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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 34361-2026

Replacing GB/T 34361-2017

Non-destructive testing - Test method for frequency scanning eddy current testing

无损检测 扫频涡流检测方法

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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. This document replaces GB/T 34361-2017 "Nondestructive Testing - Sweep Frequency Eddy Current Testing Method". Compared with GB/T 34361-2017, except for... Aside from structural adjustments and editorial changes, the main technical changes are as follows:

a) The scope of the document has been changed (see Chapter 1, Chapter 1 of the.2017 edition);

b) The definitions of some terms have been revised (see 3.1, 3.2, and

3.3 in the.2017 edition);

c) Some terms have been removed (see section

3.2 of the.2017 edition);

d) The content of the method summary has been changed (see Chapter 4, Chapter 4 of the.2017 edition);

e) Requirements for testing process specifications have been added (see Chapter 5);

f) The requirements for the composition of the detection system have been changed (see 6.1,

5.1 of the.2017 edition);

g) The performance requirements for the detector have been changed (see 6.2,

5.2 in the.2017 edition);

h) The requirements for the corresponding probe operating modes for overburden measurement and discontinuous detection have been changed (see 6.3,

4 Principles

4.1 Sweep-frequency eddy current testing uses a current signal with continuously varying frequency or a certain number of sweep points for excitation, targeting different materials at different depths of the tested part. Different eddy current responses exist in different states. By measuring and analyzing the characteristics of the probe's complex impedance changing with the excitation frequency, it is possible to effectively separate eddy currents originating from different states. Signals from the same depth layer can be used to detect discontinuous metal materials and measure the thickness of different coating layers.

4.2 When using swept-frequency eddy current to measure the thickness of the overburden layer, it can be used to inspect the following objects.

a) A single or multiple non-metallic coating layer on a metallic substrate;

b) Single or multiple metal coatings on a metal substrate;

c) A composite covering layer consisting of a single or multiple non-metallic coating layer and a single or multiple metallic plating layer on a metal substrate.

4.3 When using swept-frequency eddy current for discontinuous detection, it can be used to detect the following objects.

a) A metallic coating on a metallic or non-metallic substrate;

b) Metallic material under a single or multiple covering layer (non-metallic coating or metallic plating) with a thickness not exceeding 2 mm.

5.Testing Process Specifications Testing procedures should be developed in accordance with the requirements of this document, and should include at least the following elements.

a) Purpose of detection;

b) Detection area;

c) Description of the inspected part, such as its geometry, dimensions, material, and surface condition;

d) Reference test block;

e) Detection system configuration (including the excitation frequency and number of sweep points of the sweep frequency eddy current detector, the moving speed of the mechanical scanning device, and the scanning path) diameter, etc.);

6 Detection System

6.1 Composition A swept-frequency eddy current testing system should include a swept-frequency eddy current tester, a probe, and a reference test block, and preferably include extension cables, mechanical devices, and auxiliary equipment. Prepare, etc.

6.2 Sweep Frequency Eddy Current Analyzer A suitable sweep frequency eddy current analyzer should be selected based on the testing objective, ensuring that its adjustable parameters, parameter adjustment range, and signal display method meet the requirements. The sweep frequency eddy current analyzer meets the following testing requirements.

a) The excitation frequency range should be 64Hz to 30MHz, and should be continuously adjustable, with a frequency error not exceeding ±1%;

b) It should have a 360° phase rotation adjustment function, and be continuously adjustable with a minimum step size of no more than 1°;

c) The number of sweep points should not be less than 16;

d) The gain range should not be less than 50dB; the maximum linear deviation between the set value and the actual value of the gain should not exceed 1dB, and the minimum gain... The step size should not exceed

0.5 dB.

6.3 Probe The appropriate swept-frequency eddy current probe should be selected based on the testing objective. For overburden thickness measurement, the absolute mode of the probe should be selected; for... For discontinuous detection, differential or absolute probe operating modes are recommended. The following points should be considered when setting up the probe.

a) The installation, alignment, and travel method of the probe affect the detection results;

b) Changes in the probe gap affect detection sensitivity;

c) The detection signal generated by the change in the detection gap is used for dynamic control of the detection sensitivity;

d) If automated scanning is performed, the probe's movement speed and scanning path on the surface of the inspected workpiece shall be maintained as specified in the inspection procedure. Within the allowable tolerance range.

6.4 Reference Test Block

6.4.1 The reference test block contains known features and discontinuities, and is used to set system parameters, verify the detection function of the system, and provide calibration

curves.

6.4.2 The reference test block for measuring the coating thickness should have the same or similar coating and base material as the tested part, and have the same coating thickness. The number of layers and the thickness of each layer are similar, the manufacturing process is the same, and the surface curvature is basically the same.

6.4.3 For discontinuity testing, the material properties, electromagnetic characteristics, and structural shape of the reference test block should be similar to or closely resemble those of the tested piece. The location of the discontinuity... The shape should be similar to the inspected part.

6.4.4 An example of a reference test block for measuring the cover layer thickness is shown in Appendix A. An example of a reference test block for discontinuous testing is shown in Appendix B.

6.5 Extension Cable Provided that the detection system's functionality, sensitivity, and resolution meet the requirements, an extension cable can be used to connect the probe and the instrument. The use of cables must meet the following requirements.

a) Electrical performance should be compatible with the testing system;

b) The impact on the test results should be verified through comparative experiments, and the maximum permissible length should be determined based on the test frequency;

c) Before use, check the appearance integrity and connection reliability of the extension cable. If any damage or poor contact is found, replace it immediately.

d) During use, it should not be excessively bent or squeezed, and should not be exposed to high temperature or corrosive environments to prevent damage to the shielding layer or changes in impedance characteristics.

6.6 Detection System Verification The testing system should ideally be calibrated annually. This calibration should be performed before and after the testing process, during personnel changes, or when system components are repaired. Functional verification should be performed when repairing or replacing parts.

7.1 Preparations before testing

7.1.1 Basic information about the inspected item should be obtained through document review and/or physical inspection.

7.1.2 Based on the instruments used and the actual site conditions, and in accordance with the requirements of the testing process specifications, a sweep frequency eddy current testing operation manual should be prepared. Or process card.

7.1.3 Burrs, scale, rust, and other foreign matter on the surface of the inspected part that may hinder eddy current testing should be removed. Cleaning should not damage the part.