British Standard

BRITISH STANDARD

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10246-18:2000

Non-destructive testing of steel tubes —

Part 18: Magnetic particle inspection of tube ends of seamless and welded ferromagnetic steel tubes for the detection of laminar imperfections

The European Standard EN 10246-18:2000 has the status of a British Standard

ICS 23.040.10; 77.040.20

National foreword

This British Standard is the official English language version of EN 10246-18:2000.

The UK participation in its preparation was entrusted by Technical Committee ISE/73, Steel for pressure purposes, to Subcommittee ISE/73/1, Steel tubes for pressure purposes, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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Summary of pages

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English version

Non-destructive testing of steel tubes – Part 18: Magnetic particle inspection of tube ends of seamless and welded ferromagnetic steel tubes for the detection of laminar imperfections

Essais non destructifs sur des tubes en acier – Partie 18: Contrôle par magnétoscopie des extrémités des tubes pour la détection de dédoublures des tubes en acier ferromagnétiques sans soudure et soudés

Zerstörungsfreie Prüfung von Stahlrohren – Teil 18: Magnetpulverprüfung der Rohrenden nahtloser und geschweißter ferromagnetischer Stahlrohre zum Nachweis von Dopplungen

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

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Ref. No. EN 10246-18:2000 E

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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of an identical text or by endorsement, at the latest by August 2000, and conflicting national standards shall be withdrawn at the latest by August 2000.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.

1 SCOPE

This part of EN 10246 specifies the requirements for magnetic particle inspection of the end/bevel face at the ends of seamless and welded ferromagnetic steel tubes for the detection of laminar imperfections.

This part of EN 10246 is to be used for the detection of laminar imperfections on the end/bevel face at the ends of plain end and bevelled end tubes which may interfere with subsequent fabrication and inspection operations (e.g. welding, ultrasonic inspection of the welds).

This part of EN 10246 may be used as an alternative to or in addition to EN 10246-17.

This part of EN 10246 may also be used for the detection of imperfections other than laminar imperfections on the end/bevel face. In this case, magnetization shall be applied in the direction essentially perpendicular to the orientation of the particular imperfections to be detected.

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.

prEN ISO 9934-1:2000[1)]	Non-destructive testing - Magnetic particle testing – Part 1: General principle (ISO/FDIS 9934-1:2000)
prEN ISO 9934-2:1999[1)]	Non-destructive testing - Magnetic particle testing – Part 2: Detection media (ISO/DIS 9934-2:1999)
prEN ISO 9934-3:1998[1)]	Non-destructive testing - Magnetic particle testing – Part 3: Equipment (ISO/DIS 9934-3:1998)

3 GENERAL REQUIREMENTS

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

3.2 The surface of the tube ends to be tested shall be sufficiently clean and free from oil, grease, sand or scale or any other foreign matter that would interfere with the correct interpretation of the indications obtained from magnetic particle inspection.

NOTE: The type of indications, as well as the minimum dimension of the surface imperfections to be detected, are dependent on the specific tube manufacturing process and the surface finish of tube ends.

[1)] In preparation; until this document is published as a European Standard, the corresponding national standard(s) should be agreed at the time of enquiry and order.

4 METHOD OF TEST

4.1 During the production testing of the end/bevel face at both ends of each tube, magnetization shall, at the discretion of the manufacturer, be applied either parallel to the major axis or radially through the tube thickness, with simultaneous application of powder or suspension as appropriate to the end/bevel face, to reveal the presence of laminar imperfections using an illumination of not less than 350 lux.

In cases where there is insufficient sensitivity due, for example, either to poor contrast between powder or suspension and the surface of the end/bevel face to be inspected or as a result of the magnetization technique adopted, the end/bevel face shall, prior to inspection, be coated with a white background paint to aid contrast; otherwise fluorescent detection media shall be used. If fluorescent detection media is used, the inspection shall be carried out in a darkened area using a UV(A) radiation source. The background white light level shall not exceed 20 lux and the UV(A) radiation intensity shall be at least 10 W/m^2

The tube end/bevel face at both ends of each tube shall be inspected using the magnetic particle method for the detection of laminar imperfections using a.c. or d.c. magnetization and powder or suspension as appropriate to the magnetic particle technique adopted, generally in accordance with prEN ISO 9934-1:2000, prEN ISO 9934-2:1999 and prEN ISO 9934-3:1998. The use of dry powder is permitted only by prior agreement between the purchaser and the manufacturer.

4.2 When using magnetization parallel to the major axis of the tube, this shall be achieved using a rigid concentric coil surrounding the tube or inside the tube, positioned close to the tube end and energized using an alternating or half or full-wave rectified direct current source. In this case, it shall be demonstrated by a measuring device that the induced currents in the tube wall produce a magnetic flux perpendicular to the tube axis.

Alternatively, the current flow method may be used by passing current around the tube circumference using clamps on the tube end 180° apart and repeating the test after rotating the clamps by 90° with respect to their initial position. In this case, but only by agreement between purchaser and manufacturer, it is permissible to conduct the test using residual magnetization and fluorescent detection media.

