

Metallic materials — Tube — Drift expanding test

The European Standard EN 10234:1993 has the status of a
British Standard

UDC 669-462:620.163.22

Cooperating organizations

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United Kingdom	British Standards Institution

This British Standard, having been prepared under the direction of the Iron and Steel and the Non-ferrous Metals Standards Policy Committees, was published under the authority of the Standards Board and comes into effect on 15 May 1994

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National foreword

This British Standard has been prepared under the direction of the Iron and Steel and the Non-ferrous Metals Standards Policy Committees and is the English language version of EN 10234:1993 *Metallic materials — Tube — Drift expanding test*, published by the European Committee for Standardization (CEN). No British Standard is superseded.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 4, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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Descriptors: Metal tubes, mechanical tests, drift expanding tests

English version

Metallic materials — Tube — Drift expanding test

Matériaux métalliques — Tubes — Essai
d'évasement

Metallische Werkstoffe — Rohr —
Aufweitversuch

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

This European Standard has been prepared by sub-committee ECISS/TC 29, the Secretariat of which has been allocated to the United Kingdom (BSI).

No meeting of the sub-committee has been held but the following countries voted positively by the PQ-procedure on the acceptability of the reference document as a European Standard: Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom. No country voted negatively.

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 April 1994, and conflicting national standards shall be withdrawn at the latest by April 1994.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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Introduction

This standard is based on ISO 8493:1986 *Metallic materials — Tube — Drift expanding test* which has been editorially changed in the light of the comments received. Minor changes have been made to clause 6 “Test pieces”. The usage of symbols has been aligned with the requirements of ISO 3545-1:1989.

1 Scope

This European Standard specifies a method for determining the ability of metallic tubes of circular cross section to undergo plastic deformation by drift expansion.

It is intended that the standard should be applicable to tubes having an outside diameter not greater than 150 mm (100 mm for light metals) and thickness not greater than 10 mm. The range of the outside diameter or thickness for which this European Standard is applicable could be more exactly specified in the relevant product standard.

2 Normative reference

This European Standard 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 these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ISO 3545-1:1989, *Steel tubes and fittings — Symbols for use in specifications — Part 1: Tubes and tubular accessories with circular cross-section*.

3 Principle

Expanding the end of a test piece cut from a tube, by means of a conical mandrel, until the maximum outside diameter of the expanded tube reaches the value specified in the relevant product standard (see Figure 1).

4 Symbols, descriptions and units

Symbols, descriptions and units for the drift expanding test of tubes are in accordance with ISO 3545-1 and are given in Figure 1 and Table 1.

Table 1 — Symbols, descriptions and units

Symbol	Description	Unit
D	Original outside diameter of the tube	mm
T	Wall thickness of the tube	mm
L	Length of the test piece before the test	mm
C	Maximum outside diameter after testing	mm
β	Angle of the mandrel	degree

5 Testing equipment

5.1 The test shall be carried out in a variable-speed press or a universal testing machine.

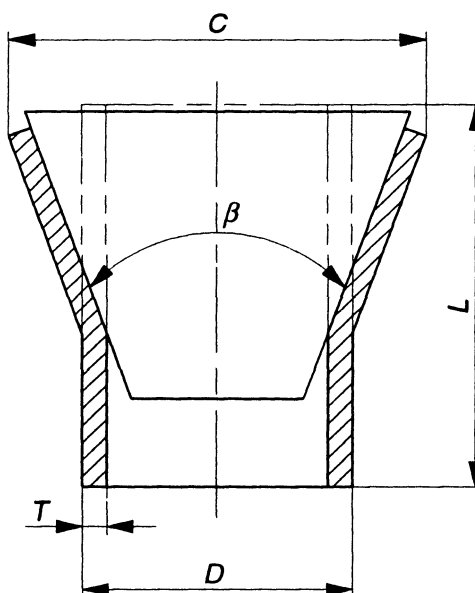


Figure 1 — Symbols for drift expanding test

5.2 The conical mandrel shall have an angle as specified in the relevant product standard and its surface shall be of sufficient hardness and polished. Preferred angles for the mandrel are 30°, 45° and 60°.

6 Test piece

6.1 The length of the test piece depends on the angle of the cone of the drift expansion mandrel. When this angle is equal to or less than 30°, the length of the test piece shall be approximately $L = 2D$. When this angle is greater than 30°, the length of the test piece shall be approximately $L = 1,5D$.

The test piece may be shorter provided that the remaining cylindrical part of the test piece after expansion is at least $0,5D$.

6.2 Both ends of the test piece shall be in a plane perpendicular to the axis of the tube. The edges of the end to be tested may be rounded by filing or chamfered by other methods.

NOTE Non-rounded or non-chamfered edges are permissible, if the test result meets the test requirements.

6.3 When welded tubes are subjected to the test, the internal weld flash may be removed.

7 Procedure

7.1 In general, the test shall be carried out at ambient temperature within the limits of 10 °C to 35 °C. The test carried out under controlled conditions shall be made at a temperature of (23 ± 5) °C.

7.2 Force the conical mandrel into the test piece without shock until the required outside diameter is reached. The axis of the mandrel shall be aligned with the axis of the tube.

The maximum outside diameter of the expanded part of the test piece C for relative expansion as a percentage of the diameter D shall be specified in the relevant product standard. The angle of the mandrel β may be specified in the relevant product standard.

When longitudinally welded tubes are subjected to the test, the mandrel may be provided with a groove to accommodate an internal weld flash.

7.3 The mandrel may be lubricated. It shall not rotate relative to the test piece during the test.

7.4 In case of dispute, the rate of penetration of the mandrel shall not exceed 50 mm/min.

7.5 Interpretation of the drift expanding test shall be carried out according to the requirements of the relevant product standard. When these requirements are not specified, absence of cracks visible without the use of magnifying aids shall be considered as evidence that the test piece passed the test. Slight premature failure at the edges shall not be considered cause for rejection.

8 Test report

8.1 A test report shall be provided when so specified in the relevant product standard.

8.2 The test report shall include at least the following information:

- a) reference to this European Standard;
- b) identification of the test piece;
- c) dimensions of the test piece;
- d) maximum outside diameter of the expanded part of the test piece C or relative expansion as a percentage of the original diameter;
- e) angle of the mandrel;
- f) result of the test.

National annex NA (informative)
Committees responsible

The United Kingdom participation in the preparation of this European Standard was entrusted by the Iron and Steel Standards Policy Committee (ISM/-) and the Non-ferrous Metals Standards Policy Committee (NFM/-) to Technical Committee ISM/NFM/4, upon which the following bodies were represented:

AEA Technology
Aluminium Federation
British Non-ferrous Metals Federation
British Railways Board
British Steel Industry
Copper Development Association
Department of Trade and Industry (National Measurement Accreditation Service)
Department of Trade and Industry (National Physical Laboratory)
ERA Technology Ltd.
GAMBICA (BEAMA Ltd.)
Institute of Materials
Light Metal Founders' Association
Ministry of Defence
Society of British Aerospace Companies Limited
University College London
Welding Institute

The following body was also represented in the drafting of the standard, through subcommittees and panels:

British Welded Steel Tube Association

BSI — British Standards Institution

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