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Coated abrasives — Determination and designation of grain size distribution —

Part 3: Microgrit sizes P240 to P5000

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*Abrasifs appliqués — Détermination et désignation de la distribution
granulométrique —
Partie 3: Micrograins P240 à P5000*

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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).

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).

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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.

This document was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 5, *Grinding wheels and abrasives*.

This third edition cancels and replaces ISO 6344-3:2013 and ISO 6344-1:1998, which have been technically revised.

The main changes compared to ISO 6344-3:2013 and ISO 6344-1:1998 are as follows:

- the title and the scope has been changed and updated due to the extension of grit designations up to P5000;
- relevant content of ISO 6344-1:1998 has been updated and transferred to this document and ISO 6344-2;
- references to ISO 6344-1:1998 have been deleted;
- normative references have been updated;
- [Clause 3](#) “Terms and definitions” has been updated;
- former [Clause 4](#) “Testing of microgrit sizes P240 to P1200” has been revised in its content and divided into two clauses: [Clause 4](#) “Grain size distribution of microgrit sizes P240 to P1200” and [Clause 5](#) “Test method of microgrit sizes P240 to P1200”;
- the checking mineral 280 has been deleted;
- former [Tables 3](#) and [4](#) for the theoretical equivalent grain diameters have been moved to a new [Annex A](#) “Theoretical equivalent grain diameters, d , for grits of fused aluminium oxide and for grits of silicon carbide”;
- former [Clause 5](#) has been revised in its content and divided into two clauses: [Clause 6](#) “Grain size distribution of microgrit sizes P1500 to P5000” and [Clause 7](#) “Test method of microgrit sizes P1500 to P5000”;

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- the grit designations P3000, P4000 and P5000 have been added;
- [Clause 8](#) "Test report" has been added;
- [Clause 10](#) (former Clause 7) "Marking" has been revised;
- [Annexes B](#) and [C](#) (former [Annexes A](#) and [B](#)) have been revised;
- Bibliography has been updated.

A list of all parts in the ISO 6344 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.

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Coated abrasives — Determination and designation of grain size distribution —

Part 3: Microgrit sizes P240 to P5000

1 Scope

This document specifies a method for determining and testing the grain size distribution of electrofused aluminium oxide and silicon carbide microgrit sizes P240 to P5000 for coated abrasive products.

It is applicable to grits used in the manufacture of coated abrasive products and to grits extracted from coated abrasive products for test purposes.

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 9138, *Abrasive grains — Sampling and splitting*

ISO 13317-3, *Determination of particle size distribution by gravitational liquid sedimentation methods — Part 3: X-ray gravitational technique*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 <https://www.electropedia.org/>

3.1

microgrit

abrasive grit having a median equivalent diameter of 58,5 μm to 2,7 μm whose *grain size distribution* (3.2) is determined by sedimentation

3.2

grain size distribution

particle size distribution

PSD

percentage of grains of different sizes composing the macrogrit or *microgrit* (3.1)

4 Grain size distribution of microgrit sizes P240 to P1200

The testing of microgrit sizes P240 to P1200 by sedimentation shall be carried out using the US sedimentometer (see 5.2.1). The principle of measurement is to determine the volume as a function of time of particles settled in the collecting tube. The equivalent grain size diameters are calculated using Stokes' law.

The grain size distribution of microgrit sizes P240 to P1200 is determined using the following criteria:

- a) the maximum grain diameter (theoretical equivalent grain diameter) of the first sedimented grain (d_{s0} value) shall not exceed the maximum permissible d_{s0} value;
- b) the grain diameter (theoretical equivalent grain diameter) shall not exceed the maximum permissible d_{s3} value at the 3 % point of the grain size distribution curve;
- c) the median grain diameter (theoretical equivalent grain diameter) shall be within the specified tolerances of the d_{s50} value at the 50 % point of the grain size distribution curve;
- d) the grain diameter (theoretical equivalent grain diameter) shall exceed the minimum permissible d_{s95} value at the 95 % point of the grain size distribution curve.

All four criteria (d_{s0} , d_{s3} , d_{s50} , d_{s95}) shall be fulfilled simultaneously.

The grain size distribution limit values (d_s values) for P240 to P1200 based on testing with US sedimentometer shall be according to [Table 1](#).

