



# SLOVENSKI STANDARD

## SIST EN 10246-17:2000

01-november-2000

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### Neporušitveno preskušanje jeklenih cevi - 17. del: Ugotavljanje laminarnih napak koncev nevarjenih in varjenih jeklenih cevi z ultrazvočno preiskavo

Non-destructive testing of steel tubes - Part 17: Ultrasonic testing of tube ends of seamless and welded steel tubes for the detection of laminar imperfections

Zerstörungsfreie Prüfung von Stahlrohren - Teil 17: Ultraschallprüfung der Rohrenden nahtloser und geschweißter Stahlrohre zum Nachweis von Dopplungen

Essais non destructifs sur des tubes en acier - Partie 17: Contrôle par ultrasons des extrémités de tubes pour la détection de dédoubleures des tubes en acier sans soudure et soudés

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**Ta slovenski standard je istoveten z: EN 10246-17:2000**

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#### **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  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 10246-17**

February 2000

ICS 23.040.10; 77.040.20

English version

**Non-destructive testing of steel tubes – Part 17: Ultrasonic testing of tube ends of seamless and welded steel tubes for the detection of laminar imperfections**

Essais non destructifs sur des tubes en acier – Partie 17:  
Contrôle par ultrasons des extrémités de tubes pour la  
détection des dédoubleures des tubes en acier sans soudure  
et soudés

Zerstörungsfreie Prüfung von Stahlrohren – Teil 17:  
Ultraschallprüfung der Rohrenden nahtloser und  
geschweißter Stahlrohre 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.



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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 full peripheral ultrasonic testing of the ends of seamless and welded tubes for the detection of laminar imperfections. The standard specifies acceptance levels and calibration procedures.

This part of EN 10246 is applicable to the inspection of welded tubes with an outside diameter greater than 30 mm. No lower limit of wall thickness is specified but see note in 3.1.

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

## 2 GENERAL REQUIREMENTS

2.1 The ultrasonic inspection covered by this part of EN 10246 is usually carried out on tubes after completion of all the primary production process operations.

2.2 The surfaces of the tube ends to be tested shall be free from foreign matter so as to ensure the validity of the test.

## 3 METHOD OF TEST

3.1 The tube end zone at both tube ends shall be tested using an ultrasonic pulse echo technique for the detection of laminar imperfections. The ultrasound shall be transmitted in the direction normal to the tube surface.

NOTE: For wall thicknesses less than 5 mm, where difficulties may occur in detecting and sizing laminar imperfections using this method of test, an alternative method of test may be agreed between the manufacturer and the purchaser.

3.2 During testing, the tubes and the transducer assembly shall be moved relative to each other so that the circumference of the tube ends is scanned from the outside surface, or the inside surface where appropriate, over a length of approximately 25 mm or  $2T$  ( $T$  = specified tube thickness in mm) whichever is the greater with a maximum of 50 mm, from the point where the outside surface meets the face or bevel.

In the case of submerged arc welded tubes, when the weld reinforcement precludes a test for laminar imperfections close to and over the reinforcement, a zone 25 mm on either side of the weld reinforcement shall not be inspected unless by agreement between the purchaser and the manufacturer the reinforcement is removed to permit a full peripheral test to be carried out.

3.3 The maximum width of each individual transducer, measured parallel to the major axis of the tube, shall be 25 mm.

3.4 The equipment for automatic/semi-automatic testing, when used, shall be capable of differentiating between acceptable and suspect tube by means of an automatic trigger/alarm level.

## 4 REFERENCE STANDARDS

### 4.1 General

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

**4.1.2** The ultrasonic equipment shall be calibrated either electronically using a tubular 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 tubular test piece (see 5.1.b)).

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

**4.1.3** The test piece shall be of the same nominal diameter, thickness and surface finish as the tube to be tested and shall have similar acoustic properties (e.g. velocity, attenuation coefficient).

### 4.2 Dimensions of reference standards

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

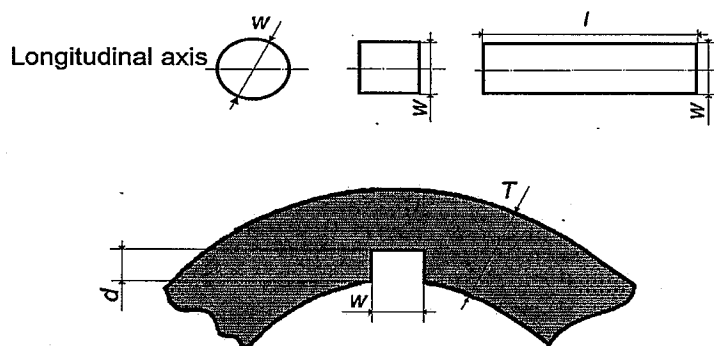
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- a) width,  $w$ : 6 mm  $^{+10\%}_0$  ;
- b) length,  $l$ : 6 mm min; [SIST EN 10246-17:2000](https://standards.iteh.ai/catalog/standards/sist/106b3867-f1f8-4b65-a0a2-as6de375670/sist-en-10246-17-2000)
- c) depth,  $d$ :  $T/4 < d < T/2$ , with a 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  $^{+10\%}_0$  ;
- 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 be established with DAC<sup>1)</sup> curves as supplied by the transducer manufacturer or 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 testing of production tubes.

### 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.

5.2 During production testing, the relative rotational and/or translational speeds and pulse repetition frequency shall be chosen to provide full surface coverage of the zone at both ends of the tube.

<sup>1)</sup> DAC = Distance amplitude correction



**5.3** The calibration of the equipment shall be checked at regular intervals during the production testing of tubes of the same nominal diameter, thickness and grade.

The frequency of checking the calibration shall be at least every four hours but also whenever there is an equipment operator team changeover and at the start and end of the production run.

**5.4** The equipment shall be recalibrated if any of the test parameters which were used during initial calibration are changed.

**5.5** If on checking during production testing the calibration requirements are not satisfied, even after increasing the test sensitivity by 3 dB to allow for system drift, then all the tubes tested since the previous check shall be retested after the equipment has been recalibrated.

## 6 ACCEPTANCE

**6.1** Any tube producing signals lower than the trigger/alarm level shall be deemed to have passed this test.

**6.2** Any tube producing signals equal to or greater than the trigger/alarm level shall be designated suspect or, at the manufacturer's option, may be retested.

**6.3** If on retesting no signal is obtained equal to or greater than the trigger/alarm level, the tube shall be deemed to have passed this test.

Tubes giving signals equal to or greater than the trigger/alarm level shall be designated suspect when the peripheral length of imperfection exceeds 6 mm. To detect this peripheral length the half-amplitude method shall be applied, if applicable.

**NOTE:** If applicable, the evaluation may be based on DAC curves.

**6.4** For a suspect tube, the manufacturer may either reject the tube or crop off the suspect area. In the latter case, the manufacturer shall ensure that all the suspect area has been removed and shall submit the end zone of the remaining length to a repeat test as specified above.

## 7 TEST REPORTING

When specified, the manufacturer shall submit to the purchaser a test report that includes at least the following information:

- a) reference to this part of EN 10246;
- b) date of test report;
- c) acceptance level;
- d) statement of conformity;
- e) product designation by grade and size;
- f) type and details of inspection technique;
- g) description of the reference standard;
- h) equipment calibration method used.