Singapore Standards Council

SS 5 : Part F1 : 2013(2018)
(ICS 87.040)

SINGAPORE STANDARD

Methods of test for paints, varnishes and related materials

– Part F1 : Bend test (cylindrical mandrel)

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This Singapore Standard was approved by the Chemical Standards Committee on behalf of the Singapore Standards Council on 27 November 2013.

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The Chemical Standards Committee, appointed by the Standards Council, consists of the following members:

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Deputy Chairman	:	Dr Tay Kin Bee	*Individual Capacity*
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The Technical Committee on Surface Coatings, appointed by the Chemical Standards Committee, consists of representatives from the following organisations:

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		Mrs Wong-Lin Tai Hoe	*TUV SUD PSB Pte Ltd*
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*Served till April 2013.

The Working Group, appointed by the Technical Committee to assist in the preparation of this standard, comprises of the following experts who contribute in their *individual capacity*:

		Name
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Secretary	:	Ms Elane Ng
Members	:	Ms Karen Chen
		Ms Guo Yilin
		Mr Lim Kian Chye
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		Ms Ellna Poh
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The organisations in which the experts of the Working Group are involved are:

AkzoNobel Paints (Singapore) Pte Ltd
DNT Singapore Pte Ltd
Housing & Development Board
Nippon Paint (Singapore) Co Pte Ltd
Pidilite Innovation Centre Pte Ltd
Setsco Services Pte Ltd
TUV SUD PSB Pte Ltd

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National Foreword

This Singapore Standard was prepared by the Working Group on the Review of Singapore Standard SS 5 Methods of Test for Paints, Varnishes and Related Materials appointed by the Technical Committee on Surface Coatings under the direction of the Chemical Standards Committee.

This is a revision of SS 5 : Part F1 : 2003 'Methods of test for paints, varnishes and related materials – Bend test (cylindrical mandrel)'. It is a modified adoption of the International Standard ISO 1519 : 2011 'Paints and varnishes – Bend test (cylindrical mandrel)', published by the International Organization for Standardization. The modifications reflect the local climatic conditions. To facilitate identification, the affected text of the International Standard which is to be changed is indicated by a left marginal bar adjacent to it.

The deviations are as follows:

Clauses/Subclauses	Modification
6.5	*Replace* "23 ± 2°C and 50 ± 5 % relative humidity" with "27 ± 2°C and 80 ± 5 % relative humidity"
4.2, 7.1 and 7.2.4	*Replace* "23 ± 2°C" with "27 ± 2°C" *Explanation: To reflect the local climatic conditions.*

Where appropriate, the words 'International Standard' in ISO 1519 : 2011, shall be read as 'Singapore Standard'. The references to International Standards shall be replaced by the following Singapore Standards:

International Standard	Corresponding Singapore Standard
ISO 1519	SS 5 : Part F1
ISO 15528	SS 5 : Part A1
ISO 1513	SS 5 : Part A2
ISO 1514	SS 5 : Part A3
ISO 2808	SS 5 : Part B1
ISO 3270	SS 5 : Part A4

For an overview of other parts to Singapore Standard 5, it is recommended to read the information in SS 5 : Part 0 'General introduction' which is issued separately.

Acknowledgment is made for the use of information from the above reference.

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions.*
2. *An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR.*
3. *Compliance with a SS or TR does not exempt users from any legal obligations.*

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 1519 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

This third edition cancels and replaces the second edition (ISO 1519:2002), which has been technically revised. The main changes are:

a) A principle clause has been added.

b) The requirement to carry out the test at a controlled relative humidity has been deleted (although the relative humidity is measured and recorded during the test). A maximum limit for the time between conditioning and testing has therefore been added.

c) The supplementary test conditions (formerly Annex A) have been integrated in the test report.

d) Information has been given on the precision of the method.

Methods of test for paints, varnishes and related materials – Part F1 : Bend test (cylindrical mandrel)

0 Introduction

This International Standard is one of six which specify empirical test procedures for assessing the resistance of coatings of paints, varnishes and related products to cracking and/or detachment from the substrate under different conditions of deformation.
The other five documents are:

– ISO 1520 Paints and varnishes — Cupping test

– ISO 6272-1 Paints and varnishes — Rapid-deformation (impact resistance) tests — Part 1: Falling-weight test, large-area indenter

– ISO 6272-2 Paints and varnishes — Rapid-deformation (impact resistance) tests — Part 2: Falling-weight test, small-area indenter

– ISO 6860 Paints and varnishes — Bend test (conical mandrel)

– ISO 17132 Paints and varnishes — T-bend test

The method chosen will depend on the property to be measured and on agreement between the interested parties. In principle, all these tests differ from each other technically and in their accuracy.

1 Scope

This International Standard specifies an empirical test procedure for assessing the resistance of a coating of paint, varnish or related product to cracking and/or detachment from a metal or plastics substrate when subjected to bending round a cylindrical mandrel under standard conditions.

For a multi-coat system, each coat can be tested separately or the complete system can be tested.

The method specified can be carried out

— either as a “pass/fail” test, by carrying out the test with a single specified size of mandrel, to assess compliance with a particular requirement;

— or by repeating the procedure using successively smaller mandrels to determine the diameter of the first mandrel over which the coating cracks and/or becomes detached from the substrate.

Two types of apparatus are specified, type 1 being appropriate for use on test panels of thickness up to 0.3 mm, and type 2 for use on test panels of thickness up to 1.0 mm. Both types of apparatus have been found to give similar results with the same coating, but normally only one will be used for testing a given product.