International Standard 7799

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Metallic materials — Sheet and strip 3 mm thick or less — Reverse bend test

Matériaux métalliques — Tôles et feuillards d'épaisseur inférieure ou égale à 3 mm *— Essai de pliage alterné*

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Foreword

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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 7799 was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*.

It cancels and replaces ISO Recommendation R 88-1959, of which it constitutes a technical revision.

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Metallic materials — Sheet and strip 3 mm thick or less — Reverse bend test

1 Scope and field of application

This International Standard specifies the method for determining the ability of sheet and strip from metallic materials 3 mm thick or less to undergo plastic deformation in reverse bending.

This method can be applied to aluminium and its alloys only after previous agreement.

2 Principle

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

3 Symbols and designations

Symbols and designations used in the reverse bend test are shown in figure 1 and specified in table 1.

Table 1

Symbol	Designation	Unit
a	Thickness of test piece	mm
r	Radius of cylindrical supports	mm
h	Distance from top tangential plane of cylindrical supports to the bottom face of guide	mm
y	Distance from a plane defined by the axes of cylindrical supports and 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.

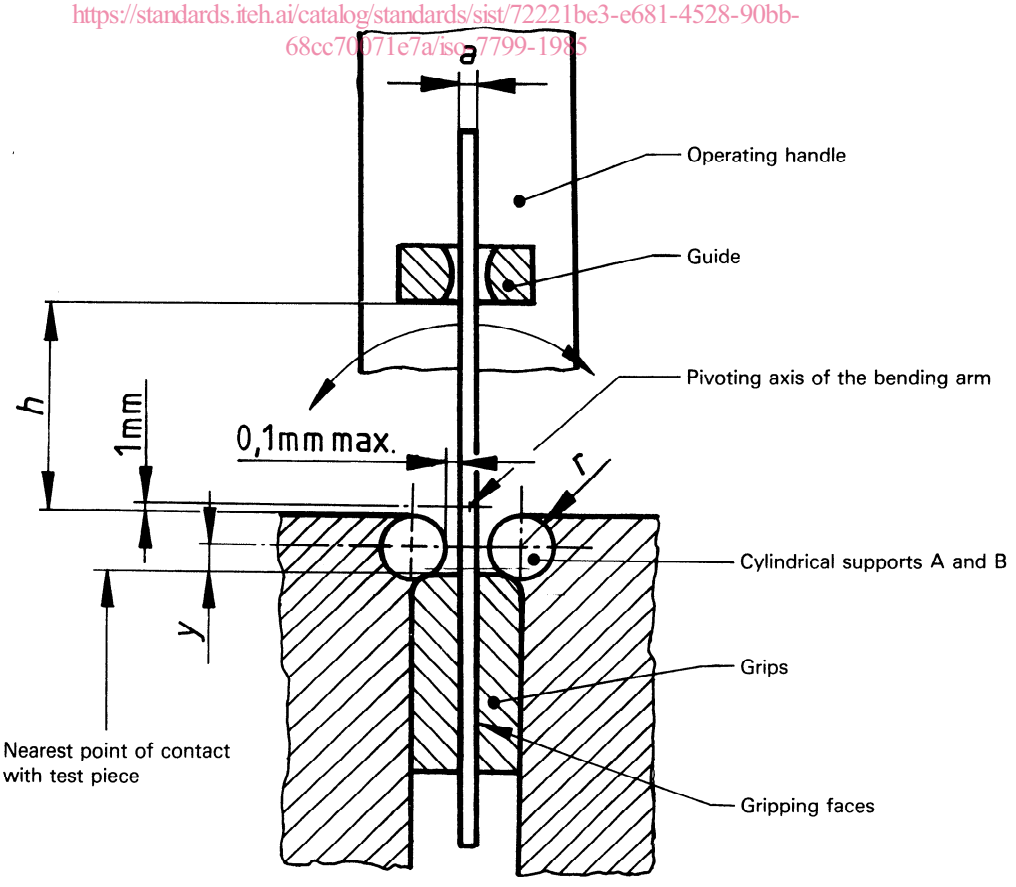

Figure 1

4.2 Cylindrical supports and grips

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

4.2.2 The radius r of the cylindrical supports shall be as specified in the relevant International Standards. If not specified, the radius given in table 2 shall be used.

Table 2

Values in millimetres

Thickness of specimen a	Radius of cylindrical support r
$a \leqslant 0{,}3$	1,0 ± 0,1
$0{,}3 < a \leqslant 0{,}5$	2,5 ± 0,1
$0{,}5 < a \leqslant 1{,}0$	5,0 ± 0,1
$1{,}0 < a \leqslant 1{,}5$	7,5 ± 0,2
$1{,}5 < a \leqslant 3{,}0$	10,0 ± 0,2

4.2.3 The axes of the cylindrical supports shall be perpendicular to the plane of bending 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 grips 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 $r \leqslant 2{,}5$ mm, $y = 1{,}5$ mm; if $r > 2{,}5$ mm, $y = 3$ mm.)

4.2.6 The distance h from the bottom of the guide to the top of the cylindrical supports shall be between 25 and 50 mm.

4.3 Bending arm

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.

5 Test piece

5.1 The thickness of the test piece shall be that of the sheet or strip from which the sample is taken, the surfaces remaining intact.

5.2 The width of the machined test piece shall be between 20 and 25 mm. Strip material of a smaller width may be tested in the full width.

5.3 The test piece shall be prepared so that the effect of heating and mechanical strengthening is minimized. The surfaces shall be free of cracks and marks, and the edges shall be free of burrs.

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 Clamp the lower end of the test piece between the grips in a position as shown in figure 1 with the upper end protruding through the guide slot. Then 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 2. Do not interrupt the testing between successive bends.

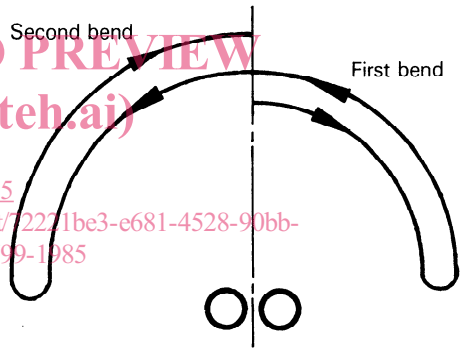

Figure 2

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

6.4 To ensure continuous contact between the test piece and the blocks 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.

6.5 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.

6.6 The bend during which 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:

a) reference to this International Standard;

b) data identifying the test piece (direction of the test piece axis relative to the product);

c) dimensions of the test piece;

d) test conditions (radius r of cylindrical supports, distance h, application of tensile stress if the case);

e) criterion for ending the test;

f) results of the test.

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