4.3 When using magnetization applied radially through the thickness of the tube at the tube ends, this shall be achieved using an a.c. or d.c. yoke with pole pieces applied radially between the inner and outer surface of the tube across the tube thickness. By agreement between the purchaser and the manufacturer, the use of a permanent magnet of sufficient power is permitted.

Other methods of applying radial magnetization may be adopted, provided that the manufacturer can demonstrate their equivalence to the above described method.

4.4 It is outside the scope of this part of EN 10246 to specify levels of magnetization and current levels required to reveal the presence of unacceptable surface imperfections, due to the wide variety of magnetic particle techniques available and permitted for this purpose.

However, in all cases, the magnetization requirements and the use of powders and suspensions given in with prEN ISO 9934-1:2000, prEN ISO 9934-2:1999 and prEN ISO 9934-3:1998 shall apply.

4.5 During the production testing of the end/bevel face, the level of magnetization shall be checked at regular intervals not exceeding four hours using, for example, a field strength meter, as appropriate, or alternatively a test piece containing either an artificial simulation of or a naturally occurring laminar imperfection on the end/bevel face where the manufacturer shall demonstrate the presence of a consistent indication from the imperfection.

4.6 When this test is used for the detection of imperfections other than laminar imperfections (see clause 1) the magnetization shall be applied in the direction essentially perpendicular to the orientation of the particular imperfection to be detected.

5 ACCEPTANCE

5.1 Any tube producing no indications or individual indications of laminar imperfections less than 6 mm in circumference on the end/bevel face at both ends of the tube shall be deemed to have passed the test.

5.2 Any tubes producing an individual indication from a laminar imperfection at either tube end equal to or greater than 6 mm in circumference shall be designated suspect.

5.3 For suspect tubes, the manufacturer may either reject the tube or re-machine the end/bevel face(s). In the latter case, the manufacturer shall ensure that as a result of the re-machining of the tube end(s) the laminar imperfection(s) detected has/have been removed. The manufacturer shall submit the re-machined end/bevel face(s) to a repeat test using the same magnetic particle technique as used in the original test.

NOTE: In order to facilitate determination of how far the laminar imperfection(s) detected on the end/bevel face(s) extend along the length of the tube from the tube end, the manufacturer may carry out an ultrasonic test in accordance with EN 10246-17 over the tube end zone.

6 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) statement of conformity;
d) product designation by grade and size;
e) type and details of the inspection technique.

ANNEX A
(informative)

Table A.1: Parts of EN 10246 - Non-destructive testing of steel tubes

Purpose of test	Title of part	Part No.	ISO ref.
Leak Tightness	Automatic electromagnetic testing of seamless and welded (except submerged arc-welded) ferromagnetic steel tubes for verification of hydraulic leak-tightness.	1	9302
	Automatic eddy current testing of seamless and welded (except submerged arc-welded) austenitic and austenitic-ferritic steel tubes for verification of hydraulic leak-tightness.	2	-
Longitudinal and/or Transverse Imperfections	Automatic eddy current testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of imperfections.	3	9304
	Automatic full peripheral magnetic transducer/flux leakage testing of seamless ferromagnetic steel tubes for the detection of transverse imperfections.	4	9598
	Automatic full peripheral magnetic transducer/flux leakage testing of seamless and welded (except submerged arc-welded) ferromagnetic steel tubes for the detection of longitudinal imperfections.	5	9402
	Automatic full peripheral ultrasonic testing of seamless steel tubes for the detection of transverse imperfections.	6	9305
	Automatic full peripheral ultrasonic testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of longitudinal imperfections.	7	9303
	Automatic ultrasonic testing of the weld seam of electric welded steel tubes for the detection of longitudinal imperfections.	8	9764
	Automatic ultrasonic testing of the weld seam of submerged arc-welded steel tubes for the detection of longitudinal and/or transverse imperfections.	9	9765
	Radiographic testing of the weld seam of automatic fusion arc welded steel tubes for the detection of imperfections.	10	12096
Surface Imperfections	Liquid penetrant testing of seamless and welded steel tubes for the detection of surface imperfections.	11	12095
	Magnetic particle inspection of seamless and welded ferromagnetic steel tubes for the detection of surface imperfections.	12	13665
Thickness	Automatic full peripheral ultrasonic thickness testing of seamless and welded (except submerged arc-welded) steel tubes.	13	10543
Laminar Imperfections	Automatic ultrasonic testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of laminar imperfections.	14	10124
	Automatic ultrasonic testing of strip/plate used in the manufacture of welded steel tubes for the detection of laminar imperfections.	15	12094
	Automatic ultrasonic testing of the areas adjacent to the weld seam of welded steel tubes for the detection of laminar imperfections.	16	13663
	Ultrasonic testing of the tube ends of seamless and welded steel tubes for the detection of laminar imperfections.	17	11496
	Magnetic particle inspection of the tube ends of seamless and welded ferromagnetic steel tubes for the detection of laminar imperfections.	18	13664

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