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**Paints, varnishes and printing inks —  
Determination of fineness of grind**

*Peintures, vernis et encres d'imprimerie — Détermination de la  
finesse de broyage*

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Published in Switzerland

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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* 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 fifth edition cancels and replaces the fourth edition (ISO 1524:2013), which has been technically revised. The main changes compared to the previous edition are as follows:

- the material of the gauges has been changed from hardened steel only to allow also other materials;
- gauges with three grooves have been added;
- the description of the scraper has been modified;
- a second example of a gauge reading has been added in [Figure 3](#);
- the text has been editorially revised and the normative references have been updated.

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).

# Paints, varnishes and printing inks — Determination of fineness of grind

## 1 Scope

This document specifies a method for determining the fineness of grind of paints, inks and related products by use of a suitable gauge, graduated in micrometres.

It is applicable to all types of liquid paints and related products, except products containing pigments in flake form (e.g. glass flakes, micaceous iron oxides, zinc flakes).

## 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 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:

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

### 3.1

#### fineness of grind

reading obtained on a standard gauge under specified conditions of test, indicating the depth of the groove(s) of the gauge at which discrete solid particles in the product are readily discernible

## 4 Apparatus

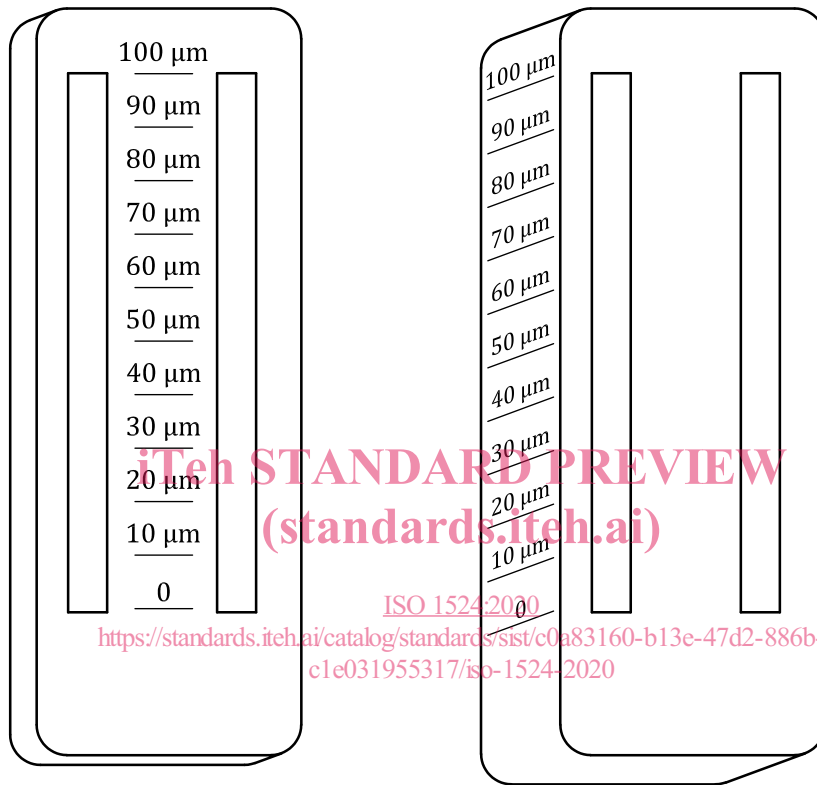
**4.1 Gauge**, consisting of a block of a hardened steel or other suitable material, e.g. 175 mm long, 65 mm wide and 13 mm thick.

At least for use with water-dilutable paints, a block of stainless steel should be used.

The top surface of the block shall be both plane and ground smooth and shall contain one, two or three grooves approximately 140 mm long and 12,5 mm wide parallel to the longer sides of the block. The depth of each groove shall be uniformly tapered along its length from a suitable depth (for example 25 µm, 50 µm or 100 µm) at one end to zero at the other end and shall be graduated as specified in [Table 1](#). A diagram showing two typical gauges is given in [Figure 1](#).

**Table 1 — Graduation of typical gauges and recommended ranges**

Maximum depth of groove μm	Interval of graduations μm	Recommended range μm
100	10	40 to 90
50	5	15 to 40
25	2,5	5 to 15



**Figure 1 — Two examples of a 100 μm gauge**

The depth of the groove at any position along its length shall not depart from its nominal value at any position across the groove depth by more than 2,5 μm.

