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

GB/T 33207-2025

Replacing GB/T 33207-2016

**Non-destructive testing - Test method for the oxide stacking in
the non-ferromagnetic metal tube in service by magnetic
testing**

无损检测 在役非铁磁性金属管内氧化物堆积的磁性检测方法

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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.

This document replaces GB/T 33207-2016 "Magnetic detection method for non-destructive testing of oxide scale accumulation in in-service metal pipes" and Compared with GB/T 33207-2016, in addition to structural adjustments and editorial changes, the main technical changes are as follows.

- a) The scope has been changed (see Chapter 1, Chapter 1 of the 2016 edition);
- b) Added the terms "oxide accumulation" and "blockage area ratio" and their definitions (see 3.1 and 3.2);
- c) The Summary of Methods has been changed (see Chapter 4, Chapter 4 of the 2016 edition);
- d) Added safety requirements (see Chapter 5);
- e) Deleted personnel requirements (see Chapter 5 of the 2016 edition);
- f) Added testing procedures (see Chapter 6);
- g) Changed the requirements for testing equipment (see Chapter 7, Chapter 7 of the 2016

edition);

h) Added calibration specimens (see 7.5);

i) Deleted the factors affecting detection (see Chapter 9 of the 2016 edition);

j) Changed the pre-test preparation elements (see 8.1, Chapter 6 of the 2016 edition);

k) Added the plotting of oxide accumulation blockage area ratio-amplitude curve (see 8.2);

l) The scanning method has been changed (see 8.3.1, 8.3 of the 2016 edition);

m) Added retest method (see 8.3.2);

n) Added test result evaluation (see Chapter 9);

o) The test report requirements have been changed (see Chapter 10, Chapter 10 of the 2016 edition).

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.

This document is proposed and coordinated by the National Technical Committee for Standardization of Non-destructive Testing (SAC/TC56).

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This document was first published in 2016 and this is the first revision.

Non-destructive testing of in-service non-ferromagnetic metals Magnetic detection method for oxide accumulation in pipes

1 Scope

This document describes the principles, procedures, and results evaluation of magnetic detection of ferromagnetic oxide buildup in in-service non-ferromagnetic metallic pipes.

This document is applicable to the inspection of in-service non-ferromagnetic metal pipes with an outer diameter of 38mm~65mm and a wall thickness of 3.5mm~13mm.

2 Normative references

GB/T 12604.6

3 Terms and Definitions

The terms and definitions defined in GB/T 12604.6 and DL/T 882 and the following apply to this document.

3.1 oxide stacking

The oxides in non-ferromagnetic metal pipes are deposited inside the pipes and at the elbows after peeling.

3.2 ratio of blockage area

The ratio of the maximum cross-sectional area of oxide accumulation in a non-ferromagnetic metal tube to the flow area in the tube.

Note. The maximum cross-sectional area of accumulation refers to the maximum cross-sectional area of oxide accumulation in non-ferromagnetic metal tubes.

4 Detection Principle

The main component of the accumulated oxide is ferromagnetic iron oxide (Fe_3O_4).

The ferromagnetic characteristics can be used to identify and judge the presence and accumulation of oxides in the tube through magnetic induction detection, as shown in Figure 1. The specific method is to A constant strong magnetic field is applied to the outer wall of the non-ferromagnetic metal tube. When there are oxides in the tube, the oxides will be magnetized by the external strong magnetic field.

Therefore, the impurities generated by the magnetized oxides are detected from the outside of the pipe wall.

The scattered magnetic field signal is converted into an electrical signal to detect the accumulation of ferromagnetic oxides in non-ferromagnetic metal tubes.