blades.

2. Visual inspection. The purpose is to determine the visual inspection method for heavy-duty gas turbine blades. This document is Part 2 of GB/T 45457 and specifies the specific technical requirements for the visual inspection method for heavy-duty gas turbine blades. Fan, plays a technical support role in the visual inspection of heavy-duty gas turbine blades. Nondestructive testing of heavy-duty gas turbine blades Part

1 Scope

Part 2 of China's national standard for the non-destructive testing of heavy-duty gas turbine blades, covering visual inspection. Visual testing sounds like the least of the methods and is in fact the one that finds most of what is found, particularly on blades returning from service. The damage that governs a blade's remaining life shows on the surface: thermal barrier coating spalled from the leading edge, oxidation and hot corrosion pitting, cooling holes closed by deposits, creep distortion, and cracks at the trailing edge where thermal gradients concentrate. Much of it is seen only with borescopes and magnification, inside an assembled machine, by an inspector deciding whether a set of blades runs another interval. Making that judgement repeatable is what the standard is for. This part establishes the general principles of the visual method and specifies the inspection techniques, quality control, assessment, and the requirements for records and test reports.

This document establishes the general principles of visual inspection methods for heavy-duty gas turbine blades and specifies the inspection techniques, quality control, assessment and Requirements for records and test reports. This document is applicable to the visual inspection of high temperature alloy blades of heavy-duty gas turbines, and other industrial gas turbine blades may be implemented for reference.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced

documents without a date, the latest version (including all amendments) applies to This document.

GB/T 12604.14 Nondestructive testing terminology Part

3 Terms and definitions

The terms and definitions defined in GB/T 12604.14, GB/T 15135 and GB/T 20737 apply to this document.

4 General Principles

4.1 Equipment and Materials Visual inspection equipment and instruments include light sources, observation aids and measuring equipment. Direct visual inspection uses the following equipment and devices.

---Auxiliary light source;

--- Length measuring equipment such as ruler, tape measure, vernier caliper, film ruler, etc.;

---Resolution test card;

---Luminance meter. Indirect visual inspection uses the following equipment and devices.

---Auxiliary light source;

---Endoscope 1); 1) Endoscopes include video endoscopes, fiber optic endoscopes and optical straight-rod endoscopes.

---Camera system;

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GB/T 15135 Gas Turbine Vocabulary

GB/T 20737 General terms and definitions for non-destructive testing

GB/T 20968 Selection of low-power magnifying glasses as auxiliary tools for non-destructive testing visual inspection

GB/T 41856.1 Non-destructive testing Industrial endoscope visual testing Part