The top surface of the block shall be finished by fine grinding or lapping; it shall be flat so that all points lie between two parallel planes 12 μm apart and, in addition, at every position along the surface, the transverse generator shall be straight so that all points along it lie between two parallel straight lines 1 μm apart. The top and bottom surfaces of the block shall be parallel within 25 μm.

Steel gauges of the approximate dimensions stated are suitable for the test, but other gauges giving similar results may be used.

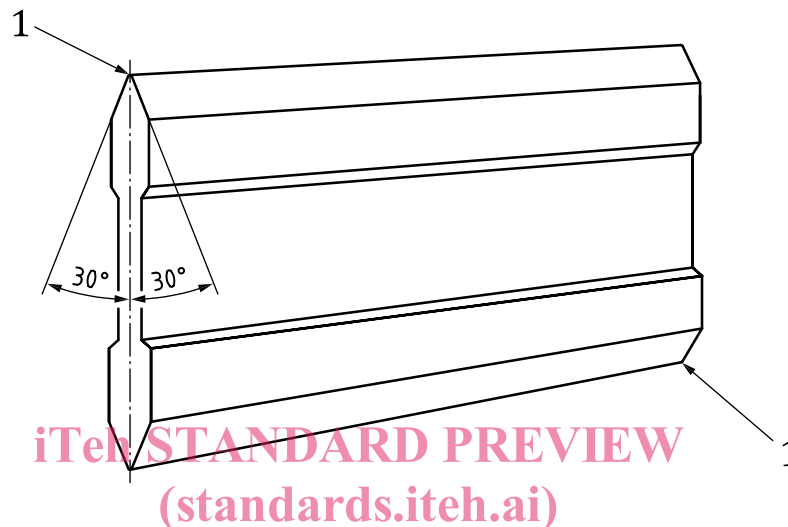
The precision of the fineness-of-grind determination depends in part on which gauge is used (see [Clause 6](#)). The 100 μm gauge is suitable for general use, but the 50 μm and especially the 25 μm gauge will only provide reliable results in the hands of skilled laboratory personnel. Particular caution is necessary in interpreting readings of less than 10 μm. Therefore, it is essential to identify the gauge (100 μm, 50 μm or 25 μm) when reporting results or specifying requirements.

**4.2 Scraper**, consisting of a single- or double-edged steel blade. The length of the scraper should be at least 10 mm more than the width of the gauge. The edge(s) on the long side(s) shall be straight and rounded to a radius of approximately 0,25 mm. A drawing of a suitable scraper is shown in [Figure 2](#).

The scraper shall be periodically checked for wear, damage or warpage. Reject the scraper if inspection reveals damage.

The top surface of the gauge may be used for routine checking of the scraper, provided it itself is not worn or warped.

The scraper shall be handled and stored with particular care.



#### Key

1 scraping edge, radius 0,25 mm

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**Figure 2 — Example for a suitable scraper**

## 5 Sampling

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

Examine and prepare each sample for testing, as described in ISO 1513.

## 6 Procedure

**6.1** Carry out a preliminary determination to establish the size of gauge most suitable for the test and the approximate fineness of grind of the test sample (see [Table 1](#) and the second paragraph in [6.5](#)). This approximate determination shall not be included in the results of the test.

Then carry out the test in triplicate.

**6.2** Place the gauge ([4.1](#)), which shall be thoroughly clean and dry, on a flat, horizontal surface.

**6.3** Pour a sufficient amount of the sample into the deep end of the groove so that it overflows from the groove slightly. Take care that during pouring the sample does not trap any air.

**6.4** Grasp the scraper ([4.2](#)) between the thumbs and fingers of both hands and place it edgewise in contact with the surface of the gauge at the extreme deep end of the groove, with the length of the scraper parallel to the width of the gauge. While holding the scraper perpendicular to the surface of the gauge and at right angles to the length of the groove, draw it at a uniform rate over the surface of the gauge to a

point beyond the zero depth of the groove in 1 s to 2 s. In the case of lithographic inks, or fluids of similar consistency, the time required to draw the scraper over the length of the groove shall be not less than 5 s, in order to avoid too low a result. Apply sufficient downward pressure on the scraper to ensure that the groove is filled with the sample and that any surplus is removed.

