

International Standard



8493

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Metallic materials — Tube — Drift expanding test

Matériaux métalliques — Tubes — Essai d'évasement

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8493 was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*.

It cancels and replaces ISO Recommendations R 166-1960, R 195-1961 and R 953-1969, of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Metallic materials — Tube — Drift expanding test

1 Scope and field of application

This International Standard specifies a method for determining the ability of metallic tubes of circular cross-section having an outside diameter not greater than 150 mm (100 mm for light metals) and thickness not greater than 10 mm to undergo plastic deformation in drift expansion. The range of the outside diameter or thickness for which this International Standard is applicable may be more exactly specified in the relevant standard.

2 Principle

Expanding the end of a tube, or 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 standard (see the figure).

3 Symbols, designations and units

Symbols, designations and units for the drift expanding test of tubes are given in the figure and the table.

Table — Symbols, designations and units

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

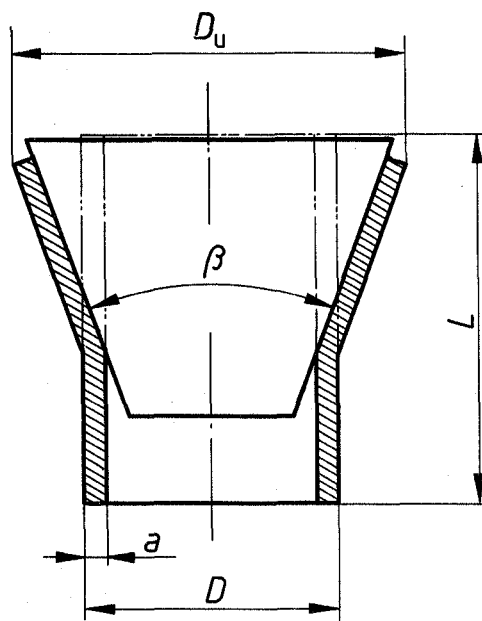


Figure — Symbols for drift expanding test

4 Testing equipment

4.1 The test shall be carried out in variable-speed presses or universal testing machines.

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

5 Test piece

5.1 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, if the tubes with a diameter of less than 20 mm are tested, provided that the remaining cylindrical part of the test piece after expansion is at least $0,5D$.

5.2 The end to be tested 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.

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

6 Procedure

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

6.2 Force the conical mandrel into the test piece without shock until the required outside diameter is reached.

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

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

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

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

6.5 Interpretation of the drift expanding test shall be carried out according to the requirements of the relevant 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.

7 Test report

The test report shall include at least the following information:

a) reference to this International 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 D_u or relative expansion as a percentage of the original diameter;

e) angle of the mandrel;

f) result of the test.

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