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Non-Destructive Testing – Cloud Testing – General Principle

无损检测 云检测 总则

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Non-Destructive Testing – Cloud Testing – General Principle

1 Scope

This Standard specifies the general rules for cloud testing of non-destructive testing (referred to as "non-destructive cloud testing"), including method summaries, security requirements, plan formulation, terminal requirements, communication network requirements, cloud requirements, testing procedures, result output, reports, etc.

This Standard is applicable to non-destructive testing based on cloud technology processing and analysis of testing data.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 9445 Non-Destructive Testing - Qualification and Certification of Personnel

GB/T 20737 Non-Destructive Testing - General Terms and Definitions

GB/T 36951 Information Security Technology - Security Technical Requirements for Application of Sensing Terminals in Internet of Things

GB/T 37024 Information Security Technology - Security Technical Requirements of Gateway in Sensing Layer of the Internet of Things

GB/T 37025 Information Security Technology - Security Technical Requirements of Data Transmission for Internet of Things

GB/T 37044 Information Security Technology - Security Reference Model and Generic Requirements for Internet of Things

GB/T 37039 Information Security Technology - Security Requirements for IoT Sensing Layer Access to Communication Network

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data across platforms;

--- Provide a platform for expert guidance and remote technical services.

4.3 Classification

According to the data entry mode, non-destructive cloud testing may be divided into two modes: manual data collection and automatic data collection.

According to the data source, non-destructive cloud testing may be divided into regular testing, patrol testing and monitoring.

5 Security Requirements

5.1 General

This Clause does not list all the security requirements for the implementation of testing. Users who use this Standard shall establish security guidelines in accordance with the requirements of GB/T 36951, GB/T 37024, GB/T 37025, GB/T 37044 and GB/T 37093 before testing.

5.2 Security requirements for sensor installation

Security requirements such as non-destructive and explosion-proof of the test object shall be ensured according to the test object and its working conditions.

Avoid falling, electric shock and other personal injuries during installation.

5.3 Data and transmission security requirements

5.3.1 Overview

The data transmission security of non-destructive cloud testing requires that all data shall be transmitted between legal cloud-testing terminals and the cloud; and the transmitted data shall not be illegally accessed, copied or modified.

Security measures include identity authentication of testing sensors, cloud-testing terminals and cloud; and the confidentiality of transmitted data.

Confidential data shall be taken security measures by the data controller himself; and shall be processed by a local area network approved by the data controller.

5.3.2 Identity authentication

Identity authentication shall ensure that the cloud identifies the identity of the cloud-testing terminal; and provide the cloud-testing terminal with access rights matching the identity of the cloud-testing terminal. If the identity authentication is in two-way, the

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--- Operation requirements;

--- Evaluation and processing methods of test results;

--- Result output;

--- Post-processing such as storage, sharing, and deletion of testing data;

--- Compiler and date.

6.2 Formulation of process planning

According to the selected non-destructive testing technology, the process planning shall be formulated in accordance with the corresponding non-destructive testing standards.

7 Requirements for the Cloud-Testing Terminal

7.1 Non-destructive cloud testing sensor

The non-destructive cloud testing sensor may be an ordinary sensor or a dedicated intelligent sensor with functions of testing, data conversion, storage and transmission.

The non-destructive cloud testing sensor shall have a unique identification module.

Non-destructive cloud testing sensor shall be calibrated and self-calibrated regularly according to actual application scenarios; self-calibration shall be performed before each use during testing; and online self-calibration shall be performed during monitoring.

7.2 Non-destructive cloud testing terminal

The non-destructive cloud testing terminal shall at least consist of the following modules:

--- Security check module that stores check information;

--- Identity information acquisition module of non-destructive cloud testing sensor;

--- Operating user's operation information input module;

--- Process the operation signal and output the corresponding signal control module;

--- Two-way transmission network module for cloud data;

--- Result display module;

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The dedicated communication protocol shall be equipped to the communication network according to the security requirements of GB/T 36951, GB/T 37024, GB/T 37025, GB/T 37044 and GB/T 37093.

9 Requirements for Cloud

9.1 Basic functions

The cloud may be a private cloud based on a local area network, or a public cloud based on a wide area network. It shall have the following functions such as information verification, data reading and data storage, as well as signal processing, data analysis, data calculation and interpretation for non-destructive testing methods, etc. The most important functions of the cloud are cloud storage and cloud computing.

9.2 Cloud storage

Cloud storage collectively stores test signals, test human-computer interaction data, image data during the test process and other test-related data; and provides functions such as dynamic collection, query and read. The storage time shall at least meet the user's requirements. In the process of acquiring, saving and reading, ensure that the data is not tampered.

9.3 Cloud computing

Cloud computing shall include the following:

--- Simulation: Use the computer to calculate the process of test signal generation, signal transmission and sensor signal pickup; and display the influence of the nature and discontinuity of the test object on the signal and the effect on the test result;

--- Processing: Process the test data uploaded to the cloud to improve sensitivity or enhance the intuitiveness of the test results;

--- Calculation: Calculate the discontinuous quantitative, semi-quantitative size and other information from the test conditions, environment, physical characteristics of the test object and the acquired test signal;

--- Evaluation: Use the test information and its calculation results to give a discontinuous grade evaluation.

9.4 Information verification

Information verification is the basis of fairness and reliability for cloud test services.

The cloud shall verify the non-destructive cloud test terminal through data encryption.

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The implementation process shall consider the following aspects:

--- Test standards;

--- Obtain or enter the information of the test object;

--- Obtain or enter the information of test personnel;

--- Connect sensors and cloud-test terminals;

---Verify the status of sensors and cloud-test terminals;

--- Obtain and record test signals through sensors; extract and record relevant test data;

--- The test data is uploaded to the cloud, including time, location, personnel, test objects, test sensors, test terminals, test signals, etc.;

--- Evaluate the test results;

--- Output test and evaluation report.

11 Result Output

11.1 Evaluation and grading

According to the test object type, and the product or test standard, evaluate the test results. Evaluation may be achieved by a combination of manual judgment and cloud automatic judgment.

11.2 Use and maintenance strategy of in-service equipment

When testing the in-service equipment, the use and maintenance strategies may be proposed based on the test results.

12 Report

12.1 Digital report

According to the requirements of the standard or the data controller, the test data should be collected and a digital test report shall be formed.

An electronic signature method may be provided, and signature information may be attached to the test report.

12.2 Digital encryption

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