
धात्विक सामग्री — तार — रिवर्स बेंड
परीक्षण
(तीसरा पुनरीक्षण)

**Metallic Materials — Wire — Reverse
Bend Test**
(*Third Revision*)

ICS 77.040.10

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NATIONAL FOREWORD

This Indian Standard (Third Revision) which is identical to ISO 7801 : 1984 'Metallic materials — Wire — Reverse bend test' issued by the International Organization for Standardization (ISO), was adopted by the Bureau of Indian Standards on the recommendation of the Mechanical Testing of Metals Sectional Committee and approval of the Metallurgical Engineering Division Council.

This standard was first published in 1960 and subsequently revised in 1971 and 1985. The third revision of this standard has been undertaken to align with the latest version ISO 7801 : 1984 to harmonize it with the latest developments that have taken place at international level.

The text of ISO standard has been approved as suitable for publication as in Indian Standard without deviations. Certain terminologies and conventions are, however, not identical with those used in Indian Standard. Attention is especially drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, it should be read as 'Indian Standard'
- b) Comma (,) has been used as a decimal marker while in Indian Standards the current practice is to use a point (.) as the decimal marker.

In reporting the result of a test or analysis made in accordance with this standard, is to be rounded off, it shall be done in accordance with IS 2 : 2022 'Rules for rounding off numerical-values (*second revision*)'.

Indian Standard
METALLIC MATERIALS — WIRE — REVERSE BEND
TEST
(*Third Revision*)

1 Scope and field of application

This International Standard specifies the method for determining the ability of metallic wire of diameter or thickness 0,3 to 10 mm inclusive to undergo plastic deformation during reverse bending. The range of diameters or thicknesses for which this International Standard is applicable may be more exactly specified in the relevant product standard.

2 Principle

The reverse bend test consists of repeated bending, through 90° in opposite directions, of a test piece held at one end, each bend being over a cylindrical support of a specified radius.

3 Symbols and designations

Symbols and designations used in reverse bend testing of wires are specified in table 1 and shown in figure 1.

