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

GB/T 42662-2023

**Non-destructive testing of steel tubes - Automated ultrasonic
testing for the detection of laminar imperfections in strip/plate
used for the manufacture of welded steel tubes**

钢管无损检测 焊接钢管用钢带/钢板分层缺欠的自动超声检测

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Foreword

This document was issued on 6 August 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 March 2024.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

1 Scope

GB/T 42662-2023 covers the automated ultrasonic examination of steel strip and plate for laminar imperfections, carried out before or during the forming of welded tube - the general requirements, which put the examination ahead of or inside tube making and demand a smooth surface free of anything that would break the coupling; the testing methods and the coverage they achieve; the reference sample against which sensitivity is set; the calibration and verification of the equipment, statically before each inspection cycle and against the reference imperfections; the acceptance, where strip below the trigger or alarm threshold passes and anything at or above it is handled as the standard directs; and the testing report. Annex A is normative and gives the procedure for sizing an indication by hand-held ultrasound. A lamination is a flat separation lying in the plane of rolling; it survives forming, then opens at the strip edge that becomes the weld bevel or shows up later as hydrogen-induced cracking in sour service, and by then the tube is welded, coated and

often in the ground. Written for tube mills, plate suppliers, NDT contractors and pipeline purchasers writing inspection clauses.

This document specifies the requirements for automatic ultrasonic detection of laminar imperfection in steel strips/plates used for the manufacture of welded steel tubes before or during the tube making process.

NOTE 1: For welded steel tubes, at the option of the manufacturer, automated ultrasonic testing of

the steel tube for laminar imperfection according to ISO 10893-8 after welding is an alternative

method.

NOTE 2: Upon agreement between the manufacturer and the purchaser, this document is also

applicable to the inspection of steel strips/plates after welding of submerged arc welded steel tubes.

This document also applies to the inspection of steel strips/plates used in the manufacture of circular hollow steel profiles.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 9445, Non-destructive testing -- Qualification and certification of NDT personnel (GB/T 9445-2015, ISO 9712:2012, IDT)

GB/T 12604.1, Non-destructive testing -- Terminology -- Ultrasonic testing (GB/T 12604.1-2020, ISO 5577:2017, MOD)

ISO 11484, Steel products -- Employer's qualification system for non-destructive testing (NDT) personnel

3 Terms and definitions

The terms and definitions defined in GB/T 12604.1 and ISO 11484 as well as the following apply to this document.

3.1 reference standard

Artificial imperfections used to calibrate non-destructive testing equipment.

3.2 reference sample

Samples for calibration.

3.3 tube

A long hollow product with open ends and a cross-section of any shape.

3.4 manufacturer

An organization that produces products in accordance with relevant standards and declares that the delivered products comply with relevant standards.

3.5 agreement

The contract entered into between the manufacturer and the purchaser at the time of inquiry and order.

3.6 laminar imperfection

An imperfection in the tube wall that is usually parallel to the surface of the steel tube.

NOTE: Its range can be calculated by measuring the contour area on the outer surface.

4 General requirements

4.1 Ultrasonic testing of straight steel strips/plates shall be carried out before or during the production of steel tubes.

4.2 The surface of the steel strip/plate to be inspected shall be smooth and free of foreign matter that would affect the validity of the test results.

4.3 Testing shall be carried out by operators trained in accordance with GB/T 9445, ISO 11484 or equivalent standards, under the supervision of qualified personnel authorized by the manufacturer. In the case of third-party testing, this shall be negotiated between the supplier and the purchaser.

Employers shall issue operation authorization certificates in accordance with procedural documents. NDT operations shall be authorized by NDT Level 3 personnel approved by the employer.

NOTE: The definitions of Level 1, Level 2, and Level 3 can be found in the corresponding

standards,

such as GB/T 9445 and ISO 11484.

6.3 Verification of reference standard

Appropriate techniques shall be used to verify the size and shape of reference standard.

7 Calibration and verification of equipment

7.1 Before the start of each inspection cycle, the testing equipment shall be statically calibrated without comparative standard imperfections in accordance with the provisions of a) of this article or with comparative standard imperfections in accordance with the provisions of b) of this article.

a) Calibration without reference standard: The probe device is positioned on the steel strip/steel plate to be inspected, and the highest echo of the first bottom surface echo minus 6 dB is used as the trigger/alarm threshold of the equipment.

The detection sensitivity can also be determined by using the DAC (distance amplitude correction) curve provided by the probe manufacturer, or by using the DAC curve used by the steel tube or steel strip/steel plate manufacturer. In both cases, a 6 mm flat bottom hole curve shall be used.

When setting the sensitivity, the manufacturer shall verify that the equipment is capable of detecting the grooves of the reference sample specified in 6.1.2 and Figure 1 under static conditions. If it cannot be detected, the sensitivity shall be adjusted before production testing.

b) Calibration with reference standard: In the static state, when a single probe or each probe on a probe holder assembly is aligned with a reference standard, the full amplitude of the signal generated shall be used as the trigger/alarm threshold for the device.

7.2 During the production inspection process of steel strips/steel plates, the selection of relative translation speed and PRF (pulse repetition frequency) shall meet the requirements of the corresponding minimum coverage and the maximum allowable spacing of adjacent scan lines specified in Table 1.