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

GB/T 46608-2025

**Non-destructive testing of steel tubes - General rules for the
machine vision inspection method for surface defects**

钢管无损检测 表面缺陷机器视觉检测技术通则

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Foreword

This document conforms to GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting is scheduled.

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1 Scope

GB/T 46608-2025 is the Chinese national standard covering inspecting tube surfaces with cameras instead of eyes - the lighting and optics that make a lap or a seam visible on a moving tube, the resolution and the detection thresholds, the calibration on reference defects, and the sorting decision. First edition, under the China Iron and Steel Association, in force from 1 May 2026. Issued on 31 October 2025, it has been in force since 1 May 2026.

This document specifies the general requirements, comparison samples, inspection system, system performance requirements, and inspection procedures for machine vision inspection of surface defects in steel pipes. Procedures, result determination, test records and reports. This document applies to the automated visual inspection of defects on the outer surface of steel pipes. Visual inspection of defects on the inner surface of steel pipes shall be performed in accordance with this document.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are listed below. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 40659 General Requirements for Online Inspection Systems Based on Machine Vision in Intelligent Manufacturing
YB/T 145 Method for Measuring the Size of Artificial Defects in Comparative Specimens for Flaw Detection of Steel Pipes

3 Terms and Definitions

The terms and definitions defined in GB/T 40659 and the following terms and definitions apply to this document.

3.1 Machine visual inspection Machine vision converts the captured information about the steel pipe surface into image signals, which are then transmitted to a dedicated image processing system for analysis based on pixels. Information such as brightness and color is

converted into digital signals. The image system performs various operations on these signals to extract the target's features. A detection method that uses target features to determine whether there are defects on the outer surface of the steel pipe being tested.

Note. The detection is carried out using two-dimensional and/or three-dimensional detection methods.

3.2 Data Acquisition Server The device responsible for interfacing with the camera to acquire images.

Note. The design needs to be tailored to the testing speed and sampling frequency of the steel pipe.

3.3 Inference server A device for detecting and classifying defects in real-time images of the steel pipe surface.

Note. The server performance meets the requirements for real-time performance, data querying, storage, and other aspects.

3.4 User terminal The software provides users with various surface quality features, including defect alarms, defect distribution previews, and historical data queries, as well as a systematic approach. A device that performs functions such as system maintenance and defect sample collection.

3.5 Line structured light three-dimensional depth detection 3D reconstruction is performed based on the principle of triangulation. During image acquisition, the line laser beam projects onto a plane of light; for...