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IS 1598 (1977): Method for Izod Impact Test of Metals [MTD
3: Mechanical Testing of Metals]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS : 1598 - 1977

Indian Standard
METHOD FOR
IZOD IMPACT TEST OF METALS
(First Revision)

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Indian Standard

METHOD FOR IZOD IMPACT TEST OF METALS

(First Revision)

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Indian Standard
METHOD FOR
IZOD IMPACT TEST OF METALS
(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 12 December 1977, after the draft finalized by the Methods of Physical Tests Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard was first published in 1960. It was taken up for review by the Committee and consequently the revised standard has been prepared incorporating the following major modifications:

- a) The scope of the standard has been modified to include all metals, and
- b) Separate machining tolerances for non-ferrous test-pieces have been specified.

0.3 In the preparation of this standard, assistance has been derived from the following publications:

ISO/R 84-1959(E) Izod impact test for steel. International Organization for Standardization

BS 131: Part 1:1961 Methods for notched bar tests, Part 1 The Izod impact test on metals. British Standards Institution.

0.4 In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard prescribes the method of conducting Izod impact test on metals.

*Rules for rounding off numerical values (*revised*).

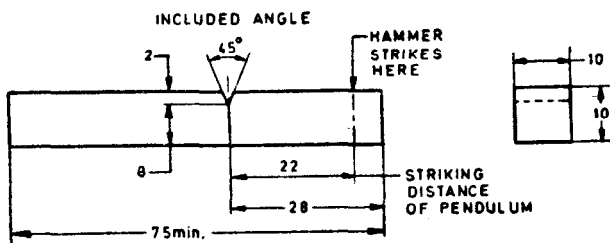
2. PRINCIPLE OF TEST

2.1 The test consists of breaking by one blow from a swinging hammer, under specified conditions, a notched test piece, gripped vertically with the bottom of the notch in the same plane as the upper face of the grips. The blow is struck at a fixed position on the face having the notch. The energy absorbed is determined.

3. TEST PIECES

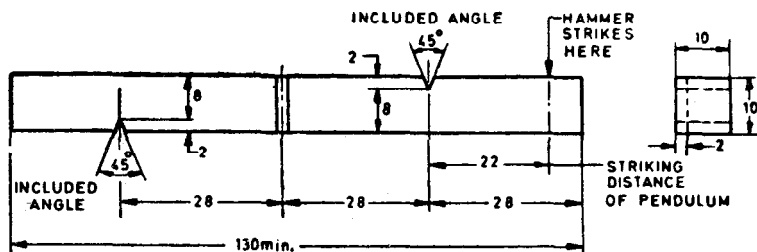
3.1 The test piece shall be of either square or round section.

3.1.1 The test piece shall conform to the dimensions given in Fig. 1, 2 and 3 for square test pieces and Fig. 5, 6 and 7 for round test pieces.



All dimensions in millimetres.

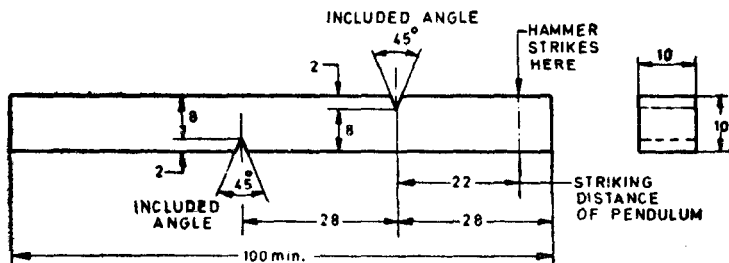
FIG. 1 SINGLE-NOTCH SQUARE TEST PIECE



All dimensions in millimetres.

FIG. 2 THREE-NOTCH SQUARE TEST PIECE

3.1.2 In each case the plane of symmetry of the notch shall be perpendicular to the longitudinal axis of the test piece. The surface of the specimen shall be smooth and free from grooves running parallel to the plane of symmetry of the notch.

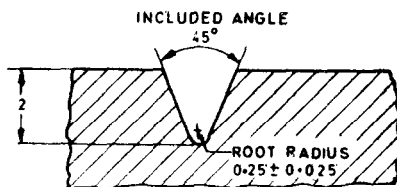


All dimensions in millimetres.

