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**Coating powders —**

Part 16:

**Determination of density by liquid  
displacement in a measuring cylinder**

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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](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)).

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](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*.

A list of all parts in the ISO 8130 series can be found on the ISO website.

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](http://www.iso.org/members.html).

# Coating powders —

## Part 16:

# Determination of density by liquid displacement in a measuring cylinder

## 1 Scope

This document specifies a method for determining the density of coating powders by liquid displacement in a measuring cylinder. The method is based on a determination of the mass and the volume of a test portion. It can be used for all types of coating powders.

**NOTE** If the powder does not swell in contact with the displacement liquid used and if the displacement liquid replaces the air between the powder particles, it can then be used and compared with the method described in ISO 8130-3.

## 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 4788, *Laboratory glassware — Graduated measuring cylinders*

ISO 8130-14, *Coating powders — Part 14: Vocabulary*

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 8130-14 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>
- IEC Electropedia: available at <https://www.electropedia.org/>

## 4 Principle

The density of the coating powder is determined by liquid displacement in a measuring cylinder. In the measurement, a liquid is used that completely wets the product under test without swelling or dissolving it.

## 5 Materials

**5.1 Displacement liquid**, i.e. any suitable aliphatic hydrocarbon or mixture of aliphatic hydrocarbons, free from aromatic compounds, with a boiling point within the range of 80 °C to 140 °C.

Ensure there is no interaction between the displacement liquid and the material under test.

## 6 Apparatus

6.1 **Measuring cylinder**, 25 ml, complying with the requirements in ISO 4788.

6.2 **Glass funnel**

6.3 **Pipette**

6.4 **Balance**, capacity 100 g, capable of weighing to 1 mg or less.

## 7 Sampling

Take a representative sample of the product to be tested as specified in ISO 15528.

## 8 Procedure

### 8.1 Number of determinations and test temperature

Carry out the determination in duplicate at  $(23,0 \pm 1,0)$  °C and, where applicable, at a relative humidity of  $(50 \pm 5)$  %. The apparatus, the replacement liquid and the sample under test shall be conditioned to reach the test temperature.

### 8.2 Determination of the density of the displacement liquid

Fill, by means of a pipette, the empty, clean measuring cylinder to the 20 ml mark with the displacement liquid. The lower edge of the meniscus shall be at the mark.

Weigh the measuring cylinder filled with the displacement liquid ( $m_1$ ).

Fill in, by means of the glass funnel, an amount of the coating powder so that the displacement liquid reaches the 25 ml mark of the measuring cylinder. The lower edge of the meniscus again shall be at the mark. Take care that no coating powder remains at the edge of the measuring cylinder above the level of the displacement liquid. The glass funnel shall not be in contact with the liquid in the measuring cylinder.

Remove the glass funnel and weigh the measuring cylinder filled with the displacement liquid and the powder ( $m_2$ ).

## 9 Expression of results

Calculate the density ( $\rho$ ), in grams per cubic centimetre, of the coating powder using [Formula \(1\)](#):

$$\rho = \frac{m_2 - m_1}{5} \quad (1)$$

where

$m_1$  is the mass, in grams, of the measuring cylinder containing only the displacement liquid;

$m_2$  is the mass, in grams, of the measuring cylinder containing the displacement liquid and the powder;

5 is the volume, in cubic centimetres, replaced by the powder.

If the two determinations differ by more than  $0,05 \text{ g/cm}^3$ , repeat the determination ([8.2](#)).

Calculate the mean of two valid determinations and report the result to the nearest  $0,01 \text{ g/cm}^3$ .

## 10 Precision

No precision data are currently available.

## 11 Test report

The test report shall contain at least the following information:

- a) all details necessary to identify the product tested;
- b) a reference to this document, i.e. ISO 8130-16:2022;
- c) the type of glass cylinder and the displacement liquid used;
- d) the result of the test (individual values and mean value);
- e) any deviation from the test method specified;
- f) any unusual features (anomalies) observed during the test;
- g) the date of the test.

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## Bibliography

- [1] ISO 8130-3, *Coating powders — Part 3: Determination of density by liquid displacement pycnometer*

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