

**SLOVENSKI STANDARD**  
**oSIST prEN ISO 3233-2:2018**  
**01-september-2018**

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**Barve in laki - Določevanje prostorninskega deleža nehlapnih snovi - 2. del:  
Metoda določevanja nehlapnih snovi v skladu z ISO 3251 in določevanje gostote  
suhe plasti filma na premazani preskusni plošči po Arhimedovem načelu (ISO/DIS  
3233-2:2018)**

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/DIS 3233-2:2018)

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/DIS 3233-2:2018)

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 feuil sec déterminée par le principe d'Archimède  
sur des panneaux d'essai revêtus (ISO/DIS 3233-2:2018)

**Ta slovenski standard je istoveten z: prEN ISO 3233-2**

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**ICS:**

87.040

Barve in laki

Paints and varnishes

**oSIST prEN ISO 3233-2:2018**

**en,fr,de**



# DRAFT INTERNATIONAL STANDARD

## ISO/DIS 3233-2

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## 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

*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 feuil sec déterminée par le principe d'Archimède sur des panneaux d'essai revêtus*

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# Contents

	Page
Foreword.....	iv
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Principle</b> .....	<b>2</b>
<b>5 Apparatus</b> .....	<b>2</b>
<b>6 Sampling</b> .....	<b>3</b>
<b>7 Procedure</b> .....	<b>4</b>
7.1 Number of determinations and preparation.....	4
7.2 Determination of the practical dry-film density.....	4
7.2.1 Determination of the mass of the uncoated plate in air and in the immersion liquid.....	4
7.2.2 Weighing the coating material and determination of the mass of the plate with coating material.....	4
7.3 Determination of the density.....	5
7.4 Determination of the non-volatile-matter content.....	5
7.5 Determination of film thickness.....	5
<b>8 Evaluation</b> .....	<b>5</b>
8.1 Calculation of the practical dry-film density.....	5
8.2 Calculation of the non-volatile matter by volume using the practical dry-film density.....	5
8.3 Determination of the practical spreading rate.....	6
<b>9 Precision</b> .....	<b>7</b>
9.1 Repeatability.....	7
9.2 Reproducibility.....	7
<b>10 Test report</b> .....	<b>7</b>
<b>Annex A (informative) Overview of existing methods for determination of non-volatile matter content and volume of non-volatile matter</b> .....	<b>8</b>
<b>Bibliography</b> .....	<b>9</b>

## ISO/DIS 3233-2:2018(E)

### 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

This second edition cancels and replaces the first edition (ISO 3233-2:2014), which has been technically revised.

The main changes compared to the previous edition are as follows:

- a general reference to ISO 4618 has been added to the introduction of [Clause 3](#);
- the definitions and sources have been updated in [Clause 3](#);
- a minimum mass of 25 mg of the coating on the plate has been added in [Clause 7.2.2](#), because measurements and simulation calculations demonstrate the need for a minimum mass for the coated panel.

A list of all parts in the ISO 3233- series can be found on the ISO website.

# 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 part of ISO 3233 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.

Using the non-volatile matter by volume results obtained in accordance with this part of ISO 3233, 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 part of ISO 3233 is not applicable to coating materials which exceed the critical pigment volume concentration (CPVC).

### 2 Normative references

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 4618, *Paints and varnishes — Terms and definitions*

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

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4618 and the following apply.

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

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

**ISO/DIS 3233-2:2018(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 3233-1:2013, 3.2]

**3.3  
spreading rate  
s**

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.

[SOURCE: ISO 4618:2014, 2.238 modified, symbol s added and Note 2 to entry deleted]

**3.4  
practical spreading rate  
s<sub>p</sub>**

spreading rate which is obtained in practice on the particular substrate being coated

[SOURCE: ISO 4618:2014, 2.203, modified, symbol s<sub>p</sub> added]

**3.5  
practical dry-film density  
ρ<sub>p</sub>**

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 ± 1) mm × (85 ± 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 is 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

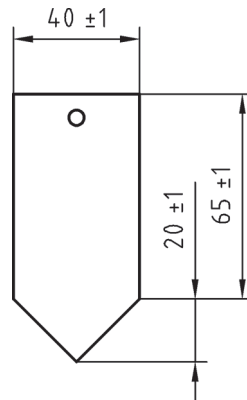


Figure 1 — Suitable plate for immersion

**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.

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**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 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.

## 6 Sampling

Take a representative sample of the coating material to be tested, in accordance with ISO 15528.

Examine and prepare the samples for testing in accordance with ISO 1513.

## ISO/DIS 3233-2:2018(E)

## 7 Procedure

### 7.1 Number of determinations and preparation

Carry out the determination in duplicate.

Degrease and clean the plate (5.1). Dry the plate and hook at the specified temperature for 10 min, and cool in the desiccator.

### 7.2 Determination of the practical dry-film density

#### 7.2.1 Determination of the mass of the uncoated plate in air and in the immersion liquid

Weigh the cleaned and dried plate plus hook in air to an accuracy of 1 mg ( $m_1$ ).

Then place the plate in the beaker with the immersion liquid, e.g. water, and weigh to an accuracy of 1 mg ( $m_2$ ). Ensure that the plate is always immersed to the same depth, with the liquid about 10 mm above the top of the plate. There shall be no air bubbles at any place on the plate (see Figure 2).

NOTE If water is used as the immersion liquid, it is beneficial to add 1 or 2 drops of a wetting agent to ensure thorough wetting of the plate.

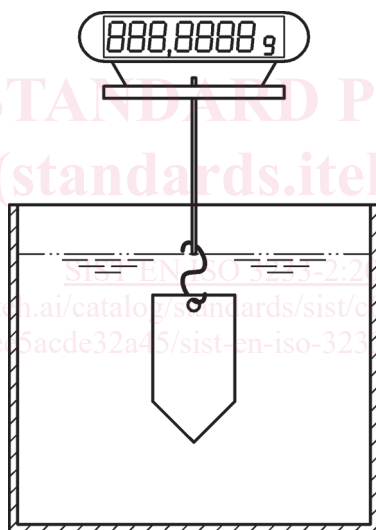


Figure 2 — Weighing the plate

#### 7.2.2 Weighing the coating material and determination of the mass of the plate with coating material

The coating material shall always be ready to use when it is tested.

The dry-film thickness on the plate shall correspond approximately to the dry-film thickness of the coating material used in practice and the minimum mass of the coating on the plate shall be 25 mg.

In the case of thixotropic or high viscous coating materials they may be diluted in accordance with the manufacturer's instructions until the sample is uniformly spread over the plate.

The preferred method of coating the plate is to immerse it in the coating material. Withdraw it at a steady rate and remove any excess coating material by, for example, drawing a glass rod along the lower edge of the plate. No thick edge shall be allowed to form on the lower edge. If any air bubbles form on the coated surfaces, burst them with a needle.