FIG. 3 TWO-NOTCH SQUARE TEST PIECE

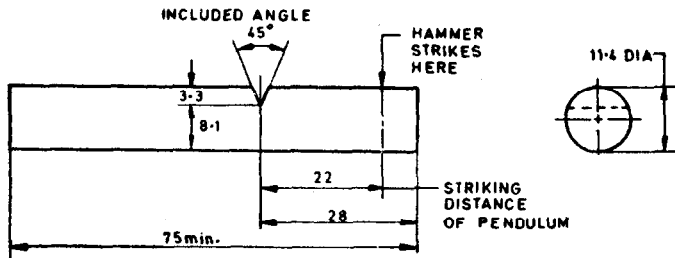
3.1.3 The notch shall be of V-form having an included angle of 45° . The notch may be made by any machining method. The notch shall be carefully prepared so that no groove appears at the base of the notch.

3.2 Square Test Pieces — The notch shall be 2 mm deep with a root radius of 0.25 mm (see Fig. 4).



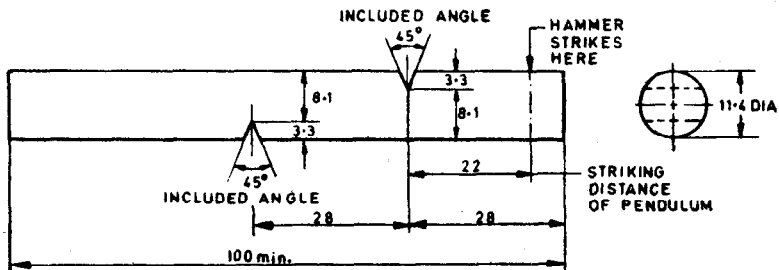
All dimensions in millimetres.

FIG. 4 ENLARGED VIEW OF NOTCH FOR SQUARE TEST PIECE



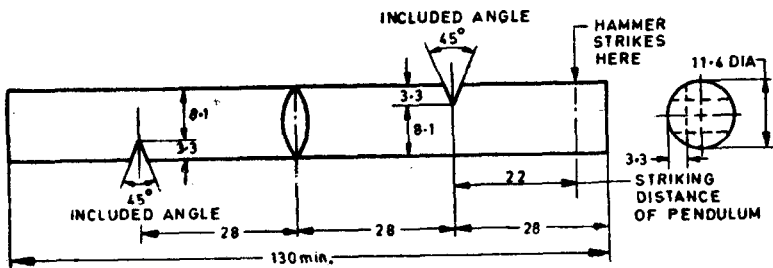
All dimensions in millimetres.

FIG. 5 SINGLE-NOTCH ROUND TEST PIECE



All dimensions in millimetres.

FIG. 6 TWO-NOTCH ROUND TEST PIECE



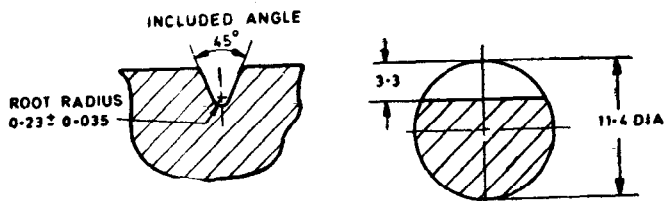
All dimensions in millimetres.

FIG. 7 THREE-NOTCH ROUND TEST PIECE

3.2.1 The following machining tolerances on the specified dimensions shall be permitted:

Item	Nominal Dimension	Machining Tolerance	
		Ferrous Test Piece	Non-ferrous Test Piece
Length:			
Single notch	75 mm, <i>Min</i>		
Two notch	100 mm, <i>Min</i>		
Three notch	130 mm, <i>Min</i>		
Thickness	10 mm	± 0.11 mm	± 0.05 mm
Width	10 mm	± 0.11 mm	± 0.05 mm
Angle of notch	45°	$\pm 2^\circ$	$\pm 1^\circ$
Root radius of notch	0.25 mm	± 0.025 mm	± 0.025 mm
Depth below notch	8 mm	± 0.045 mm	± 0.025 mm
Distance of notch from end of test piece and from adjacent notch	28 mm	± 0.42 mm	± 0.42 mm
Angle between plane of symmetry of notch and the axis of the test piece	90°	$\pm 2^\circ$	$\pm 1^\circ$

3.3 Round Test Pieces — The notch shall be 3.30 mm deep at the position of its maximum depth in the specimen. It shall have a root radius of 0.25 mm (see Fig. 8).



All dimensions in millimetres.

