

# SVENSK STANDARD

## SS-EN ISO 3233-2:2019



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### **Färg och lack – Bestämning av volymtorrhalt – Del 2: Bestämning genom mätning av torrfilmdensitet (ISO 3233-2:2019)**

**Paints and varnishes – Determination of the percentage volume  
of non-volatile matter –  
Part 2: Method using the determination of non-volatile-matter  
content in accordance with ISO 3251 and determination of dry  
film density on coated test panels by the Archimedes principle  
(ISO 3233-2:2019)**

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Europastandarden EN ISO 3233-2:2019 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 3233-2:2019.

Denna standard ersätter SS-EN ISO 3233-2:2014, utgåva 1

The European Standard EN ISO 3233-2:2019 has the status of a Swedish Standard. This document contains the official version of EN ISO 3233-2:2019.

This standard supersedes the SS-EN ISO 3233-2:2014, edition 1

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Denna standard är framtagen av kommittén för Färg och lack, SIS/TK 433.

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EUROPEAN STANDARD

EN ISO 3233-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2019

ICS 87.040

Supersedes EN ISO 3233-2:2014

English Version

Paints and varnishes - Determination of the percentage volume of non-volatile matter - Part 2: Method using the determination of non-volatile-matter content in accordance with ISO 3251 and determination of dry film density on coated test panels by the Archimedes principle (ISO 3233-2:2019)

Peintures et vernis - Détermination du pourcentage en volume de matière non volatile - Partie 2: Méthode utilisant la teneur en matière non volatile déterminée conformément à l'ISO 3251 et la masse volumique du feuillet sec déterminée par le principe d'Archimède sur des panneaux d'essai revêtus (ISO 3233-2:2019)

Beschichtungsstoffe - Bestimmung des Volumens nichtflüchtiger Anteile - Teil 2: Verfahren mit Bestimmung des Gehaltes an nichtflüchtigen Anteilen nach ISO 3251 und Bestimmung der Trockenfilmdichte beschichteter Probenplatten nach dem Archimedes-Prinzip (ISO 3233-2:2019)

This European Standard was approved by CEN on 28 July 2019.

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COMITÉ EUROPÉEN DE NORMALISATION  
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## European foreword

This document (EN ISO 3233-2:2019) has been prepared by Technical Committee ISO/TC 35 "Paints and varnishes" in collaboration with Technical Committee CEN/TC 139 "Paints and varnishes" the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2020, and conflicting national standards shall be withdrawn at the latest by April 2020.

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

This document supersedes EN ISO 3233-2:2014.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### Endorsement notice

The text of ISO 3233-2:2019 has been approved by CEN as EN ISO 3233-2:2019 without any modification.





# Paints and varnishes — Determination of the percentage volume of non-volatile matter —

Part 2:

## Method using the determination of non-volatile-matter content in accordance with ISO 3251 and determination of dry film density on coated test panels by the Archimedes' principle

### 1 Scope

This document specifies a method for determining the non-volatile matter by volume ( $NV_V$ ) of coating materials by determining the practical dry-film density. This method determines the volume percentage of non-volatile matter in paints, varnishes and related products by measuring the density of a dry coating for any specified temperature range and period of drying or curing. The non-volatile matter content is determined in accordance with ISO 3251.

Using the non-volatile matter by volume results obtained in accordance with this document, it is possible to calculate the practical spreading rate of coating materials.

This method specifies an additional shape of plate to those described in ISO 3233-1 and is suitable for all products which can be applied by dipping.

This document is not applicable to coating materials which exceed the Critical Pigment Volume Concentration (CPVC).

[Annex A](#) gives an overview of the existing methods for the determination of non-volatile matter content and of non-volatile matter volume.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1513, *Paints and varnishes — Examination and preparation of test samples*

ISO 2808, *Paints and varnishes — Determination of film thickness*

ISO 2811 (all parts), *Paints and varnishes — Determination of density*

ISO 3251, *Paints, varnishes and plastics — Determination of non-volatile-matter content*

ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

## SS-EN ISO 3233-2:2019 (E)

### 3.1 non-volatile matter

NV

residue by mass obtained by evaporation under specified conditions

Note 1 to entry: Instead of the term “non-volatile matter”, different terms, such as solid, dry residue, dry matter, solid matter, stoving residue are being used commonly with the respective abbreviations. The term “non-volatile matter” which is also applied in ISO 3251 should be used together with the abbreviation “NV” instead of these terms.

