



SLOVENSKI STANDARD

SIST EN 10246-15:2000

01-november-2000

Neporušitveno preskušanje jeklenih cevi - 15. del: Ugotavljanje laminarnih napak trakov/pločevine, ki se uporabljajo za izdelavo varjenih jeklenih cevi, z avtomatsko ultrazvočno preiskavo

Non-destructive testing of steel tubes - Part 15: Automatic ultrasonic testing of strip/plate used in the manufacture of welded steel tubes for the detection of laminar imperfections

Zerstörungsfreie Prüfung von Stahlrohren - Teil 15: Automatische Ultraschallprüfung von Band/Blech, das für die Herstellung geschweißter Stahlrohre eingesetzt wird, zum Nachweis von Dopplungen

Essais non destructifs des tubes en acier - Partie 15: Contrôle automatique par ultrasons pour la détection des dédoubleures dans les bandes/plaques utilisées pour la fabrication des tubes en acier soudés

Ta slovenski standard je istoveten z: EN 10246-15:2000

ICS:

23.040.10	Železne in jeklene cevi	Iron and steel pipes
77.040.20	Neporušitveno preskušanje kovin	Non-destructive testing of metals

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EUROPEAN STANDARD

EN 10246-15

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2000

ICS 23.040.10; 77.040.20

English version

Non-destructive testing of steel tubes – Part 15: Automatic ultrasonic testing of strip/plate used in the manufacture of welded steel tubes for the detection of laminar imperfections

Essais non destructifs des tubes en acier – Partie 15:
Contrôle automatique par ultrasons pour la détection des
dédoublures dans les bandes/plaques utilisées pour la
fabrication des tubes en acier soudés

Zerstörungsfreie Prüfung von Stahlrohren – Teil 15:
Automatische Ultraschallprüfung von Band/Bech, das für
die Herstellung geschweißter Stahlrohre eingesetzt wird,
zum Nachweis von Dopplungen

This European Standard was approved by CEN on 25 December 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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FOREWORD

This European Standard has been prepared by Technical Committee ECISS/TC 29, Steel tubes and fittings for steel tubes, the Secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2000, and conflicting national standards shall be withdrawn at the latest by August 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 SCOPE

This part of EN 10246 specifies requirements for the ultrasonic testing of strip/plate used in the manufacture of welded tubes for the detection of laminar imperfections. The standard specifies acceptance levels and calibration procedures.

NOTE 1: In the case of welded tube, an alternative ultrasonic testing specification for the detection of laminar imperfections is available which may be applied at the manufacturer's option by ultrasonic testing of the tube subsequent to seam welding in accordance with EN 10246-14.

NOTE 2: At the discretion of the manufacturer, the requirements of this part of EN 10246 may be applied to finished submerged arc welded (SAW) tubes.

This part of EN 10246 is applicable to the inspection of strip/plate with a thickness greater than or equal to 4,0 mm.

European Standard EN 10246, Non-destructive testing of steel tubes, comprises the parts shown in Annex A.

2 GENERAL REQUIREMENTS

2.1 This ultrasonic inspection of strip/plate shall be carried out before or during pipe production in the flat form.

2.2 The strip/plate to be tested shall be sufficiently free from surface irregularities and foreign matter so as to ensure the validity of the test.

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3 METHOD OF TEST

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3.1 The strip/plate shall be tested using an ultrasonic pulse echo technique for the detection of laminar imperfections with ultrasound transmitted in the direction normal to the strip/plate surface or using the ultrasonic through-transmission technique at the discretion of the manufacturer.

3.2 During testing, the strip/plate and the transducer assembly shall be moved relative to each other so that the strip/plate surface is scanned along equidistant scan lines parallel or transverse to the principal rolling direction of the strip/plate, with a minimum coverage and maximum allowable gap between adjacent scanning tracks as given in table 1. For the oscillating technique, the minimum coverage shall be half the values given in table 1.

Table 1: Acceptance level designation and minimum coverage of the strip/plate (C_{min}) and maximum gap between adjacent scanning tracks

Acceptance level	Coverage C_{min} %	Maximum gap between adjacent scanning tracks mm
U1	20	100
U2	10	150
U3	5	200

3.3 The longitudinal strip/plate edges shall be 100 % ultrasonically inspected for the detection of laminar imperfections over a width of at least 15 mm plus, if appropriate, the total width of the edge material which will be removed from each original strip/plate edge prior to seam welding in order to detect the relevant minimum imperfection length L_{min} as given in table 2.

NOTE: The longitudinal edges are defined as those parallel to the principle rolling direction.

