

Australian Standard[®]

Methods for impact tests on metals

**Part 4: Calibration of the testing
machine**

This Australian Standard was prepared by Committee MT/6, Mechanical Testing of Metals. It was approved on behalf of the Council of Standards Australia on 13 January 1989 and published on 12 May 1989.

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Aluminium Development Council
Bureau of Steel Manufacturers of Australia
CSIRO, Division of Applied Physics
Confederation of Australian Industry
Department of Defence
Federal Chamber of Automotive Industries
Metal Trades Industry Association of Australia
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**Part 4: Calibration of the testing
machine**

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PREFACE

This Standard was prepared under the direction of Standards Australia's Committee on Mechanical Testing of Metals to supersede AS 1544.4 — 1980.

This Standard is one in the AS 1544 series of Standards covering impact testing of metals. Others in the series are as follows:

AS

1544.1 *Izod*

1544.2 *Charpy V-notch*

1544.3 *Charpy U-notch and keyhole notch*

1544.5 *Assessment of fracture surface appearance*

This edition introduces a requirement for verification of the calibration procedure by dynamic testing of standardized test pieces. These test pieces are obtained from sources which are nationally recognized. The principal known recognized source is the USA through ASTM, although standardized test pieces are becoming more widely available from other countries.

These verification requirements are not as stringent as those in ASTM E23, *Methods for notched bar impact testing of metallic materials*, and it is expected that this situation will be reconsidered in the next revision.

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FOREWORD

The satisfactory operation of a pendulum impact testing machine is dependent on factors which include the design, the foundation, the accuracy of construction of machine components, the degree of wear, and the friction-free movement of the pendulum.

During a test, all the absorbed energy indicated by the machine is attributed to the fracturing of the test piece. However, it is known that there are other mechanisms by which small amounts of energy may be absorbed. It is suspected that items such as test piece supports, the machine foundation and frame work, the pendulum and striker, ejection and drag of the broken test piece cause some degree of energy absorption. This energy is not determined, as suitable methods and apparatus have not yet been developed for measuring energy absorption by these individual items.

STANDARDS AUSTRALIA

Australian Standard
Methods for impact tests on metals

Part 4: Calibration of the testing machine

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard sets out methods for the static calibration of the energy-measuring system of machines used for impact tests on metals in accordance with AS 1544, Parts 1, 2 and 3, and specifies additional dynamic verification requirements applying to Charpy machines. It deals with complete calibration and with partial calibration of the machines.

This Standard applies to testing machines which indicate in terms of the SI unit of energy, the joule (J), and also to machines which use other units.

1.2 REFERENCED DOCUMENTS. The following documents are referred to in this Standard:

AS	
1544	Methods for impact tests on metals
1544.1	Part 1: Izod
1544.2	Part 2: Charpy V-notch
1544.3	Part 3: Charpy U-notch and keyhole notch
ASTM	
E23	Methods for notched bar impact testing of metallic materials

1.3 DEFINITIONS. For the purpose of this Standard, the definitions given in AS 1544, Parts 1, 2 and 3 and those below apply.

1.3.1 Calibrating authority—any approved person or organization qualified and equipped to perform the tests set out in Section 2 or Section 3, or both.

NOTE: There are organizations registered with the National Association of Testing Authorities, Australia, for performing calibrations in accordance with this Standard.

1.3.2 Calibration—all the operations for the purpose of determining the compliance of the machine with the requirements of this Standard.

1.3.3 Centre of percussion—that point in a pendulum at which a blow, delivered in a tangential direction, will cause no reaction at the centre of rotation.

1.3.4 Initial potential energy—the energy theoretically available in a pendulum-type impact testing machine when the pendulum is returned from its striking position to its initial release position.

1.3.5 Length of pendulum—the distance from the axis of rotation of the pendulum to the impact point of the pendulum, on a standard test piece.

1.3.6 Point of impact—the midpoint of the line of contact between the striking edge and the test piece.

1.3.7 Secondary standard test pieces—Charpy test pieces having an assigned impact value, which value has been obtained from tests performed upon a verified testing machine.

1.3.8 Standardized test pieces—Charpy test pieces from a nationally recognized source which have certified impact values for testing machine verification purposes.

1.3.9 Striking energy—the kinetic energy of the pendulum of the testing machine at the instant of impact.

1.3.10 Striking velocity—the linear velocity of the striking edge at the instant of impact.

1.3.11 Verification—the proving of calibration procedures by testing of standardized test pieces.

1.4 NOTATION. The quantity symbols used in this Standard are listed in Table 1.

1.5 TESTING MACHINE. Details of Izod and Charpy testing machine construction are shown in Figures 1.1, 1.2, 1.3 and 1.4. Dimensions for calculations are shown in Figure 1.5.

NOTE: In most impact machines the struck face of the test piece is vertically below the axis of rotation. However, in some machines the test piece supports are advanced so that impact occurs before the pendulum is at the bottom of its swing. In this case the support surfaces are tilted by the amount of the angular advance. In other machines, the long axis of the test piece, and not the struck face, is vertically below the axis of rotation. There is no evidence that either variation affects the results obtained on the machine. Clauses 2.7.2, 2.8, 2.12 and 2.14 should be interpreted to take account of these variations.

1.6 REQUIREMENTS FOR GAUGES. Gauges used for checking machine components shall comply with the requirements, in Appendix A, of either Table A1 for Charpy machines or Table A2 for Izod machines.