[SOURCE: ISO 4618:2014, 2.176]

### 3.2 non-volatile matter by volume

NV<sub>v</sub>

percentage residue by volume obtained by evaporation under specified conditions

[SOURCE: ISO 4618:2014, 2.177]

### 3.3 spreading rate

surface area that can be covered by a given quantity of coating material to give a dried film of requisite thickness

Note 1 to entry: It is expressed in m<sup>2</sup>/l or m<sup>2</sup>/kg.

Note 2 to entry: See also *practical spreading rate* (3.4).

[SOURCE: ISO 4618:2014, 2.238, modified — “Application rate” and “theoretical spreading rate” have been deleted from Note 2 to entry.]

### 3.4 practical spreading rate

$s_p$   
*spreading rate* (3.3) which is obtained in practice on the particular substrate being coated

[SOURCE: ISO 4618:2014, 2.203, modified — Symbol,  $s_p$ , has been added.]

### 3.5 practical dry-film density

$\rho_p$   
practically determined density of a dried and cured coating

[SOURCE: ISO 3233-1:2013, 3.4]

## 4 Principle

The non-volatile matter by volume is calculated from the quotient of the density of the coating material and the dry film, with the dry-film density being determined practically.

## 5 Apparatus

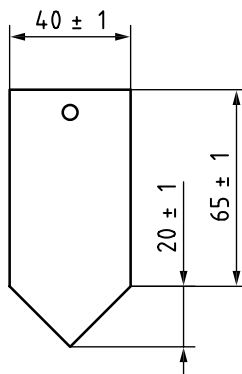
Standard laboratory apparatus together with the following:

**5.1 Metal plate**,  $(40 \pm 1)$  mm  $\times$   $(85 \pm 1)$  mm, with a small hole at least 2 mm to 3 mm from the upper edge. A plate with a tip on one of the shorter edges is easier to immerse in the coating material (see [Figure 1](#)).

The material of the plate shall be suitable and adapted to the coating material under test. In addition, the material of the plate shall not change its volume during contact with the coating material under test. The thickness of the plate shall be about 0,7 mm or it shall be agreed between the interested parties.

Smaller plates may be used, subject to agreement between the interested parties, provided that the coated surface area is at least 5 600 mm<sup>2</sup>.

Dimensions in millimetres



**Figure 1 — Suitable plate for immersion**

**5.2 Hook**, made of stainless material or synthetic thread, for attaching the plate to the balance during weighing operations. The diameter of the wire shall not exceed 0,30 mm because of surface tension effects.

**5.3 Beaker**, of a size convenient for immersing the plate with a clearance of at least 10 mm and which can be accommodated in the balance case.

**5.4 Analytical balance**, accurate to 0,1 mg. A single-pan balance is most convenient, and a useful modification is to replace the balance pan by a standard counterweight attachment.

**5.5 Support**, for holding the beaker under the balance stirrup without jamming the pan damper, if a counterweight as recommended in [5.4](#) is not available.

**5.6 Immersion liquid** of suitable density, in which the plate is immersed.

NOTE Water is a suitable immersion liquid for most coating materials. Other organic liquids are also suitable provided that they do not attack the coating.

**5.7 Desiccator** containing a suitable desiccant.

**5.8 Air oven**, capable of maintaining the specified or agreed test temperature to  $\pm 2,0$  °C (for temperatures up to 150 °C) or  $\pm 3,5$  °C (for temperatures above 150 °C and up to 200 °C). An air oven with forced ventilation shall be used.

**WARNING — To protect against explosions and fire, careful handling of products containing flammable volatile materials is essential.**

Drying in a vacuum can be beneficial for certain applications. In such cases, the conditions shall be agreed. Air ovens of the same type shall be used by all parties for referee tests.