SLOVENSKI STANDARD

SIST EN 10246-10:2001

01-november-2001

Neporušitvene preiskave jeklenih cevi - 10. del: Ugotavljanje napak varov avtomatsko obločno varjenih jeklenih cevi z radiografsko preiskavo

Non-destructive testing of steel tubes - Part 10: Radiographic testing of the weld seam of automatic fusion arc welded steel tubes for the detection of imperfections

Zerstörungsfreie Prüfung von Stahlrohren - Teil 10: Durchstrahlungsprüfung der Schweißnaht automatisch lichtbogenschmelzgeschweißter Stahlrohre zum Nachweis von Fehlern

Essais non destructifs des tubes en acier - Partie 10: Contrôle par radiographie du cordon de soudure pour la détection des imperfections des tubes en acier soudés a l'arc immergé sous flux en poudre

Ta slovenski standard je istoveten z: EN 10246-10:2000

ICS:

23.040.10	Železne in jeklene cevi	Iron and steel pipes
25.160.40	Varjeni spoji in vari	Welded joints
77.040.20	Neporušitveno preskušanje kovin	Non-destructive testing of metals

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EUROPEAN STANDARD

NORME EUROPÉENNE

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ICS 23.040.10; 25.160.40

English version

Non-destructive testing of steel tubes - Part 10: Radiographic testing of the weld seam of automatic fusion arc welded steel tubes for the detection of imperfections

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Zerstörungsfreie Prüfung von Stahlrohren - Teil 10:
Durchstrahlungsprüfung der Schweißnaht automatisch
lichtbogenschmelzgeschweißter Stahlrohre zum Nachweis
von Fehlern

This European Standard was approved by CEN on 29 March 2000.

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.

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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 October 2000, and conflicting national standards shall be withdrawn at the latest by October 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 the requirements for radiographic X-ray testing of the longitudinal or helically weld seams of automatic fusion arc-welded steel tubes for the detection of imperfections.   The standard specifies acceptance levels and calibration procedures.

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

2   NORMATIVE REFERENCES

This Part of EN 10246 incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of those publications apply to this Part of EN 10246 only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 444	Non-destructive testing - General principles for radiographic examination of metallic materials by X- and gamma-rays.
EN 462-1	Non-destructive testing - Image quality of radiographs - Part 1: Image quality indicators (wire type) - Determination of image quality value
EN 462-2	Non-destructive testing - Image quality of radiographs- Part 2: Image quality indicators (step/hole type) - Determination of image quality value
EN 1330-3	Non-destructive testing - Terminology - Part 3: Terms used in industrial radiographic testing
EN 1435	Non-destructive examination of welds – Radiographic examination of welded joints

3   TERMS AND DEFINITIONS

For the purposes of this Part of EN 10246, the terms and definitions given in EN 444, EN 1330-3 and EN 1435 shall apply.

4   GENERAL REQUIREMENTS

4.1   The radiographic inspection covered by this Part of EN 10246 is usually carried out on tubes after completion of all the primary production process operations.

4.2   The tubes to be tested shall be sufficiently straight and free from foreign matter as to ensure the validity of the test. The surfaces of the weld seam and adjacent parent metal shall be sufficiently free from such foreign matter and surface irregularities which would interfere with the interpretation of the radiographs.

Surface grinding is permitted in order to achieve an acceptable surface finish.

4.3   In cases where the weld reinforcement is removed, markers, usually in the form of lead arrows, shall be placed on each side of the weld so that its position can be identified on the radiograph.

4.4   Identification symbols, usually in the form of lead letters, shall be placed on each section of the weld beam radiograph so that the images of these symbols appear in the radiograph to ensure unequivocal identification of the section.

4.5   Permanent markings shall be provided on the source side of the tube surface to provide reference points for the accurate relocation of the position of each radiograph. Where the nature of the product and/or its intended service conditions render stamping impossible, other suitable means shall be provided for relocating the radiographs, e.g. by paint marking or by reference to accurate sketches.

4.6   When radiographing a continuous length of weld with separate films, adjacent films shall overlap by at least 10 mm to ensure that no portion of the weld length remains unexamined.

5   METHOD OF TEST

5.1   The weld of longitudinally or helically welded tubes shall be radiographically tested using the X-ray film technique.

By agreement between the purchaser and the manufacturer, the use of radioscopic methods is permitted but only when the manufacturer can demonstrate adequate sensitivity.

5.2   Two image quality classes R1 and R2 are specified:

– class R1: X-ray examination technique with enhanced sensitivity.

– class R2: X-ray examination technique with standard sensitivity.

5.3   The films shall be at least fine-grain for image quality class R1 and shall be at least medium-grain for image quality class R2 (see EN 444 and EN 584-1).

The front intensifying screen, for both image quality class R1 and image quality class R2, shall have a thickness of between 0,02 mm and 0,25 mm. Other thicknesses may be adopted for the back intensifying screen.

In cases where a double film technique is used, both intensifying screens, where used, shall be in the upper thickness range of the front intensifying screen.

5.4 Salt intensifying screens shall not be used.

5.5   The amount of back-scattered or internally scattered X-ray radiation in the film shall be minimised.

Where there is doubt regarding the adequacy of protection from back-scattered X-ray radiation, a characteristic symbol (typically a 1,6 mm thick letter B) shall be attached to the back of the cassette or film holder and a radiograph made in the normal manner. When the image of this symbol appears on the radiograph at a lighter density than the background, it is an indication that protection against back-scattered X-ray radiation is insufficient and it is essential that additional precautions are taken.

5.6   The beam of radiation shall be directed at the centre of the section of the weld seam under examination and shall be normal to the tube surface at that point.

