

INTERNATIONAL STANDARD

**ISO
2808**

Third edition
1997-09-15

Paints and varnishes — Determination of film thickness

Peintures et vernis — Détermination de l'épaisseur du feuil

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 2808:1997

<https://standards.iteh.ai/catalog/standards/sist/7f0fa2e1-a186-40f7-81d2-932ec06a5b00/iso-2808-1997>



Reference number
ISO 2808:1997(E)

Contents

1	Scope	1
2	Normative references	8
3	Required supplementary information	9
4	Definitions	9
5	General requirements	10
6	Method No 1 – Determination of wet-film thickness	11
7	Method No 2 – Determination of dry-film thickness by calculation from film mass per unit area	17
8	Method No 3 – Measurement of dry-film thickness by mechanically contacting methods	18
9	Method No 4 — Measurement of dry-film thickness by the profilometer method	21
10	Method No 5 — Measurement of dry-film thickness using microscope methods	22
11	Method No 6 – Magnetic method	29
12	Method No 7 – Eddy current method	30
13	Method No 8 – Non-contact methods	31
14	Method No 9 – Gravimetric method (dissolving method)	33
15	Method No 10 – Determination of dry-film thickness on blast-cleaned steel substrates	33
16	Test report	35

Annexes

A	Method No 2 – Procedure	37
---	-------------------------	----

© ISO 1997

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization
 Case postale 56 • CH-1211 Genève 20 • Switzerland
 Internet central@iso.ch
 X.400 c=ch; a=400net; p=iso; o=isocs; s=central

Printed in Switzerland

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.

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.

International Standard ISO 2808 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 2808:1991) of which it constitutes a technical revision.

The main technical changes are:

- a) Addition of the following methods of film thickness determination:
 - 1) Gravimetric (dissolving) method (Method 9)
 - 2) Determination of dry-film thickness on blast-cleaned steel substrates (Method 10).
- b) Table 1 includes typical instrument bias and precision for each method.

Annex A forms an integral part of this International Standard.

iTeh STANDARD PREVIEW
This page intentionally left blank
(standards.iteh.ai)

ISO 2808:1997

<https://standards.iteh.ai/catalog/standards/sist/7f0fa2e1-a186-40f7-81d2-932ec06a5b00/iso-2808-1997>

Paints and varnishes — Determination of film thickness

1 Scope

This International Standard reviews and specifies a number of methods that are applicable to the measurement of the thickness of organic coatings applied to a substrate. It does not apply to metallic coatings. Some of the techniques described can be adapted for the measurement of the thickness of detached coatings. The principles of the methods, their particular field of application and the expected precision are given in table 1.

This International Standard also defines terms concerning the determination of film thickness.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 2808:1997](#)

<https://standards.iteh.ai/catalog/standards/sist/7f0fa2e1-a186-40f7-81d2-932ec06a5b00/iso-2808-1997>

Table 1 - Methods of film thickness measurement

Note 1: Many of the methods referred to below may be adapted for use with detached films.

Number and description	Techniques and applications	Typical instrument bias ¹⁾ and precision	Remarks
Method No. 1	iTeh STANDARD PREVIEW A Comb gauge (standards.iteh.ai)		
Assessment of wet-film thickness	<p>B Wheel gauge https://standards.iteh.ai/catalog/standards/sis/70fa2e1-a186-40f7-81d2-932e06a5b00/iso-2808-1997</p> <p>C By weighing</p> <p>For measurement of wet-film thickness of freshly painted surfaces.</p>	<p>Bias: $\pm 2,5\% + 1\ \mu\text{m}$</p> <p>Reproducibility: $\pm 15\ \mu\text{m}$</p>	<p>Measurements give an approximate indication of the thickness of the wet film.</p> <p>May be used in laboratories and on site.</p> <p>Method 1C may also be used for determining the dry-film thickness, but in the laboratory only.</p>
Method No. 2	For use on films too soft to be measured by methods which use a presser foot or probe.	Determinations are not precise	Provides a check that the mean thickness lies between specified limits. The film remains undamaged.
Determination of dry-film thickness by calculation from the ratio of dry-film mass to dry-film area			

iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 2808:1997

<https://standards.iteh.ai/catalog/standards/sist/7f0fa2e1-a186-40f7-81d2-932ec06a5b00/iso-2808-1997>

Method No. 3

Measurement of dry-film thickness by mechanically contacting instruments

A Micrometer method. For use on test panels or painted surfaces that are substantially plane.

Bias: $\pm 2 \mu\text{m}$

Reproducibility: $\pm 30 \%$ for low and 20% for higher film thicknesses

The film has to be hard enough to resist indentation on closing the micrometer jaws. The film is damaged in the test. The film thickness shall be greater than $25 \mu\text{m}$ unless the film is detached.

B Dial gauge method

Test panels or painted surfaces that are substantially plane or have a curvature in one direction

Reproducibility: $\pm 10 \%$, with a lower limit of $2 \mu\text{m}$

The film has to be hard enough to resist indentation on lowering the gauge or electric-device presser foot.

Method No. 4

Measurement of dry-film thickness by the profilometric method

Recommended as a referee method for painted surfaces that are substantially plane.

Reproducibility: $\pm 10 \%$, with a lower limit of $2 \mu\text{m}$

The film has to be hard enough to resist indentation by the profile-tracing stylus. The film is damaged in the test.

Method No. 5

Measurement of dry-film

thickness by microscope methods

A Microscopic examination of cross-section. Bias: 2 µm

Recommended as a referee method for films on substrates of varying profile, for example grit-blasted surfaces. Reproducibility: ± 10 %

A portion of the painted article is cut out and mounted in resin. The film is damaged in the test.

iTeh STANDARDS IN REVIEW

(standards.itteh.ai)

B Wedge cut method. Reproducibility: ± 10 %, with a lower limit of 2 µm

A special cutting tool or paint borer is required to cut through the film. The film is damaged in the test.

