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

GB/T 45578-2025

**Non-destructive testing - Acoustic emission testing -
Verification of the receiving sensitivity spectra of piezoelectric
acoustic emission sensors**

(English Translation)

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Table of Contents

Preface
Introduction
1 Scope
2 Normative references
3 Terms and Definitions
4 Symbols and abbreviations
5 Overview
6 General Hardware Requirements
7 Determination of receiving sensitivity spectrum
8 Determination of emission sensitivity spectrum
Appendix A (Informative) Template Example
Appendix B (Informative) Instrument Example
Appendix C (Informative) Verification method for piezoelectric acoustic emission sensors
Appendix D (Informative) Additional information on receiving sensitivity determination
Appendix E (informative) Additional information on emission sensitivity determination
Appendix F (informative) Adaptation of RV/RD to the acoustic impedance of the material used
References

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 equivalent to ISO 24543:2022 "Testing of the receiving sensitivity spectrum of piezoelectric acoustic emission sensors for non-destructive testing of acoustic emission tests" certificate".

Introduction

The method proposed in this document for determining the receiving sensitivity spectrum of a piezoelectric acoustic emission sensor is based on an installation method in which the sensor to be tested is the surface is directly coupled to the active surface of the piezoelectric transmitting transducer through a thin layer of coupling agent. The transmitting

transducer is usually an ultrasonic sensor.

The particle displacement pulse in the normal direction of the ultrasonic sensor surface excites the sensor to be tested. The displacement pulse is generated by the laser vibrometer when the transmitting transducer the transmit sensitivity of the transmitting transducer is determined in absolute units of nanometers per volt (nm/V).

and the receiving sensitivity of the sensor under test in absolute units of volts per nanometer (V/nm).

The purpose of this document is to establish consistency in acoustic emission testing, to provide a basis for data correlation, and to facilitate the use of different acoustic emission testing agencies in different for more information on the validation method for piezoelectric acoustic emission sensors, see Annex C.

Nondestructive Testing Acoustic Emission Testing Piezoelectric Acoustic Emission Sensor Verification of the receiving sensitivity spectrum

1 Scope

This document describes a method for determining the receive sensitivity spectrum of a piezoelectric acoustic emission sensor.

The piezoelectric transmitting transducer surface is stimulated by a pulse in the direction perpendicular to the sensor surface, and the corresponding voltage output under the unit particle motion input is obtained.

As its absolute sensitivity, the particle motion can be the particle displacement (such as in nanometers) or the particle velocity (such as in millimeters per second).

seconds), covering the acoustic emission detection frequency range (20kHz~1.5MHz).

This document also describes the determination of the absolute magnitude of the piezoelectric transducer's emission sensitivity spectrum (displacement output per unit voltage input, e.g. nanometers per volt).

The value can be obtained by measuring the particle displacement pulse on the active surface of the transmitting transducer and the input voltage spectrum of the transmitting transducer.

The particle displacement can be measured using a scanning laser vibrometer.

This document does not cover the case where the incident angle is different from the normal (90°) or the wavelength of the elastic wave passing through the sensor sensing surface is smaller than the size of the sensing surface.

The "cancellation effect" on the sensor response when the ratio is 10.

This document does not describe the method for measuring the effect of different materials

on sensor sensitivity, but a description of this effect is given in Annex F.

NOTE: The method described in this document may be considered for sensors other than piezoelectric for detecting motion on planar members and within the same frequency range.

Working sensor.

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.

tion-Vocabulary)

Note: GB/T 12604.4-2005 Nondestructive testing terminology Acoustic emission testing (ISO12716.2001, IDT)

3 Terms and definitions

For the purpose of this document, the terms and definitions defined in ISO 12716 and the following apply.

Transmitter

A piezoelectric device that converts electrical signals into particle motion or pressure.

Note: A single letter identifier (TM-serial number A~Z) can be added after TM to identify a specific transmitting transducer.

Sensor under test

SUT

A piezoelectric acoustic emission sensor whose receiving sensitivity spectrum (3.8, 3.9) is to be verified.

Note: A two-digit identifier (SUT-serial number 00~99) can be added after SUT to identify the type of sensor to be tested.