Table 1 — Limit d_s values for P240 to P1200

Grit designation	d_{s0} value	d_{s3} value	Median grain size		d_{s95} value
	max. µm	max. µm	d_{s50} value µm		min. µm
P240	110	81,7	58,5	±2,0	44,5
P280	101	74,0	52,2	±2,0	39,2
P320	94	66,8	46,2	±1,5	34,2
P360	87	60,3	40,5	±1,5	29,6
P400	81	53,9	35,0	±1,5	25,2
P500	77	48,3	30,2	±1,5	21,5
P600	72	43,0	25,8	±1,0	18,0
P800	67	38,1	21,8	±1,0	15,1
P1000	63	33,7	18,3	±1,0	12,4
P1200	58	29,7	15,3	±1,0	10,2

NOTE The d_s values are results of cooperative tests.

5 Test method of microgrit sizes P240 to P1200

5.1 Materials

5.1.1 Sedimentation medium

As the sedimentation medium use methyl alcohol of 95 % to 99 % purity.

Adjust the sedimentation medium using the checking minerals specified in [5.1.3](#).

5.1.2 Dispersing agent

In order to avoid grain agglomeration, a dispersing agent, such as EDTA (tetrasodium salt of ethylenediamine tetra-acetic acid), shall be added to the methyl alcohol, i.e. 4 ml of a 1 % aqueous EDTA-solution per litre of methyl alcohol.

5.1.3 Checking minerals

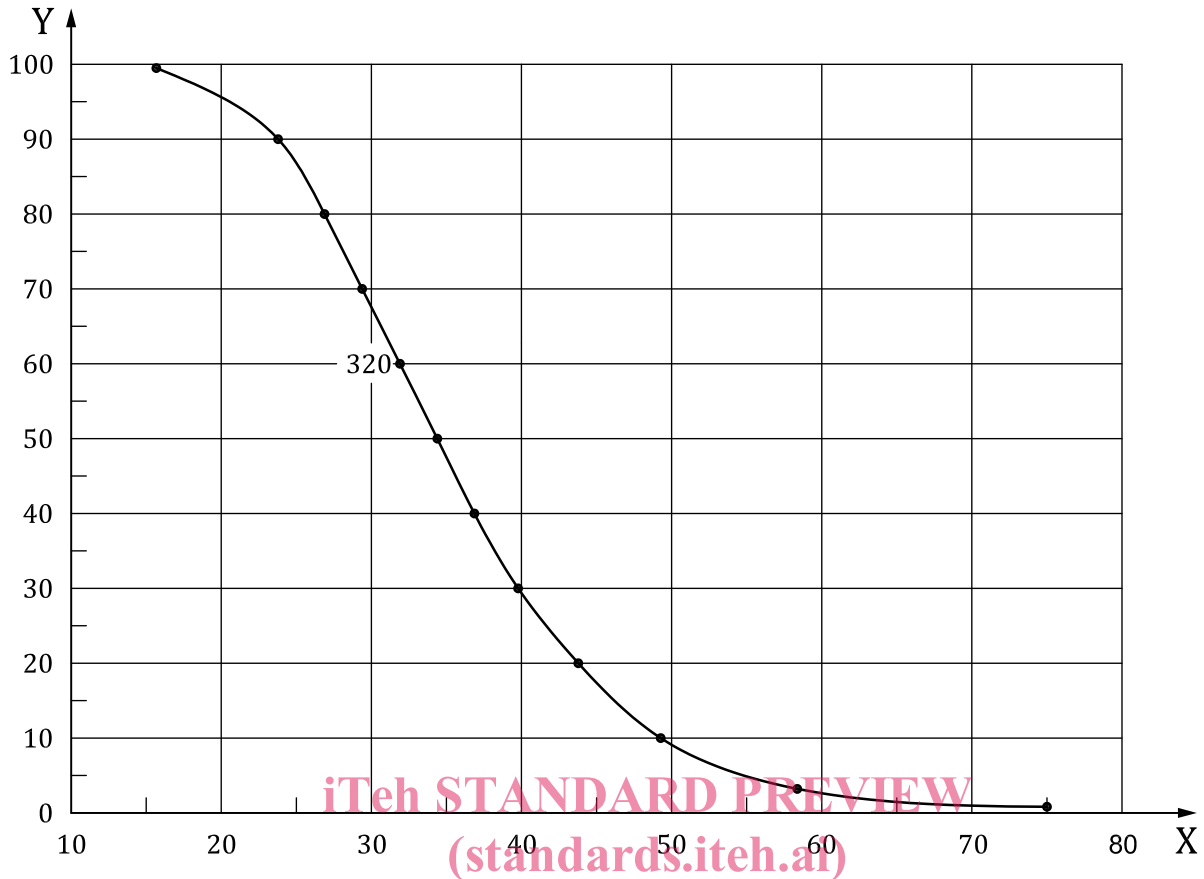
The adjustment of the whole measuring procedure is controlled by means of the checking mineral 320¹⁾. Each supply of the checking mineral is accompanied by a cumulative volume grain size distribution curve (see [Figure 1](#)). The 10 %, 20 %, 30 %, 40 % and 50 % points shall not deviate by more than ± 2 % from the sizes indicated in [Table 2](#).