Table 2: Acceptance level designation and minimum laminar imperfection length (L_{min}) on the strip/plate edges to be detected (trigger/alarm condition)

Acceptance level	Minimum length of laminar imperfections L_{min} mm
S 1	10
S 2	20
S 3	30

3.4 The maximum dimension of each individual transducer measured at right angles to the scanning direction shall be 30 mm.

NOTE: In the case of twin crystal probes with different sizes of transducer within the transducer assembly, the dimension of the smallest transducer shall be used to calculate the coverage.

3.5 The equipment for automatic testing shall be capable of classifying strip/plate as either acceptable or suspect by means of an automatic trigger/alarm level combined with a marking and/or sorting system.

4 REFERENCE STANDARDS

4.1 General

4.1.1 The reference standards defined in this part of EN 10246 are convenient standards for calibration of non-destructive testing equipment. The dimensions of these standards should not be construed as the minimum size of imperfection detectable by such equipment.

4.1.2 The ultrasonic equipment shall be calibrated either electronically using a test piece (see 5.1.a)) or with a reference standard comprising flat bottomed circular, square or rectangular recess (see figure 1) machined into the surface of a flat test piece (see 5.1.b)).

The flat bottomed circular reference standard shall be used as the primary means of establishing the test sensitivity. When using one of the other types of reference standards, the test sensitivity shall be adjusted such that it is equivalent to that obtained when using the flat bottomed circular recess.

For the through-transmission technique, either the recess shall be filled with a suitable attenuating material or a suitable attenuating material of the same dimensions as the reference standard shall be attached to the surface of the test piece.

4.1.3 The test piece shall have a similar surface finish and similar acoustic properties (e.g. velocity, attenuation coefficient) as the strip/plate to be tested. The test piece selected by the manufacturer for calibration purposes shall be of convenient length and width.

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4.2 Dimensions of reference standards

4.2.1 The dimensions of the rectangular recess reference standards (see figure 1) shall be as follows:

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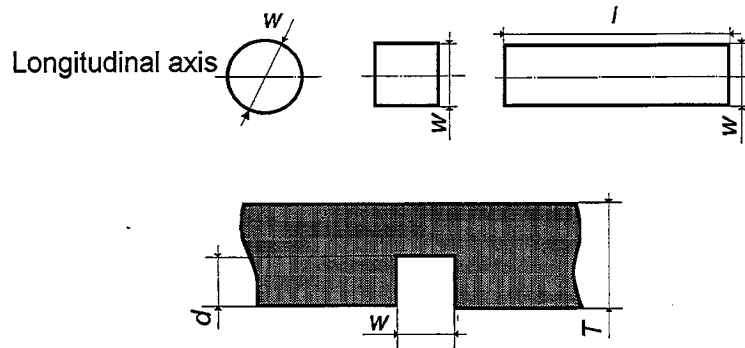
- a) width, w : 6 mm, $\begin{matrix} +10\% \\ 0 \end{matrix}$;
- b) length, l : 6 mm min;
- c) depth, d : $T/4 < d < T/2$, with a maximum of 10 mm.

4.2.2 The dimensions of the circular and square recess reference standards (see figure 1) shall be as follows:

- a) width or diameter, w : 6 mm, $\begin{matrix} +10\% \\ 0 \end{matrix}$;
- b) depth, d : $T/4 < d < T/2$, with a maximum of 10 mm.

4.3 Verification of reference standards

The reference standard dimensions and shape shall be verified by a suitable technique.



l = length of rectangular recess

w = width or diameter of recess

d = depth of recess

T = specified wall thickness

Figure 1 - Reference recess forms (reference standards)

5 EQUIPMENT CALIBRATION AND CHECKING

5.1 The equipment shall be calibrated statically either without reference standard in accordance with 5.1.a) or using a reference standard in accordance with 5.1.b).

a) Calibration without reference standard:

With the transducer assembly positioned on the test piece, the full amplitude of the first back-wall echo minus 6 dB shall be used to set the trigger/alarm level of the equipment.

The test sensitivity may also be established with DAC¹⁾ curves as supplied by the transducer manufacturer or with DAC curves as prepared by the tube manufacturer using, in both cases, the 6 mm flat bottom hole curve.

At the commencement of the production test run, the manufacturer shall demonstrate that at the set sensitivity, the equipment will detect under static conditions the reference standard as given in 4.1.2 and figure 1. If this is not the case, the necessary adjustment in sensitivity shall be made prior to the production test run.

b) Calibration using a reference standard:

Under static conditions, with the transducer or each transducer of a transducer assembly centrally located over the reference standard, the full signal amplitude of the signal obtained from the reference standard shall be used to set the trigger/alarm level of the equipment.

¹⁾ DAC = Distance amplitude correction