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**Electromagnetic testing method for hard spots on the surface
of steel plates**

钢板表面硬点电磁检测方法

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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.

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

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Electromagnetic detection method for hard spots on steel plate surface

1 Scope

This document specifies the general requirements, testing principles, quality grades, testing methods, testing equipment, and comparisons for electromagnetic testing of hard spots on steel plate surfaces.

Sample, testing procedure, result evaluation, test report.

This document applies to the electromagnetic testing of surface hard spots on ferromagnetic steel plates with a hardness value of not less than 30HV10 produced by thermomechanical rolling.

The surface hard spot detection of ferromagnetic steel plates produced by his rolling process shall be carried out in accordance with the following procedures.

2 Normative references

GB/T 9445

GB/T 12604.6

GB/T 17394.1

GB/T 20737

GB/T 34205

3 Terms and Definitions

The terms and definitions defined in GB/T 12604.6 and GB/T 20737, as well as the following terms and definitions, apply to this document.

3.1 hardspot

Areas on the surface of a steel plate where the surface hardness value is higher than the normal hardness value.

4.1 Testing personnel

4.1.1 Personnel engaged in the detection of hard spots on steel plate surfaces shall be trained and qualified in accordance with GB/T 9445 or equivalent standards for eddy current testing, and shall...

After receiving training on hardness testing knowledge.

4.1.2 Suspicious areas discovered during electromagnetic method testing of surface hard spots should be verified using a portable hardness tester. Those performing portable hardness tester testing...

Personnel conducting the tests should be familiar with the relevant technologies and equipment operation.

4.2 Inspected steel plate

4.2.1 The surface of the steel plate to be inspected should be free of foreign matter such as cutting slag and iron oxide scale. If necessary, the surface of the steel plate should be cleaned.

4.2.2 The steel plate being inspected should be sufficiently straight to ensure the effectiveness of the inspection.

4.3 Site Requirements

The testing site should be free from vibrations and electromagnetic interference that could affect the testing.

4.4 Testing Procedures

Testing procedures should be developed based on specific circumstances, and should include at least the following.

- a) Scope of application;
- b) The steel grade and dimensions of the steel plate being inspected;
- c) The standards or technical specifications referenced;
- d) Qualification requirements for testing personnel;
- e) Detection timing, detection range, scanning coverage level, and the scope of undetectable areas at the edges;
- f) Testing instruments and sensors;
- g) Quality grade;
- h) Comparative sample design;
- i) Calibration and verification;

- j) Detect scanning direction and scanning speed;
- k) Verification and handling of suspicious areas, and handling of uninspectable border areas;
- l) Acceptance criteria;
- m) Inspection records and reports;
- n) Occupation and environmental protection.

5 Detection Principle

Localized changes in the surface hardness of the steel plate lead to changes in its ferromagnetic properties, which are detected and recorded by an electromagnetic sensor. The amplitude of the signal is detected by eddy current.

and methods such as phase analysis, eddy current impedance analysis, incremental permeability analysis, higher harmonic signal component analysis, or Barkhausen magnetic noise analysis.

The combination of these components assesses changes in surface hardness in the inspected area. The detection principle is illustrated in Figure 1.