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

Part 1:

Method using a coated test panel to determine non-volatile matter and to determine dry film density by the Archimedes principle

*Peintures et vernis — Détermination du pourcentage en volume de
matière non volatile —*

*Partie 1: Méthode utilisant un panneau d'essai revêtu pour déterminer
la matière non volatile et pour déterminer la masse volumique du feuil
sec par le principe d'Archimède*



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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 3233-1 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

It cancels and replaces ISO 3233:1998, which has been technically revised. It also incorporates the Technical Corrigendum ISO 3233:1998/Cor.1:1999.

In addition to the change in number, the main changes are as follows:

- a) definitions of non-volatile matter, spreading rate and practical dry-film density have been added;
- b) the determination is now carried out in triplicate rather than in duplicate;
- c) a calculation of the spreading rate has been added;
- d) the symbols have been harmonized with those used in ISO 23811;
- e) in Annex A, an additional drying class (class 3) has been added for water-borne coating materials;
- f) the text has been editorially revised and the normative references updated.

ISO 3233 consists of the following parts, under the general title *Paints and varnishes — Determination of percentage volume of non-volatile matter*:

- *Part 1: Method using a coated test panel to determine non-volatile matter and to determine dry film density by the Archimedes principle*
- *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 pannels by the Archimedes principle*
- *Part 3: Determination by calculation from the non-volatile-matter content determined in accordance with ISO 3251, the density of the coating material and the density of the solvent in the coating material¹⁾*

1) In preparation, replacing ISO 23811:2009.

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Introduction

This method is used to measure the density and to determine the volume of a dry coating obtainable from a given volume of liquid paint. This volume is considered to be the most meaningful measure of the coverage (area of surface covered at a specified dry-film thickness per unit volume) of a paint, varnish or related product. The value obtained by this method might not be the same as that calculated on the basis of the addition of masses and volumes of the raw materials in a formulation. The volume occupied by a combination of resin and solvent can be the same as, greater than or less than the combined volume of the separate components, due to contraction or expansion of the resin and solvent. A second factor affecting the volume of a dry coating formulation is the degree to which the spaces between pigment particles are filled with binder. A third factor is the use of volatile components in reactive systems that, by their reaction, change into non-volatile film-building materials, i.e. amines and reactive solvents in high-build two-component coating materials.

Above and close to the critical pigment volume concentration, the volume of a dry paint film is greater than the theoretical volume, due to an increase in unfilled voids between pigment particles. The porosity of the film means that this method is unsuitable.

The values obtained for the non-volatile matter by volume are dependent on the temperature and time of heating, and these conditions should be carefully considered for the material being tested.