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Secretariat: BSI

Paints and varnishes — Determination of density — Part 1: Pycnometer method

Peintures et vernis — Détermination de la masse volumique — Partie 1: Méthode pycnométrique

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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.

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~~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~~www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 ~~www.iso.org/iso/foreword.html~~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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 139, *Paints and varnishes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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

This fourth edition cancels and replaces the third edition (ISO 2811-1:2016), which has been technically revised.

The main changes are as follows:

— a requirement to de-aerate the sample prior to the determination in order to achieve reproducible results for the density has been added to 8.2;

— the text has been editorially revised and the normative references have been updated.

A list of all parts in the ISO 2811 series can be found on the ISO website.

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Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at ~~www.iso.org/members.html~~www.iso.org/members.html.

Paints and varnishes — Determination of density — Part 1: Pycnometer method

1 Scope

This document specifies a method for determining the density of paints, varnishes and related products using a metal or Gay-Lussac pycnometer.

The method is limited to materials of low or medium viscosity at the temperature of test. The Hubbard pycnometer (see ISO 3507) can be used for highly viscous materials.

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 3696, *Water for analytical laboratory use — Specification and test methods*

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 terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at ~~https://www.iso.org/obp~~https://www.iso.org/obp

— IEC Electropedia: available at ~~https://www.electropedia.org/~~https://www.electropedia.org/

3.1
density
ρ
mass divided by the volume of a portion of a material

Note 1 to entry: It is expressed in grams per cubic centimetre.

4 Principle

A pycnometer is filled with the product under test. The density is calculated from the mass of the product in the pycnometer and the known volume of the pycnometer.

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5 Temperature

The effect of temperature on density is highly significant with respect to filling properties, and varies with the type of product.

For international reference purposes, it is essential to standardize one test temperature, and (23,0 ± 0,5) °C is specified in this document. It can be more convenient, however, to carry out comparative testing at another agreed temperature, for example (20,0 ± 0,5) °C, as specified by relevant weights and measures ~~legislation~~regulation (see B.2).

The test sample and pycnometer shall be conditioned to the specified or agreed temperature, and it shall be ensured that the temperature variation does not exceed 0,5 °C during testing.

6 Apparatus

Ordinary laboratory apparatus and glassware, together with the following shall be used.

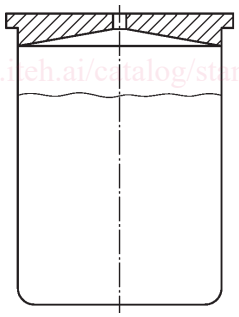
6.1 Pycnometer

Either ~~6.1.1~~a) or ~~6.1.2~~b) below can be used.

~~6.1.1~~ a) Metal pycnometer, with a volume of either 50 cm³ or 100 cm³, a circular cross-section and a cylindrical form, made of a smoothly finished corrosion-resistant material with a snugly fitting lid having a hole in its centre.

The inside of the lid shall be concave (see Figure 1).

~~6.1.2~~ b) Glass pycnometer, with a volume in the range 10 cm³ to 100 cm³ (Gay-Lussac type) [see Figure 2].



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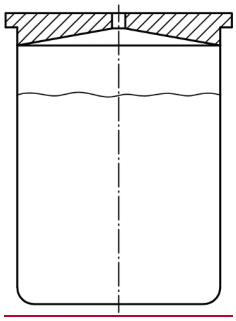
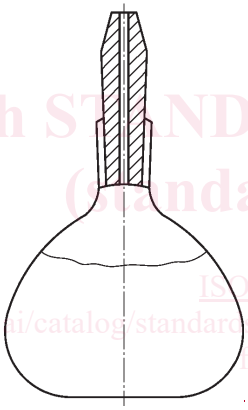


Figure 1 — Metal pycnometer



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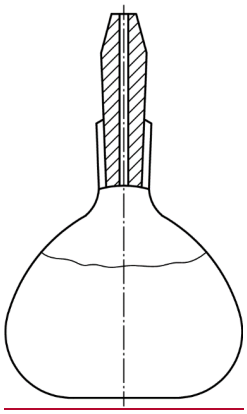

Figure 2 — Gay-Lussac pycnometer

6.2 Analytical balance, with a maximum permissible error of 1 mg for pycnometers for less than 50 ml or a maximum permissible error of 10 mg for 50 ml to 100 ml pycnometers.

The maximum permissible error of the balance required depends on the size of the pycnometer used (see also 8.2).

6.3 Thermometer, with a maximum permissible error of 0,2 °C.

NOTE Typically, a thermometer with a maximum permissible error of 0,2 °C has a resolution of 0,05 °C.

6.4 Temperature control unit

Either 6.4.1a) or 6.4.2b) below can be used.

6.4.1a) Temperature-controlled chamber, capable of accommodating the balance, pycnometer and test sample and maintaining them at the specified or agreed temperature (see Clause 5).

6.4.2b) Water bath, capable of maintaining the pycnometer and test sample at the specified or agreed temperature.

7 Sampling

Take a representative sample of the product under test as specified in ISO 15528.

Examine and prepare the sample as specified in ISO 1513. The sample shall be free from any air bubbles.

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