Australian Standard®

Methods for impact tests on plastics

Part 3: Calibration of the testing machine

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CSIRO — Division of Building, Construction and Engineering
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PREFACE

This Standard was prepared by the Standards Australia's Committee on Mechanical Testing of Plastics under the direction of the Plastics Standards Board, to supersede the 1972 edition.

This Standard is one in the AS 1146 series of Standards covering impact testing of plastics. Others in the series are as follows:

AS	
1146	*Methods for impact tests on plastics*
1146.1	Part 1: *Izod impact resistance*
1146.2	Part 2: *Charpy impact resistance*

This edition is technically equivalent to the superseded edition; its presentation has been changed and it is now comparable with AS 1544.4, *Methods for impact tests on metals*, Part 4: *Calibration of the testing machine.*

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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 within the machine which absorb small amounts of energy; the test piece supports, the machine foundation and frame work, the pendulum and striker, ejection and drag of the broken test piece all 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.

Pendulum impact testing machines, used for testing plastics, commonly have impact energies in the range 1.35 J to 22.0 J, with a velocity at impact of 3.5 m/s.

STANDARDS AUSTRALIA

Australian Standard
Method for impact tests on plastics

Part 3—Calibration of the testing machine

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard sets out methods for the calibration of both Izod and Charpy machines used for impact tests on plastics in accordance with AS 1146.1 and AS 1146.2. Requirements and procedures are given for both complete calibration and partial calibration of the machines.

NOTE: Attention is drawn to the fact that although a machine may have been verified, the verification can be invalidated by the effects of normal wear of the working parts. The procedure set out in Clause 2.2 of this Standard can be used for the purpose of regular inspection of the machine to ensure that it remains in good condition.

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

AS
1146 Methods for impact tests on plastics
1146.1 Part 1: Izod impact resistance
1146.2 Part 2: Charpy impact resistance

1.3 DEFINITIONS. For the purpose of this Standard, the definitions given in AS 1146.1 and AS 1146.2, and those below apply.

1.3.1 Calibrating authority—any approved person or organization qualified and equipped to perform the test 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 below:

Quantity symbol	Term	Unit symbol	Text Reference
A	Nominal initial potential energy	J	Clauses 2.6.1, 2.12, 2.13
A_v	Absorbed energy	J	Clause 2.13
$A_{v,1}$	Absorbed energy without test piece	J	Clauses 2.6.1, 2.6.2, 2.13
$A_{v,2}$	Absorbed energy without test piece – second reading	J	Clause 2.6.2
$A_{v,3}$	Absorbed energy reading after 10th free swing	J	Clause 2.6.2
G	Force exerted at distance R	N	Clause 2.12
L	Length of pendulum	m	Clauses 2.11, 2.12, 2.14
M	Moment of pendulum	N.m	Clauses 2.12, 2.13
P	Distance of centre of percussion from axis of rotation	m	Clause 2.11
N	A distance along pendulum	m	Clause 2.12
T	Total duration of 100 complete oscillations	s	Clause 2.11
g	Acceleration due to gravity	m/s^2	Clauses 2.11, 2.14
p	Time of one complete oscillation	s	Clause 2.11
v	Striking velocity	m/s	Clause 2.14
α	Angle of fall	....°	Clauses 2.12, 2.14
β	Angle of rise at scale calibration position	....°	Clause 2.13
ϕ	Angle of rise at zero reading (A_{v1} position)	....°	Clause 2.13