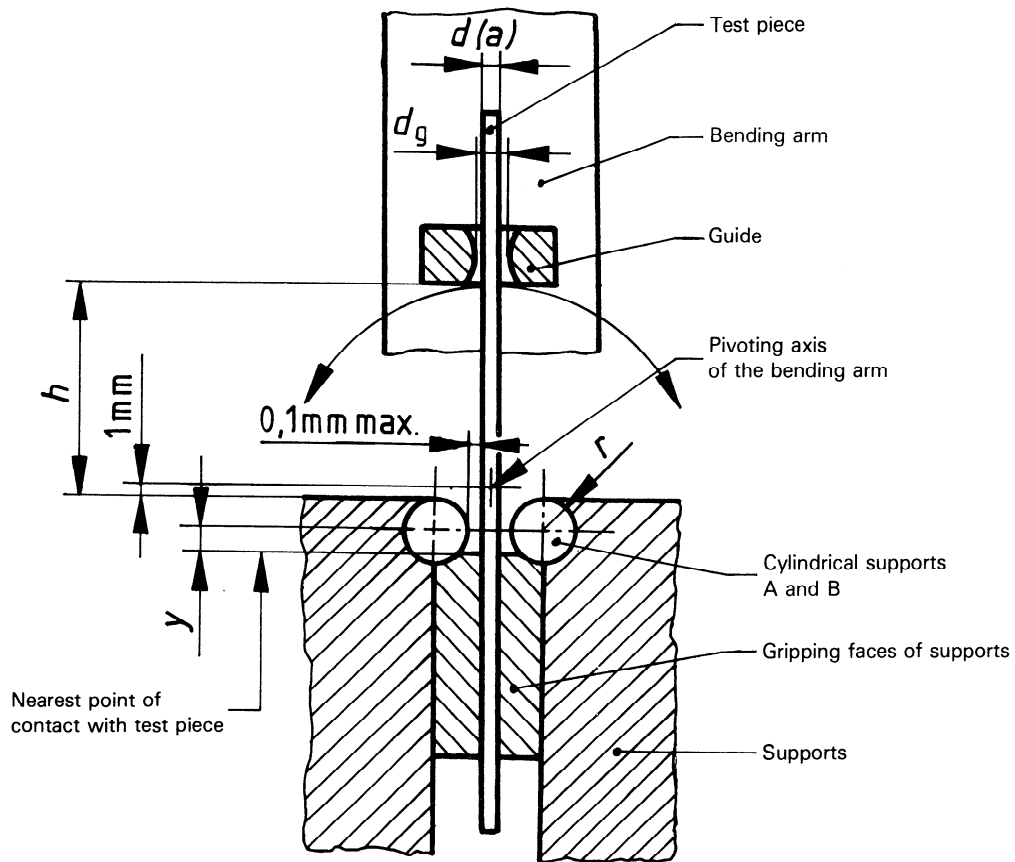


Figure 1

Table 1

Symbol	Designation	Unit
d	Diameter of round wire	mm
a	Minimum thickness of wire of non-circular section capable of being held between parallel grips (see figure 2)	mm
r	Radius of cylindrical supports	mm
h	Distance from the top tangential plane of cylindrical supports to the bottom face of guide	mm
d_g	Diameter of guide hole	mm
y	Distance from a plane, defined by the axes of the cylindrical supports, to the nearest point of contact with the test piece	mm
N_b	Number of reverse bends	—

4 Testing equipment

4.1 General

The testing machine shall be constructed so as to conform with the principles indicated in figure 1 and the essential dimensions given in table 2.

4.2 Cylindrical supports and gripping faces

4.2.1 The cylindrical supports and the gripping faces shall be of sufficient hardness (to provide rigidity and/or resistance to abrasion).

4.2.2 The radius of cylindrical support r shall not differ from its nominal dimension by more than the tolerance given in table 2.

4.2.3 The axes of the cylindrical supports shall be perpendicular to the plane of bend and shall be parallel and in the same plane to within 0,1 mm.

4.2.4 The gripping faces shall project slightly beyond the face of the cylindrical supports to a distance which does not exceed 0,1 mm, as measured by the clearance between the test piece and each cylindrical support on a line joining the centres of curvature.

4.2.5 The top edge of the gripping faces shall be below the centres of curvature of the cylindrical supports by a distance y of 1,5 mm for supports of radius equal to or less than 2,5 mm and by 3 mm for supports of larger radius. (If $r \leq 2,5$ mm, $y = 1,5$ mm; if $r > 2,5$ mm, $y = 3$ mm.)

4.3 Bending arm and guide

4.3.1 The distance of the pivoting axis of the bending arm from the top of the cylindrical supports shall be 1,0 mm for all sizes of supports.

4.3.2 The holes in the guide shall widen out at each end and have a diameter in accordance with table 2.

5 Test piece

5.1 The length of wire to be used as the test piece is to be as straight as possible, but it may exhibit slight curvature in the plane in which it will be bent during the test.

5.2 If straightening is necessary, it shall be done by hand or, if this is not possible, by hammering on a level surface of wood, plastic material or copper using a hammer of a similar material.

5.3 During straightening, the surface of the wire must not be damaged and the test piece must not be subjected to any twisting.

5.4 Wire with a localized sharp curvature shall not be straightened.

6 Procedure

6.1 In general, the test is carried out at ambient temperature between 10 and 35 °C. Tests carried out under controlled conditions shall be made at a temperature of 23 ± 5 °C.

6.2 The radius of the support r , the distance h , and the diameter of the hole d_g shall be selected according to the wire diameter as given in table 2.