FIG. 8 ENLARGED SECTION OF NOTCH FOR ROUND TEST PIECE

3.3.1 The following machining tolerances on the specified dimensions shall be permitted:

Item	Nominal Dimension	Machining Tolerance	
		Ferrous Test Piece	Non-ferrous Test Piece
Length:			
Single notch	75 mm, <i>Min</i>	—	—
Two notch	100 mm, <i>Min</i>	—	—
Three notch	130 mm, <i>Min</i>	—	—
Diameter	1.4 mm	± 0.14 mm	± 0.07 mm
Angle of notch	45°	$\pm 2^\circ$	$\pm 1^\circ$
Depth below notch	8.1 mm	± 0.045 mm	± 0.025 mm
Root radius of notch	0.25 mm	± 0.025 mm	± 0.025 mm
Distance of notch from end of test piece and from adjacent notch	28 mm	± 0.5 mm	± 0.05 mm
Angle between plane of symmetry of notch and axis of the test piece	90°	$\pm 2^\circ$	$\pm 1^\circ$

4. TESTING MACHINE

4.1 The testing machine shall be of rigid construction and installation.

4.1.1 The following conditions shall be satisfied:

Details

Distance between base of notch (top of grips) and point of specimen hit by the hammer (<i>L</i> of Fig. 9)	22 mm \pm 0.5 mm
Angle between top face of grips and face holding the specimen vertical	90° \pm 1°
Angle at tip of hammer	75° \pm 1°
Angle between normal to the specimen and the underside face of the hammer at striking point	10° \pm 1°
Speed of hammer at impact	3 to 4 m/s
Striking energy	165.6 \pm 3.4 J

4.1.1.1 Testing machines with different striking energies, with an accuracy of ± 2 percent are permitted, particularly where lower capacities shall provide better discrimination with materials of low energy absorption. When recording the energy absorbed, the striking energy of the machine shall also be indicated.

4.1.2 The weight of the anvil and its foundation shall be at least 40 times the weight of the hammer.

4.1.3 The plane of swing of the hammer shall be perpendicular to the Izod vice within 3 in 1 000.

4.1.4 The radius of the centre of percussion about the axis of rotation shall be equal to the radius of the striker about this axis within a tolerance of ± 1 percent.

4.1.5 The machine shall be verified in accordance with IS : 3766-1977* and shall satisfy the relevant requirements of that standard.

4.1.6 The machine shall also satisfy the conditions stated in Fig. 9 and 10.

5. TEST REQUIREMENTS

5.1 The longitudinal axis of the test piece shall lie in the plane of swing of the centre of gravity of the hammer.

5.2 The notch shall be positioned so that its plane of symmetry coincides with the top face of the grips.

5.3 The notch shall be at right angles to the plane of swing of the centre of gravity of the hammer. This is ensured by form of the test pieces and method of grip.

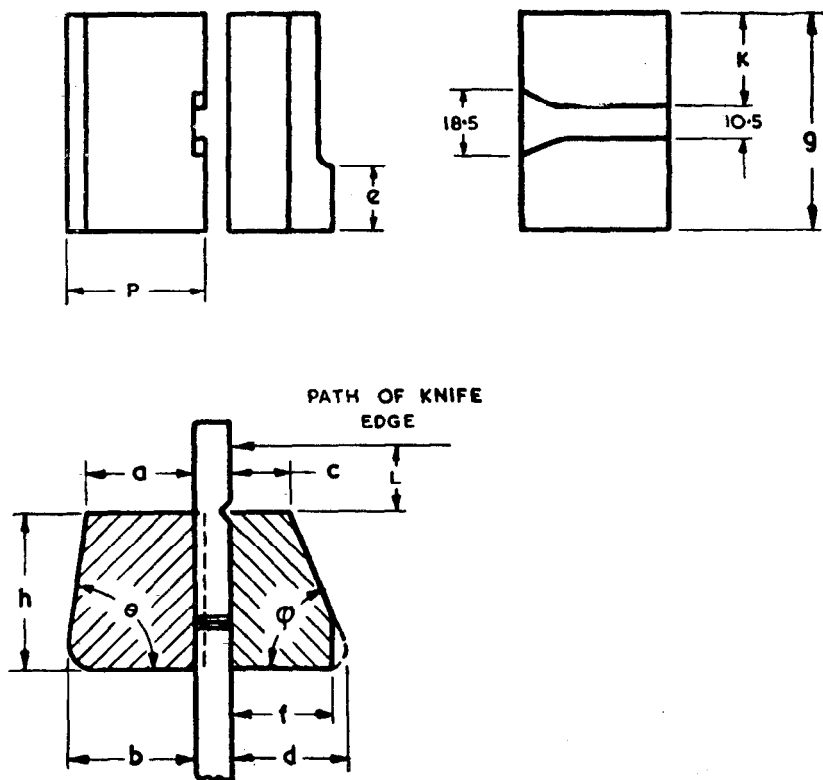
5.3.1 The test piece shall be gripped tightly in the anvil grips.