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5.7 The diagnostic length shall be such that the increase in penetrated thickness at the ends of the useful length of a radiograph shall not exceed the penetrated thickness at the centre of the radiograph by more than 10 % for image quality class R1 or by more than 20 % for image quality class R2 provided that the conditions specified in 5.11 and clause 8 are not compromised.

5.8 The single wall penetration technique shall be used. If this technique is impractical for dimensional reasons, the use of the double wall penetration technique is permitted by agreement.

5.9 The separation between the film and the weld surface shall be as small as possible.

5.10 The minimum value of the source to specimen distance, f, shall be selected so that the ratio of this distance to the effective dimension of source size d, i.e. f/d, conforms to the values given by the following equations:

for image quality class R1: $\qquad f / d \geq 15\left(\dfrac{b}{mm}\right)^{2/3}$

for image quality class R2: $\qquad f / d \geq 7,5\left(\dfrac{b}{mm}\right)^{2/3}$

Where:

b is the specimen thickness in the direction of the radiation beam plus separation between the film and the surface remote from the radiation source.

NOTE: These relationships are presented graphically in Figure 1.

5.11 Exposure conditions shall be such that the density of the radiograph of the sound weld metal in the area under examination is not less than 2,0 for image quality class R1 and not less than 1,7 for image quality class R2.

5.12 To maintain sufficient sensitivity, the X-ray tube voltage shall not exceed the maximum values given in Figure 2.
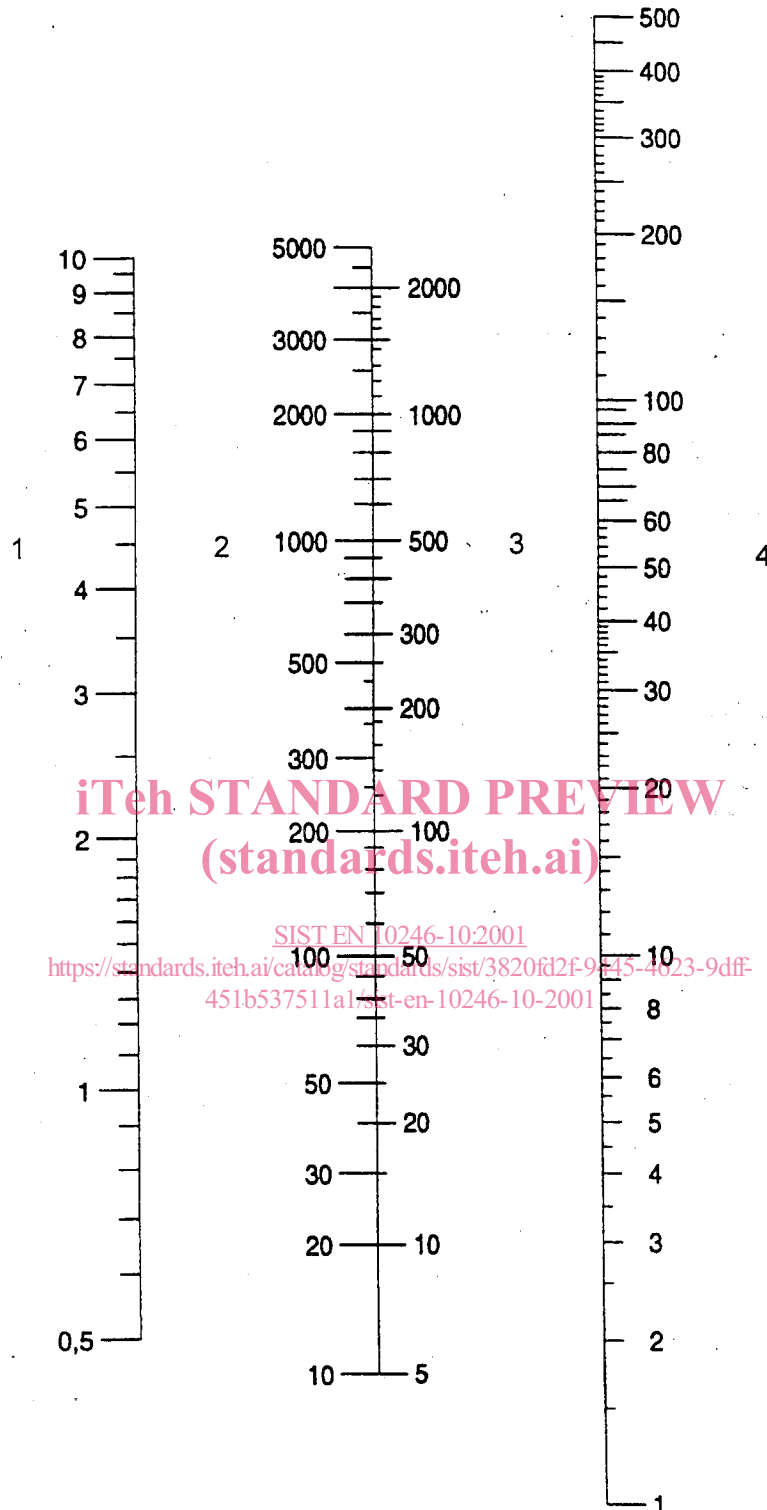
Key

1 d = Source d (mm)
2 fR1 = Minimum source to specimen distance f for class R1 (mm)
3 fR2 = Minimum source to specimen distance f for class R2 (mm)
4 b = Specimen to film distance b (mm)

**Figure 1 - Nomogram for determination of minimum source-to specimen distance f
in relation to specimen-to-film distance b and the source size d**