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**Metallic materials - Residual stresses determination -
Short-wavelength X-ray diffraction method**

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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.

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.

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Introduction

Short-wavelength X-ray diffraction is a nondestructive method for determining residual stress in crystalline materials.

Non-destructive determination of stress in a sample. The sample or workpiece is mounted on the sample stage of a short-wavelength X-ray diffraction instrument and the elastic stress is measured.

When the radiation source system is a heavy metal target X-ray tube, the X-ray beam is used to calculate the residual stress.

The energy analysis method of the electron can be used to monochromatize the short-wavelength characteristic X-ray. The extreme density maximum method in this document can be used to determine the existence of texture.

The purpose of this document is to determine the internal (residual) stress of polycrystalline materials and the internal (residual) stress of single crystal materials.

Provides a basis for measuring (residual) stresses in engineering applications.

Determination of residual stress in metal materials Short wavelength X-ray diffraction Warning. Personnel using this document should have practical experience in regular laboratory work. This document does not reflect all possible safety issues.

The user is responsible for taking appropriate safety and health measures and ensuring that the conditions stipulated by relevant national laws and regulations are met.

1 Scope

This document specifies the principle, general requirements and methods for determining residual stress in metallic materials using short wavelength X-ray diffraction (hereinafter referred to as SWXRD).

Requirements, specimens, test equipment, measurement procedures, measurement uncertainty evaluation and test reports, etc.

This document is applicable to the determination of internal (residual) stress of polycrystalline materials by short-wavelength X-ray diffraction method, and can also be used as a reference for single crystal materials.

2 Normative references

GB/T 8170

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3 Terms and definitions

The following terms and definitions apply to this document.

3.1 short-wavelength X-ray

X-rays with a wavelength less than 0.03nm.

Note. When the radiation source is a heavy metal target X-ray tube, it radiates characteristic X-rays with a wavelength less than 0.03 nm; when the radiation source is high-energy synchrotron radiation, it radiates wavelengths less than 0.03 nm.

X-rays with a length less than 0.03nm.

3.2

A special device placed to determine the propagation path of short-wavelength X-rays, usually consisting of a collimator and/or a slit.

3.3 Count intensity intensity counts

The number of photons measured within a specified time.

3.4 Peak shape function peakshapefunction

Function expression describing the diffraction peak shape.