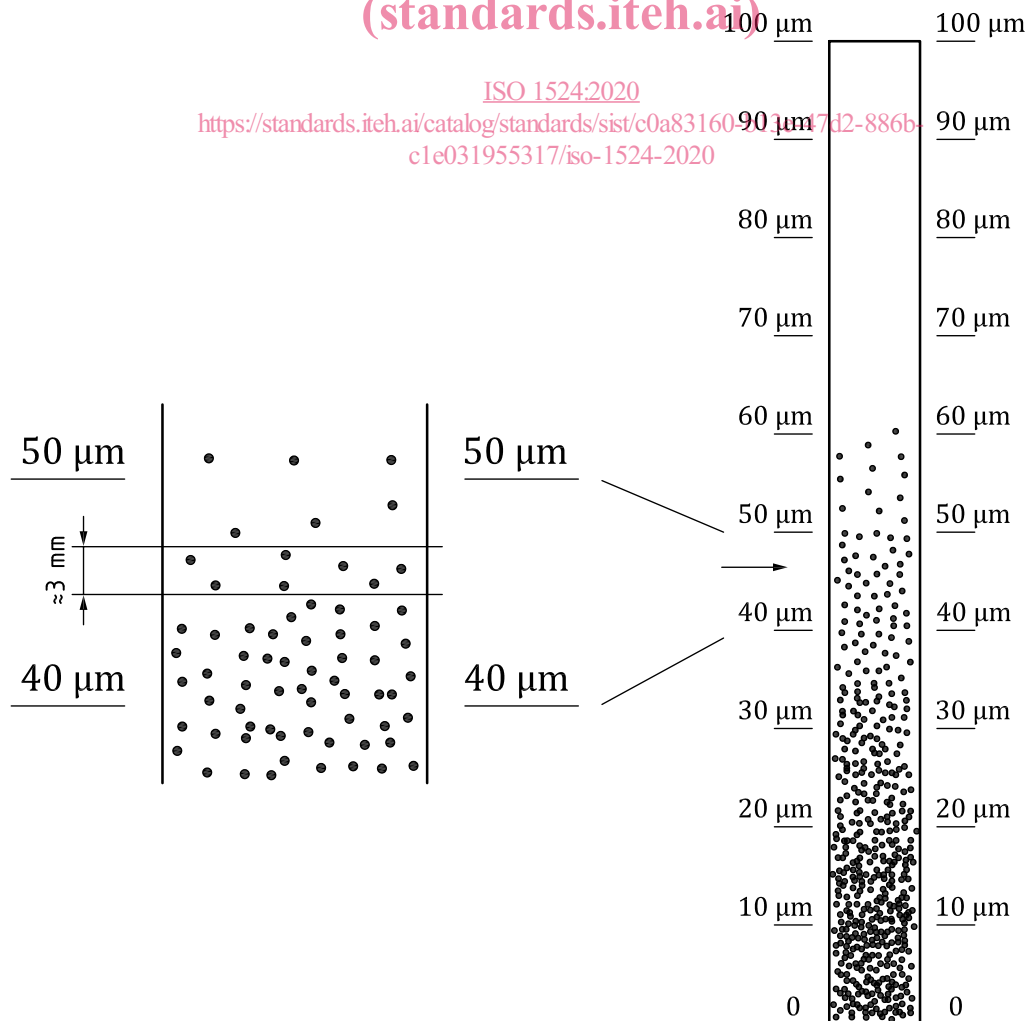
6.5 As quickly as possible (within seconds) after the completion of the drawdown, and while the paint is still wet, view the gauge from the side in such a manner that the line of vision is at right angles to the long dimension of the groove and at an angle of  $(30 \pm 2)^\circ$  to the surface of the gauge while it is in a light that will make the pattern of the sample in the groove readily visible.

If the flow behaviour of the sample is such that a smooth pattern is not obtainable after drawdown, a minimal quantity of an appropriate thinner or binder solution may be added to the sample by hand stirring, and the test repeated. Any dilution shall be stated in the test report. In some instances, the dilution of the sample might lead to flocculation and the fineness of grind might be affected.

