

# International Standard



# 8494

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

## Metallic materials — Tube — Flanging test

*Matériaux métalliques — Tubes — Essai de rabatement de collerette*

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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 8494 was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*.

It cancels and replaces ISO Recommendation R 165-1960, of which it constitutes a technical revision.

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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 – Flanging 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 and wall thickness not greater than 10 mm to undergo plastic deformation during flange formation. The range of diameters or wall thicknesses for which this International Standard is applicable may be more exactly specified in the relevant standard.

### 2 Principle

Forming, on the end of a tube or on the end of a test piece cut from a tube, a flange in a plane perpendicular to the axis of the tube, until the external diameter of the flange reaches the value specified in the relevant standard.

### 3 Symbols, designations and units

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

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
$R$	Corner radius of the second forming tool	mm
$D_u$	Maximum outside diameter of the flange	mm
$\beta$	Angle of the first forming tool	degree

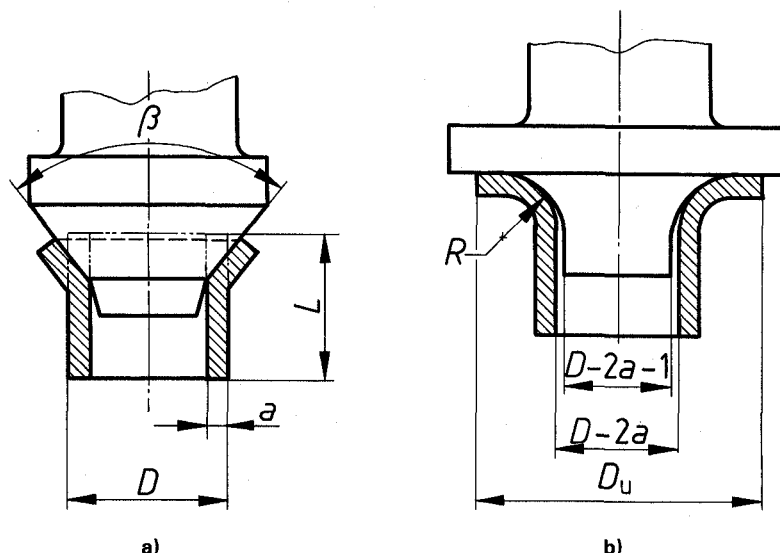


Figure – Symbols for flanging test

## 4 Testing equipment

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

4.2 The forming equipment shall consist of

- a) a conical tool having a suitable angle (generally  $90^\circ$ );
- b) a tool having
  - a cylindrical end of a diameter about 1 mm less than the inside diameter of the tube,
  - a flat concentric portion, perpendicular to the axis of the forming tool, and having a diameter not less than the required diameter of the flange.

4.3 The forming tools shall be made of polished material of sufficient hardness.

## 5 Test piece

5.1 If the test piece is removed from a tube, the length of the test piece  $L$  shall be such that the remaining cylindrical part of the test piece after flanging 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 welded 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  $35^\circ\text{C}$ . The test carried out under controlled conditions shall be made at a temperature of  $23 \pm 5^\circ\text{C}$ .

6.2 Preform the test piece by forcing the conical forming tool until the diameter of the drifted test pieces is such that a flange having the specified diameter can be formed [see figure a)].

6.3 Remove the conical forming tool and, if necessary, replace with the second forming tool [see figure b)].

6.4 Form the flange by applying axial force to the test piece until the drifted portion has formed a flange of the required diameter perpendicular to the axis of the test piece.

6.5 The forming mandrel may be lubricated. The tool shall not rotate relative to the test piece during the test.

6.6 In case of dispute, the rate of movement of the forming tools shall not exceed 50 mm/min.

6.7 The diameter of the flange and the radius  $R$  shall be as specified in the relevant standard.

6.8 Interpretation of the flanging 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) result of the test.