NOTE The grain size distributions of the checking mineral 320 do not correspond to the grain size distribution of the microgrit P320 of this document.

Table 2 — Grain diameter of the checking mineral 320

Volume fraction of the settled checking mineral	Grain diameter
%	<i>d</i> µm
0	75,1
3	58,7
10	49,8 ± 1,00
20	44,2 ± 0,88
30	40,5 ± 0,81
40	37,5 ± 0,75
50	34,9 ± 0,70
60	32,5
70	30,1
80	27,5
90	24,4
100	16,5

1) Checking mineral 320 (edition 2009) can be obtained by: State Materials Testing Institute Darmstadt (Staatliche Materialprüfungsanstalt Darmstadt, MPA), Grafenstraße 2, D-64283 Darmstadt, Germany. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.



Key

Y cumulative volume fraction, %

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X grain diameter, d , μm

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Figure 1 — Cumulative volume grain size distribution curve of the checking mineral 320

5.2 Apparatus

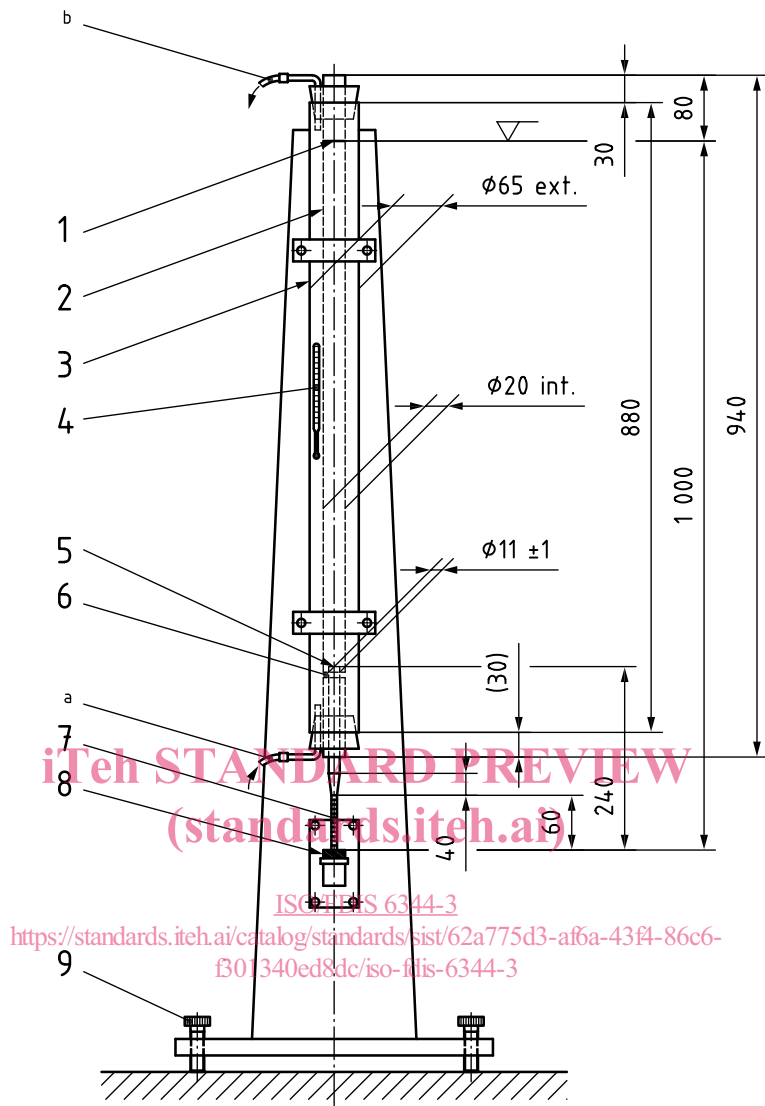
5.2.1 US sedimentometer, in accordance with [Figure 2](#). It consists of a vertical sedimentation tube of 940 mm in length and of a 20 mm inside diameter. It is surrounded by a water jacket in which the water temperature is maintained at a constant level. A graduated collecting tube is fixed at the bottom of the sedimentation tube. The whole assembly is mounted on a frame, the base plate of which is fitted with level adjusting screws for keeping the tube vertical (see [Figure 2](#)). The design and dimensions of the collecting tube shall be made in accordance with [Figure 3](#).

