



MALAYSIAN STANDARD

MS ISO 178:2012

**Plastics - Determination of flexural properties
(Second revision)
(ISO 178:2010, IDT)**

ICS: 83.080.01

Descriptors: plastics, test, flexural properties, rigid and semi-rigid plastics

© Copyright 2012

DEPARTMENT OF STANDARDS MALAYSIA

DEVELOPMENT OF MALAYSIAN STANDARDS

The **Department of Standards Malaysia (STANDARDS MALAYSIA)** is the national standards and accreditation body of Malaysia.

The main function of STANDARDS MALAYSIA is to foster and promote standards, standardisation and accreditation as a means of advancing the national economy, promoting industrial efficiency and development, benefiting the health and safety of the public, protecting the consumers, facilitating domestic and international trade and furthering international cooperation in relation to standards and standardisation.

Malaysian Standards (MS) are developed through consensus by committees which comprise balanced representation of producers, users, consumers and others with relevant interests, as may be appropriate to the subject at hand. To the greatest extent possible, Malaysian Standards are aligned to or are adoption of international standards. Approval of a standard as a Malaysian Standard is governed by the Standards of Malaysia Act 1996 [Act 549]. Malaysian Standards are reviewed periodically. The use of Malaysian Standards is voluntary except in so far as they are made mandatory by regulatory authorities by means of regulations, local by-laws or any other similar ways.

STANDARDS MALAYSIA has appointed SIRIM Berhad as the agent to develop, distribute and sell the Malaysian Standards.

For further information on Malaysian Standards, please contact:

Department of Standards Malaysia
Ministry of Science, Technology and Innovation
Level 1 & 2, Block 2300, Century Square
Jalan Usahawan
63000 Cyberjaya
Selangor Darul Ehsan
MALAYSIA

Tel: 60 3 8318 0002
Fax: 60 3 8319 3131
<http://www.standardsmalaysia.gov.my>

E-mail: central@standardsmalaysia.gov.my

OR **SIRIM Berhad**
(Company No. 367474 - V)
1, Persiaran Dato' Menteri
Section 2, P.O. Box 7035
40700 Shah Alam
Selangor Darul Ehsan
MALAYSIA

Tel: 60 3 5544 6000
Fax: 60 3 5510 8095
<http://www.sirim.my>

E-mail: msonline@sirim.my

Contents

	Page
Committee representation	ii
National foreword.....	iii
Foreword.....	v
1 Scope.....	1
2 Normative references.....	2
3 Terms and definitions	2
4 Principle	5
5 Test machine.....	5
5.1 General	5
5.2 Test speed.....	5
5.3 Supports and loading edge	6
5.4 Force- and deflection-measuring systems	6
5.5 Equipment for measuring the width and thickness of the test specimens.....	7
6 Test specimens.....	8
6.1 Shape and dimensions	8
6.2 Anisotropic materials.....	9
6.3 Preparation of test specimens	9
6.4 Specimen inspection.....	10
6.5 Number of test specimens.....	10
7 Atmosphere for conditioning and testing.....	10
8 Procedure	10
9 Calculation and expression of results	13
9.1 Flexural stress	13
9.2 Flexural strain	13
9.3 Flexural modulus.....	14
9.4 Statistical parameters	14
9.5 Significant figures	14
10 Precision	15
11 Test report.....	15
Annex A (informative) Precision statement.....	16
Annex B (informative) Influence of changes in test speed on the measured values of flexural properties	18
Bibliography.....	19

MS ISO 178:2012

Committee representation

The Industry Standards Committee on Plastics and Plastics Products (ISC J) under whose authority this Malaysian Standard was adopted, comprises representatives from the following organisations:

Department of Standards Malaysia
Federation of Malaysian Manufacturers
Jabatan Kerja Raya Malaysia
Malaysian Association of Standards Users
Malaysian Institute of Chemistry
Malaysian Petrochemical Association
Malaysian Plastics Manufacturers Association
Malaysian Rubber Board
Ministry of Domestic Trade, Co-operatives and Consumerism
Ministry of Health Malaysia
Ministry of International Trade and Industry
SIRIM Berhad (Advanced Polymer and Composites Programme)
SIRIM Berhad (Secretariat)
SIRIM QAS International Sdn Bhd (Product Certification and Inspection Department)
The Institution of Engineers, Malaysia
The Plastics and Rubber Institute of Malaysia
Universiti Kebangsaan Malaysia
Universiti Sains Malaysia
Universiti Teknologi Malaysia