6.3 Insert the test piece, with the bending arm vertical, through one of the holes in the guide as indicated in figure 1. Hold the lower end of the test piece between the grips so that

Table 2

Dimensions and tolerances in millimetres

Nominal diameter or thickness of wire $d (a)$	Radius of cylindrical support r	Distance h	Diameter of guide hole ¹⁾ d_g
$0,3 < d (a) < 0,5$	$1,25 \pm 0,05$	15	2,0
$0,5 < d (a) < 0,7$	$1,75 \pm 0,05$	15	2,0
$0,7 < d (a) < 1,0$	$2,5 \pm 0,1$	15	2,0
$1,0 < d (a) < 1,5$	$3,75 \pm 0,1$	20	2,0
$1,5 < d (a) < 2,0$	$5 \pm 0,1$	20	2,0 and 2,5
$2,0 < d (a) < 3,0$	$7,5 \pm 0,1$	25	2,5 and 3,5
$3,0 < d (a) < 4,0$	$10 \pm 0,1$	35	3,5 and 4,5
$4,0 < d (a) < 6,0$	$15 \pm 0,1$	50	4,5 and 7,0
$6,0 < d (a) < 8,0$	$20 \pm 0,1$	75	7,0 and 9,0
$8,0 < d (a) < 10,0$	$25 \pm 0,1$	100	9,0 and 11,0

1) Where appropriate, the smaller diameter of hole is to be used for the smaller nominal diameter of wire (see column 1) and the larger diameter of hole for the larger nominal diameter of wire (also see column 1). For diameters within ranges given in column 1, the appropriate size of hole is to be chosen to ensure free movement of the wire.

the test piece is perpendicular to the axes of the cylindrical supports.

NOTE — Non-circular test pieces are to be placed so that the greater dimension is parallel, or approximately parallel, to the gripping faces as shown in figure 2.

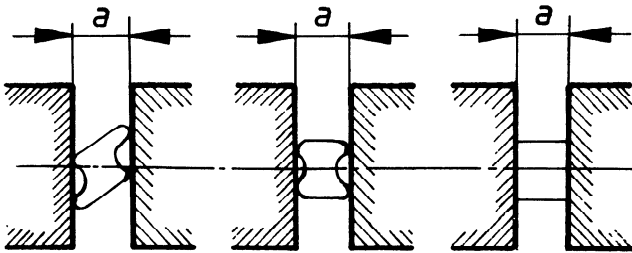


Figure 2

6.4 Bend the test piece through 90° alternately in opposite directions. One bend consists of bending the free end of the test piece through 90° and returning it to its original position. Make the following bend in the opposite direction as shown in figure 3. Do not interrupt the testing between successive bends.

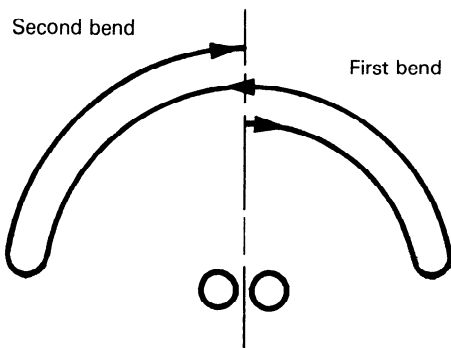


Figure 3

6.5 Bend at a uniform rate without shock, not exceeding one bend per second. If necessary, reduce the rate of bending to ensure that the heat generated does not affect the result of the test.

6.6 To ensure continuous contact between the test piece and the cylindrical supports during the test, some form of constraint may be applied. This may be in the form of a tensile stress not greater than 2 % of the value of the nominal tensile strength, unless otherwise specified in the relevant standard.

6.7 Continue the test until the number of bends specified in the relevant standard is completed, or cracking visible without the use of magnifying aids is seen to occur.

Alternatively, if specified in the relevant standard, continue the test until complete fracture of the test piece occurs.

6.8 The bend during which the failure of test piece occurs shall not be counted into the number of bends N_b .

7 Test report

The test report shall include the following information:

- reference to this International Standard;
- identification of the test piece (e.g. type of the material, cast number, etc.);
- nominal diameter d or minimum thickness a of the test piece;
- details regarding the preparation of the test piece (e.g. straightening);
- test conditions (e.g. radius r of the cylindrical supports, application of tensile stress);
- criterion for ending the test;
- test result.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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