

INTERNATIONAL  
STANDARD

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8493

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**Metallic materials — Tube —  
Drift-expanding test**

*Matériaux métalliques — Tubes — Essai d'évasement*

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Reference number  
ISO 8493:1998(E)

## 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8493 was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 2, *Ductility testing*.

This second edition cancels and replaces the first edition (ISO 8493:1986), of which it constitutes a technical revision.

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International Organization for Standardization  
Case postale 56 • CH-1211 Genève 20 • Switzerland  
Internet iso@iso.ch

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# Metallic materials — Tube — Drift-expanding test

## 1 Scope

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

This International Standard is intended for tubes having an outside diameter no greater than 150 mm (100 mm for light metals) and a thickness no greater than 10 mm although the range of the outside diameter or the thickness for which this International Standard is applicable may be more exactly specified in the relevant product standard.

## 2 Symbols, designations and units

Symbols, designations and units for the drift-expanding test of tubes are given in table 1 and are shown in figure 1.

Table 1

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

<sup>a</sup> The symbol  $T$  is also used in steel tube standards.

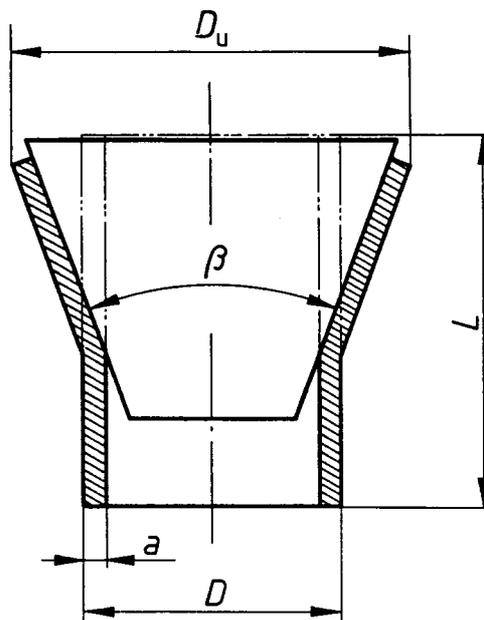


Figure 1

### 3 Principle

Expansion of the end of the test piece cut from the 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 Testing equipment

#### 4.1 Variable-speed press or universal testing machine.

**4.2 Conical mandrel**, which shall have an angle as specified in the relevant product standard and its surface shall be made of polished material of sufficient hardness.

Preferred angles for the conical 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 conical 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  $0,5D$ .

**5.2** Both ends of the test piece shall be in the 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.

**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 °C to 35 °C. The test carried out under controlled conditions shall be made at a temperature of  $23\text{ °C} \pm 5\text{ °C}$ .

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

The maximum outside diameter of the expanded part of the test piece,  $D_u$ , or relative expansion as a percentage of the original diameter,  $D$ , shall be specified in the relevant product standard. The angle of the conical mandrel,  $\beta$ , may be specified in the relevant product standard.

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

**6.3** The conical 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 conical mandrel shall not exceed 50 mm/min.

**6.5** Interpretation of the drift-expanding test shall be carried out in accordance with the requirements of the relevant product standard. When these requirements are not specified, the test piece shall be considered to have passed the test if no cracks are visible without the use of magnifying aids. Slight cracking at the edges shall not be considered cause for rejection.