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Australian Standard 1544, Part 4—1980

METHODS FOR IMPACT TESTS ON METALS

Part 4—CALIBRATION OF THE TESTING MACHINE

STANDARDS ASSOCIATION OF AUSTRALIA

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THE FOLLOWING INDUSTRIAL, SCIENTIFIC AND GOVERNMENTAL organizations and departments were officially represented on the committee entrusted with the preparation of this standard:

Aluminium Development Council

Australian Institute of Metals

Bureau of Steel Manufacturers of Australia

Confederation of Australian Industry

Department of Defence (Standardization Committee)

Department of Industry and Commerce

Federal Chamber of Automotive Industries

Metal Trades Industry Association of Australia

National Association of Testing Authorities

National Measurement Laboratory

Railways of Australia Committee

Society of Automotive Engineers—Australasia

Universities

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Part 4 CALIBRATION OF THE TESTING MACHINE

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PREFACE

This standard was prepared by the Association's Committee on Mechanical Testing of Metals to supersede AS B188, Part 4—1966.

During preparation of this standard, the committee reviewed ASTM E23 which uses standard test pieces for proof testing of Charpy testing machines. The committee considered the introduction of a similar scheme into the Australian standard but resolved that as such a scheme requires considerable experimentation which has not been undertaken at this stage, it was not possible to include such a scheme; however, when the results are available this standard will be revised accordingly.

This standard requires reference to the following Australian standards:

AS 1544 Methods for Impact Tests on Metals
Part 1—Izod
Part 2—Charpy V-notch
Part 3—Charpy U-notch and Keyhole Notch

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FOREWORD

The methods for the calibration of pendulum impact testing machines described in this standard relate to the following elements of the machine, which are illustrated in Figs 1 to 4:

(a) Machine framework, i.e. the structure supporting the pendulum, excluding only the foundation.

(b) Pendulum and striker.

(c) Test piece supports.

(d) Indicating equipment, e.g. scale and friction pointer.

The clauses describing these methods have been drafted with particular application to the normal arrangement depicted in Figs 1, 3 and 5 (a), with the struck face of the test piece vertically below the axis of rotation. However, in some machines the test piece supports have been advanced so that impact occurs before the pendulum is at the bottom of its swing and 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.

In the application of the methods, all the absorbed energy indicated by the machine is attributed to the fracturing of the test piece.

NOTE: It is known that energy is absorbed other than by the fracturing of the test piece. It is assumed that this energy is absorbed by items such as the test piece supports, the machine foundation and framework, the pendulum and striker, ejection of the broken part of the test piece, and drag of a partially broken test piece. This energy is not determined, as suitable methods and apparatus have not yet been developed for measuring either its total or constituent parts.

SECTION 1. SCOPE, APPLICATION AND DEFINITIONS

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.

The standard deals with complete calibration and with partial calibration.

1.2 APPLICATION. This standard primarily applies to testing machines which indicate in terms of the SI unit of energy, the joule (J).

1.3 DEFINITIONS. For the purpose of this standard, the definitions given in AS 1544, Parts 1, 2 and 3 and the following definitions apply:

1.3.1 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.

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

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

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

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

1.3.6 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.

1.3.7 Calibration—all the operations for the purpose of determining the compliance of the machine with the requirements of this standard.

1.3.8 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.

1.4 SYMBOLS AND DESIGNATIONS. For the purpose of this standard, the following symbols and designations apply:

A = nominal initial potential energy
L = length of pendulum
M = moment of pendulum
P = distance of centre of percussion from axis of rotation
g = acceleration due to gravity
t = time of one complete oscillation
v = striking velocity