5.4 During testing of the two- and three-notch test pieces the material remaining for testing after each test shall be examined to ensure that the correct length of test piece is available above the next notch and any undesirable deformed metal shall be removed to ensure that the form and length of the test piece are correct before further testing.

5.5 Unless otherwise stated in the relevant material specification, an impact test shall consist of three specimens taken from a single test coupon or test location, the average value of which shall comply with the specified minimum, but in no case below either two-thirds of the specified minimum or 7 Joules whichever is greater. If more than one value is below the specified minimum, or if one value is below the

*Calibration of pendulum impact testing machines for testing metals (*first revision*).

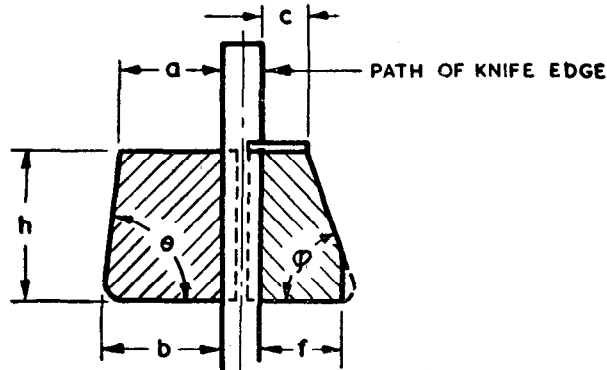
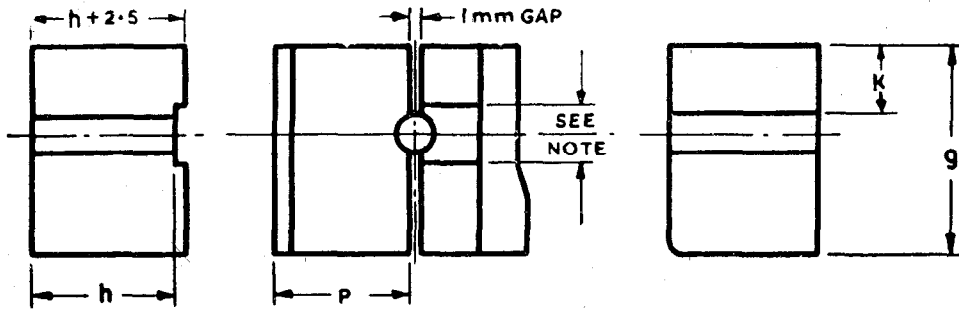
greater of 7 Joules or two-thirds of the specified minimum, a retest of three additional specimens shall be made, each of which should have a value equal to or exceeding the specified minimum.



NOTE — Dimensions a , b , c , d , e , f , g , k , and the angle θ should be obtained from the actual grips in the machine, the dimension h should be checked and, if necessary, corrected to make L equal to 22 mm.

All dimensions in millimetres.

FIG. 9 VIEW OF GRIPS AND MODE OF ASSEMBLY FOR TESTING SQUARE SPECIMEN



Note - See note under Fig. 9 for dimensions a , b , c , etc. Slot for gauge for setting test piece notch parallel to knife edge and level with top of vice.

All dimensions in millimetres.

FIG. 10 VIEW OF GRIPS AND MODE OF ASSEMBLY FOR TESTING ROUND SPECIMEN

5.5.1 The impact value shall be quoted in joules.

5.6 The temperature of the test piece at the moment of breaking shall not differ from the specified temperature by more than $\pm 2^{\circ}\text{C}$ unless some other tolerance is agreed. If the temperature of testing is not specified, it shall be taken as 27°C subject to the above tolerance. In all cases, the temperature of test shall be recorded.

NOTE — In view of the difficulties of carrying out the Izod test at other than ambient temperatures, it is recommended that charpy V-notch test be used for testing at sub-ambient and elevated temperatures.

5.7 If, during the test, the test piece is not completely broken, the impact value obtained is indefinite. The test report should state that the test piece was unbroken by joules.