The Technical Committee on General Methods of Test for Plastics which recommended the adoption of the ISO Standard as Malaysian Standard consists of representatives from the following organisations:

Federation of Malaysian Manufacturers
Hicom-Teck See Manufacturing Sdn Bhd
IKRAM QA Services Sdn Bhd
Malaysian Institute of Chemistry
Polypropylene Malaysia Sdn Bhd
SIRIM Berhad (Advanced Polymer and Composites Programme)
SIRIM Berhad (Secretariat)
Universiti Kebangsaan Malaysia
Universiti Teknologi Malaysia
Universiti Teknologi MARA

NATIONAL FOREWORD

The adoption of the ISO Standard as a Malaysian Standard was recommended by the Technical Committee on General Methods of Test for Plastics under the authority of the Industry Standards Committee on Plastics and Plastics Products.

This Malaysian Standard is the second revision of MS 1349, *Method of test for plastics - Determination of flexural properties*.

This Malaysian Standard is identical with ISO 178:2010, *Plastics - Determination of flexural properties*, published by the International Organization for Standardization (ISO). However, for the purposes of this Malaysian Standard, the following apply:

- a) in the source text, "this International Standard" should read "this Malaysian Standard";
- b) the comma which is used as a decimal sign (if any), to read as a point; and
- c) reference to International Standards should be replaced by corresponding Malaysian Standards as follows:

Referenced International Standards

Corresponding Malaysian Standards

ISO 291, *Plastics - Standard atmospheres for conditioning and testing*

MS ISO 291, *Plastics - Standard atmospheres for conditioning and testing*

ISO 293, *Plastics - Compression moulding of test specimens of thermoplastic materials*

MS ISO 293, *Plastics - Compression moulding of test specimens of thermoplastic materials*

ISO 294-1, *Plastics - Injection moulding of test specimens of thermoplastic materials - Part 1: General principles, and moulding of multipurpose and bar test specimens*

MS ISO 294-1, *Plastics - Injection moulding of test specimens of thermoplastic materials - Part 1: General principles, and moulding of multipurpose and bar test specimens*

ISO 295, *Plastics - Compression moulding of test specimens of thermosetting materials*

MS ISO 295, *Plastics - Compression moulding of test specimens of thermosetting materials*

ISO 2602, *Statistical interpretation of test results - Estimation of the mean - Confidence interval*

MS ISO 2602, *Statistical interpretation of test results - Estimation of the mean - Confidence interval*

ISO 2818, *Plastics - Preparation of test specimens by machining*

MS ISO 2818, *Plastics - Preparation of test specimens by machining*

ISO 7500-1, *Metallic materials - Verification of static uniaxial testing machines - Part 1: Tension/compression testing machines - Verification and calibration of the force-measuring system*

MS ISO 7500-1, *Metallic materials - Verification of static uniaxial testing machines - Part 1: Tension/compression testing machines - Verification and calibration of the force-measuring system*

MS ISO 178:2012

NATIONAL FOREWORD (continued)

Referenced International Standards

ISO 9513, *Metallic materials - Calibration of extensometers used in uniaxial testing*

ISO 16012, *Plastics - Determination of linear dimensions of test specimens*

ISO 20753, *Plastics - Test specimens*

ISO 23529, *Rubber - General procedures for preparing and conditioning test pieces for physical test methods*

Corresponding Malaysian Standards

MS ISO 9513, *Metallic materials - Calibration of extensometers used in uniaxial testing*

MS ISO 16012, *Plastics - Determination of linear dimensions of test specimens*

MS ISO 20753, *Plastics - Test specimens*

MS ISO 23529, *Rubber - General procedures for preparing and conditioning test pieces for physical test methods*

This Malaysian Standard cancels and replaces MS ISO 178:2004.

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

NOTE. IDT on the front cover indicates an identical standard i.e. a standard where the technical content, structure, and wording (or is an identical translation) of a Malaysian Standard is exactly the same as in an International Standard or is identical in technical content and structure although it may contain the minimal editorial changes specified in clause 4.2 of ISO/IEC Guide 21-1.