BRITISH STANDARD

BS 131-1: 1961

Incorporating Amendment Nos. 1 and 2

CONFIRMED JANUARY 1982

Methods for

Notched bar tests —

Part 1: The izod impact test on metals

UDC 620.178.746

Co-operating organizations

The Mechanical Engineering Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

Admiralty*
Air Ministry
Associated Offices' Technical Committee
Association of Consulting Engineers (Incorporated)
British Chemical Plant Manufacturers Association
British Compressed Air Society
British Electrical and Allied Manufacturers' Association*
British Engineers' Association
British Gear Manufacturers' Association
British Internal Combustion Engine Manufacturers' Association
British Iron and Steel Federation*
British Railways, the British Transport Commission
Crown Agents for Oversea Governments and Administrations
D.S.I.R.—National Engineering Laboratory*
Electricity Council, The Generating Board and the Area Boards in England and Wales
Engineering Equipment Users' Association
Gas Council
High Commission of India
Institute of Marine Engineers
Institute of Petroleum
Institution of Civil Engineers
Institution of Gas Engineers
Institution of Heating and Ventilating Engineers
Institution of Mechanical Engineers*
Institution of Mechanical Engineers (Automobile Division)
Institution of Production Engineers*
Locomotive and Allied Manufacturers' Association of Great Britain
Machine Tool Trades Association
Ministry of Labour (Factory Inspectorate)
Ministry of Power
Ministry of Transport
Ministry of Works
National Coal Board
National Physical Laboratory (D.S.I.R.)*
Radio Industry Council
War Office*

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the Committee entrusted with the preparation of this standard:

Alloy Steels Association
Aluminium Development Association
Aluminium Industry Council
Association of British Chemical Manufacturers
British Cast Iron Research Association
British Constructional Steelwork Association
British Iron and Steel Research Association
British Non-ferrous Metals Research Association
British Welding Research Association
Council of British Manufacturers of Petroleum Equipment
D.S.I.R.—Building Research Station
D.S.I.R.—Forest Products Laboratory
Institute of Welding
Institution of Engineering Inspection
Lloyd's Register of Shipping
Ministry of Aviation
Testing Houses
Testing Machine Manufacturers and Individual Firms

This British Standard, having been approved by the Mechanical Engineering Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 30th May, 1961.

First published August, 1920
First revision, August, 1933
Second revision, May, 1961

The following BSI references relate to the work on this standard:
Committee reference ISM/NFM/4
Draft for comment A(MEE) 9391

ISBN 0 580 00761 8

Amendments issued since publication

Amd. No.	Date	Comments
(PD 4651)	September 1962	
5069	March 1986	Indicated by a sideline in the margin

Contents

Foreword

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 9,000, fully indexed and with a note of the contents of each, will be found in the BSI Catalogue which may be purchased from BSI Sales Department. The Catalogue may be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standard:

BS 131-2, *Charpy V-notch impact test on metals.*

This British Standard which states the requirements for the Izod Impact Test on metals is published as Part 1 of a revision of BS 131. Part 2 previously published gives the requirements for the Charpy V-notch test.

The work of Technical Committee 17, "Steel", of the International Organization for Standardization (ISO) has been taken into account in preparing the standard and the square section and circular section straight notch test pieces are in accordance with ISO Recommendation R84. The scope has also been widened to include details of the method of test together with structural and dimensional requirements for testing machines.

Dimensions with appropriate machining tolerances are given for standard 10 mm square section and standard circular section test pieces. The use of the curved notch circular section test piece is not preferred, but at the request of the steel industry the form and dimensions of this test piece are given in an Appendix.

After due consideration of the requirements of certain sections of industry for subsidiary test pieces of cross-section smaller than 10 mm × 10 mm, it has been decided to omit the two given in the 1933 revision of the standard, and to introduce in an appendix two new subsidiary test pieces having dimensions of 10 mm × 7.5 mm and 10 mm × 5 mm with the notch cut in a narrow face. These are intended for use only when it is impossible to obtain a standard test piece from the material available. It should be noted that no trustworthy relationship has been found between the energies absorbed in breaking test pieces of different sizes and only results of test pieces of identical dimensions should be compared.

In this standard no reference is made to the number of tests required for particular applications as this is regarded as part of the specification for the material.

It should also be noted that no reliable relationship has been found between different types of impact test, and conversions from Izod impact test results to Charpy V-notch or Charpy U-notch values are not recommended.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 16 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies the conditions for carrying out the Izod impact test on metals. The test consists of measuring the energy absorbed in breaking a notched test piece by one blow from a striker carried by a pendulum. The test piece is gripped vertically with the root of the notch in the same plane as the upper face of the grips. The blow is struck on the same face as the notch and at a fixed height above it.

2 Form and dimensions of test piece

The standard test pieces shall have dimensions and tolerances in accordance with Table 1 or Table 2 and shall conform to the appropriate figures as follows:

a) *Test pieces with square section* (10 mm × 10 mm).

Figure 1 With single notch.

Figure 2 With two notches.

Figure 3 With three notches.

b) *Test pieces with circular section* (0.45 inch diameter).

Figure 5 With single straight notch.

Figure 6 With two straight notches.

Figure 7 With three straight notches.

Where more than one notch is cut in a test piece the notches shall be spaced as shown in Table 1 or Table 2. The notches shall be cut around the test pieces as shown in Figure 2, Figure 3, Figure 6 and Figure 7 unless otherwise required by the material specification.

The plane of symmetry of the notch shall be perpendicular to the longitudinal axis of the test piece, i.e. the direction of the notch shall be at right angles to the longitudinal axis of the test piece and the plane of symmetry of the notch shall be at right angles to the face in which it is cut.

Dimensions and tolerances for curved notch circular section test pieces are given in Appendix B, and those for rectangular section subsidiary test pieces in Appendix C.

3 Preparation of test piece

The schedule of operations for producing a test piece will in general be a matter for the specification of the material being tested.

Details of the notches are given in Figure 4 and Figure 8.

Unless a particular method of preparing the notch is specified in the standard for the material, it may be cut by any machining method provided that a smooth contour of the specified form is produced. Attention is drawn to the fact that the impact properties of some materials are affected by the method employed.

4 Testing machine

The testing machine shall be constructed and installed steady and rigid (see Appendix A).

The following conditions shall be satisfied (see Figure 9)

Distance between plane of symmetry of notch and line of contact between test piece and striker	22 ± 0.5 mm
Angle at tip of striker	75 ± 1°
Radius at tip of striker	0.5 – 1.0 mm
Angle between face of test piece and striker-side face of striker	100 ± 1°
Speed of striker at instant of impact	3 – 4 m/s (9.8 – 13.1 ft/s)

The plane of swing of the striker shall be vertical. The machine shall be so constructed that the loss of energy (such as from translation, rotation or vibration) in the machine framework during a test is negligible. 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 per cent.

5 Striking energy

In general a machine of 120 ft lb (16.6 kg m) capacity will be found adequate for most materials. Smaller machines of 20 ft lb or 60 ft lb (2.76 or 8.3 kg m) will provide better discrimination with materials of very low energy absorption.

When recording the energy absorbed the capacity of the machine shall also be indicated (see Clause **8**).