5.2.2 Horizontal beam light source, which can be used to improve the accuracy of sedimentation volume readings.

5.2.3 Magnifying glass, which can be used to improve the accuracy of sedimentation volume readings.

5.2.4 Time printer, which can be used to make the recording of the sedimentation times easier.

Dimensions in millimetres

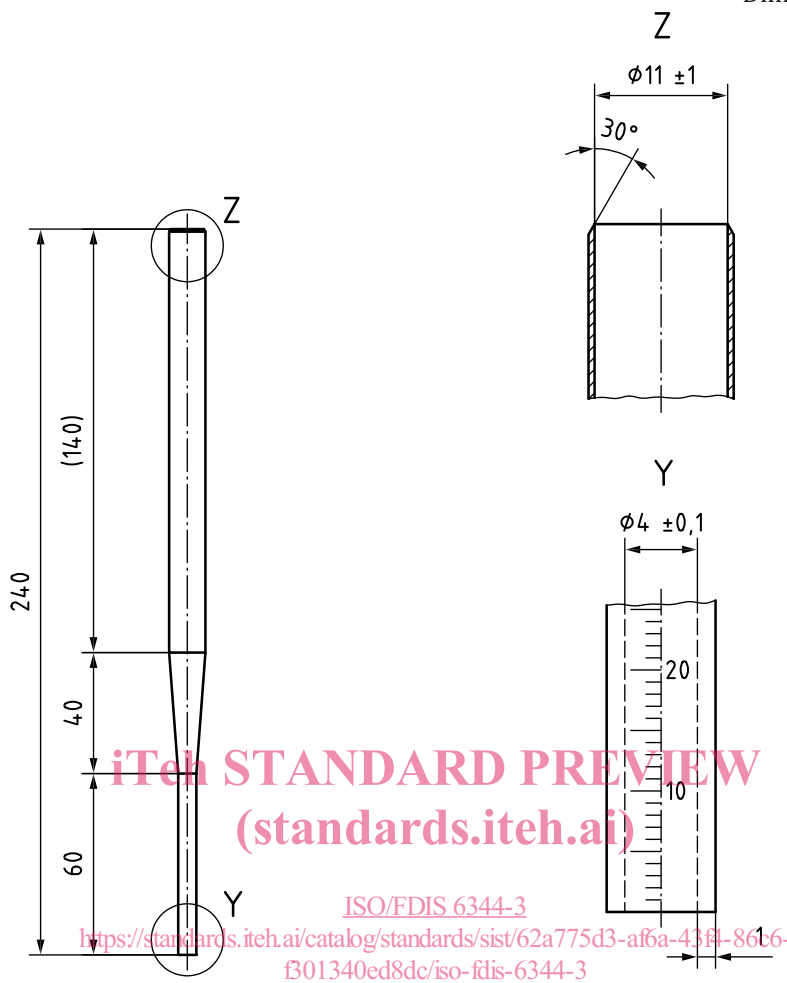


Key

- | | |
|----------------------------------|-------------------------------------|
| 1 methyl alcohol level (initial) | 7 scale for height of sedimentation |
| 2 sedimentation tube | 8 rubber gasket |
| 3 water jacket | 9 vertical adjusting screws |
| 4 thermometer | a Water inlet. |
| 5 collecting tube (see Figure 3) | b Water outlet. |
| 6 rubber centring spacer | |

Figure 2 — US sedimentometer

Dimensions in millimetres



The following parameters are recommended:

- Dial graduation and figures should be in white.
- 50 division marks at equal intervals (graduation about 1 mm).
- Length of division mark: 3 mm
- Length of every fifth division mark: 4 mm
- Thickness of division mark: 0,25 mm

Figure 3 — Collecting tube

5.3 Preparation

5.3.1 Preparation of the apparatus

5.3.1.1 Setting up the test device

When setting up the US sedimentometer, check that the collecting tube is positioned centrally in the sedimentation tube. It is held in the vertical position by a rubber spacer located about 30 mm from the top of the collecting tube. Check the position using a plumb line suspended from the top of the sedimentation tube and the collecting tube. The plumb line shall pass centrally through both the