ISO 2808:1997

<https://standards.itteh.ai/catalog/standards/7062e1-e186-4077-81d2-932ec06d3600/ISO-2808-1997>

Both A and B can be used for thicknesses of individual coats in a paint system

C Surface profile measuring method. Applies to transparent films and to films which can be cleanly removed from the substrate.

Reproducibility: ± 10 %

A special microscope is used to examine the profile of the film (split-beam microscope). Only transparent films remain undamaged.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

<https://standards.iteh.ai/catalog/standards/sist/710f11-1-a186-40f7-81d2-932ec06a5b00/iso-2808-1997>

Method No. 6	For magnetic metallic substrates	Magnetic methods	A Magnetic-induction principle	Bias: $\pm 2\% + 1\ \mu\text{m}$ Reproducibility: $\pm 10\%$	The film has to be hard enough to withstand the pressure of the probe. May be used on site.
			B Permanent-magnet pull-off principle	Bias: $\pm 5\% + 1\ \mu\text{m}$	
Method No. 7	For non-magnetic metallic substrates	Eddy current method		Reproducibility: $\pm 10\%$	Instruments operate on the eddy-current principle. The film has to be hard enough to withstand the pressure of the probe. May be used on site.

Method No. 8

Used when contact by the measuring instrument with the coating needs to be avoided. Applicable to painted surfaces which are substantially flat. Reproducibility: $\pm 10\%$

Instruments operate on the beta-particle back-scatter principle (method No. 8A) or the X-ray fluorescence principle (method No. 8B).

iTeh STANDARD PREVIEW (standards.iteh.ai)

Paint films have to be homogeneous for measurements to be accurate.

Method No. 9

Applicable to films on substrates of varying profiles, for example grit-blasted steel panels, and to films on polymeric substrates if the substrate is not affected by the paint solvent.

The coating mass is determined by dissolving the coating without dissolving the substrate. The mass of coating divided by the density and the area of the coating gives the average coating thickness.

iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 2808:1997

<https://standards.iteh.ai/catalog/standards/sist/7f0fa2e1-a186-40f7-81d2-932ec06a5b00/iso-2808-1997>

Method No. 10

For dry coatings on magnetic metallic substrates having a rough (blast-cleaned) surface.

Instruments operate on the magnetic-induction principle.

Determination of dry-film thickness on blast-cleaned steel substrates

May be used on site.
In some cases, method No. 5A or method No. 9 may also be used.

D) The bias data are based on information supplied by the instrument manufacturers

2 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1463:1982, Metallic and oxide coatings - Measurement of coating thickness - Microscopical method

ISO 1514:1993, Paints and varnishes - Standard panels for testing

ISO 2178:1982, Non-magnetic coatings on magnetic substrates - Measurement of coating thickness - Magnetic method

ISO 2360: 1982, Non-conductive coatings on non-magnetic basis metals - Measurement of coating thickness - Eddy current method

ISO 2811:1997, Paints and varnishes - Determination of density -

Part 1: Pycnometer method

Part 2: Immersed body (plummet) method

Part 3: Oscillation method

Part 4: Pressure cup method

STANDARD PREVIEW
(standards.iteh.ai)

ISO 3233:1984,¹⁾ Paints and varnishes - Determination of volume of dry coating (non-volatile matters) obtained from a given volume of liquid coating

ISO 3497:1990, Metallic coatings - Measurement of coating thickness - X-ray spectrometric methods

ISO 3543:1981, Metallic and non-metallic coatings - Measurement of thickness - Beta backscatter method

ISO 4518: 1980, Metallic coatings - Measurement of coating thickness - Profilometric method

ISO 7254:1984, Paints and varnishes - Assessment of natural spreading rate - Brush application

ISO 8503-1:1988, Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned steel substrates - Part 1: Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces.

1) Under revision.

3 Required supplementary information

The methods of measurement specified require to be completed, for any particular application, by the following supplementary information.

This information should be derived from the International Standard or national standard or other document for the product under test or, if appropriate, may be the subject of agreement between the interested parties.

- a) The method of application of the coating to the substrate and whether it is a single coating or a multi-coat system.
- b) The duration and conditions of drying (or stoving) and ageing (if applicable) of the coating before measurement.
- c) The method of film thickness measurement to be used (see table 1).
- d) The significant area (see 4.2) of the coated article and, if necessary, the number of measurements.

4 Definitions **iTeh STANDARD PREVIEW** (standards.iteh.ai)

For the purpose of this International Standard, the following definitions apply:

4.1 film thickness: The thickness of a coating applied to a substrate is the distance between the surface of the film and the surface of the substrate.

NOTE 1 - The value of a film thickness depends, to some extent, on the method of measurement used. To give a correct value would only be possible if the coating and substrate had flat and even surfaces. In practice, neither the surface of the coating nor the surface of the substrates is even. In many cases, the surface irregularities exceed 10% of the film thickness. The results of the measurements by different methods are influenced by these irregularities. The influence is different for each method. Therefore, the results of different methods applied to the same specimen may differ markedly. This is the reason why the results of film thickness measurements always have to be reported together with information on the method of measurement and which type of instrument was used, plus the bias of the instrument, if known.

4.2 significant surface area: That part of an article covered or to be covered by the coating and for which the coating is essential for serviceability and/or appearance.

4.3 reference area: That part of the significant surface area within which a specified number of single measurements are required to be made.