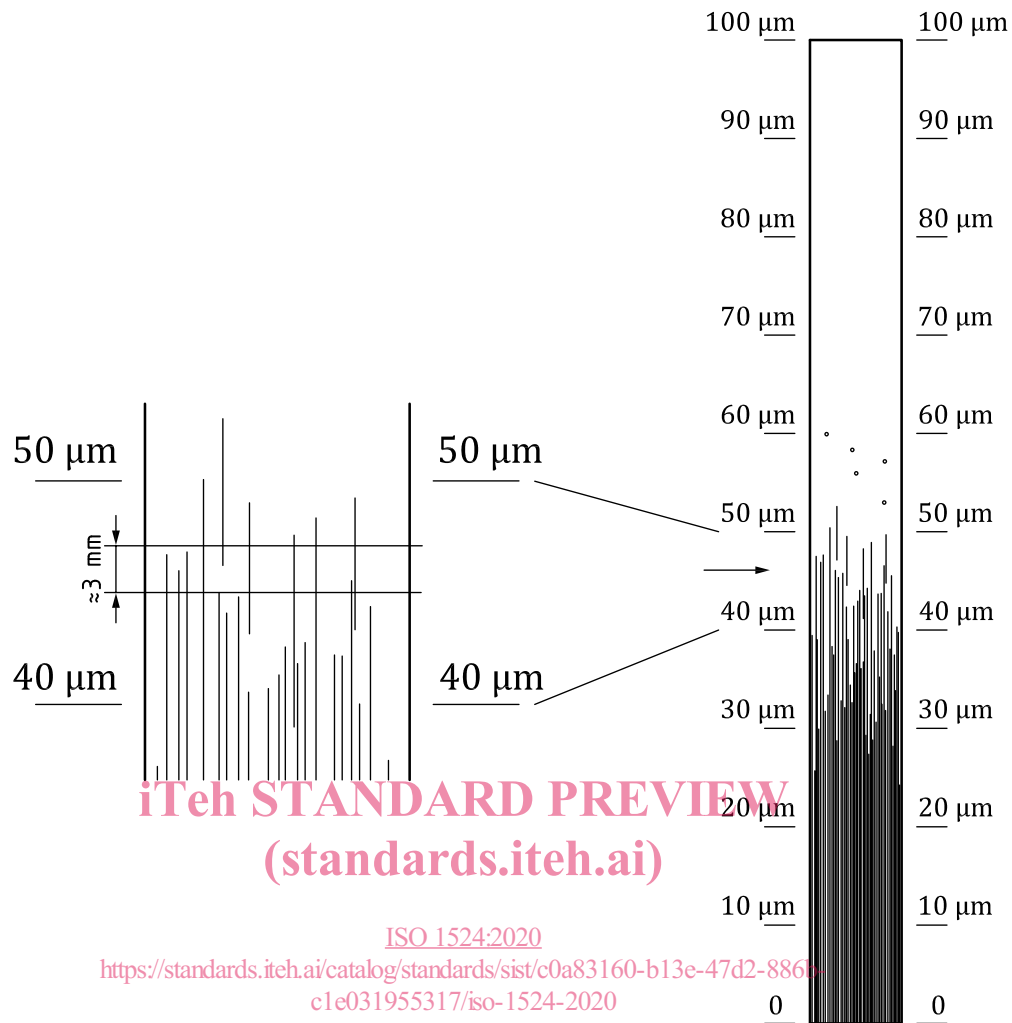
6.6 Observe the point where the product first shows a predominately speckled appearance and/or linear scratches, that is, where a 3 mm wide band across the groove contains five to ten particles or scratches (see Figure 3). Disregard any scattered specks or scratches that might appear prior to the point where the predominately speckled appearance begins. Estimate the position of the upper limit of the band to the nearest

- 5  $\mu\text{m}$  for the 100  $\mu\text{m}$  gauge;
- 2  $\mu\text{m}$  for the 50  $\mu\text{m}$  gauge;
- 1  $\mu\text{m}$  for the 25  $\mu\text{m}$  gauge.

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**Figure 3 — Examples of a gauge reading 45  $\mu\text{m}$**

**6.7** Clean the gauge and scraper carefully with a suitable solvent immediately after each reading.

## 7 Expression of results

Calculate the mean of the three determinations and record the result to the same accuracy as the original readings (see 6.6).

## 8 Precision

### 8.1 Repeatability limit, $r$

The value below which the absolute difference between two single test results, obtained on identical material by one operator, using the same equipment, in one laboratory within a short interval of time using the standardized test method, is expected to lie with a 95 % probability is 10 % of the range of the gauge.