
**Abrasive grains — Determination of bulk
density —**

**Part 2:
Microgrits**

*Grains abrasifs — Détermination de la masse volumique apparente —
Partie 2: Micrograins*



Foreword

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International Standard ISO 9136-2 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 5, *Grinding wheels and abrasives*.

ISO 9136 consists of the following parts, under the general title *Abrasive grains* — *Determination of bulk density*:

- *Part 1: Macrogrits* [Currently ISO 9136:1989]
- *Part 2: Microgrits*

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International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

Printed in Switzerland

Abrasive grains — Determination of bulk density —

Part 2: Microgrits

1 Scope

This part of ISO 9136 specifies a test method for the determination of the bulk density of bonded and coated abrasive microgrits.

2 Term and definition

For the purposes of this part of ISO 9136, the following term and definition apply.

2.1

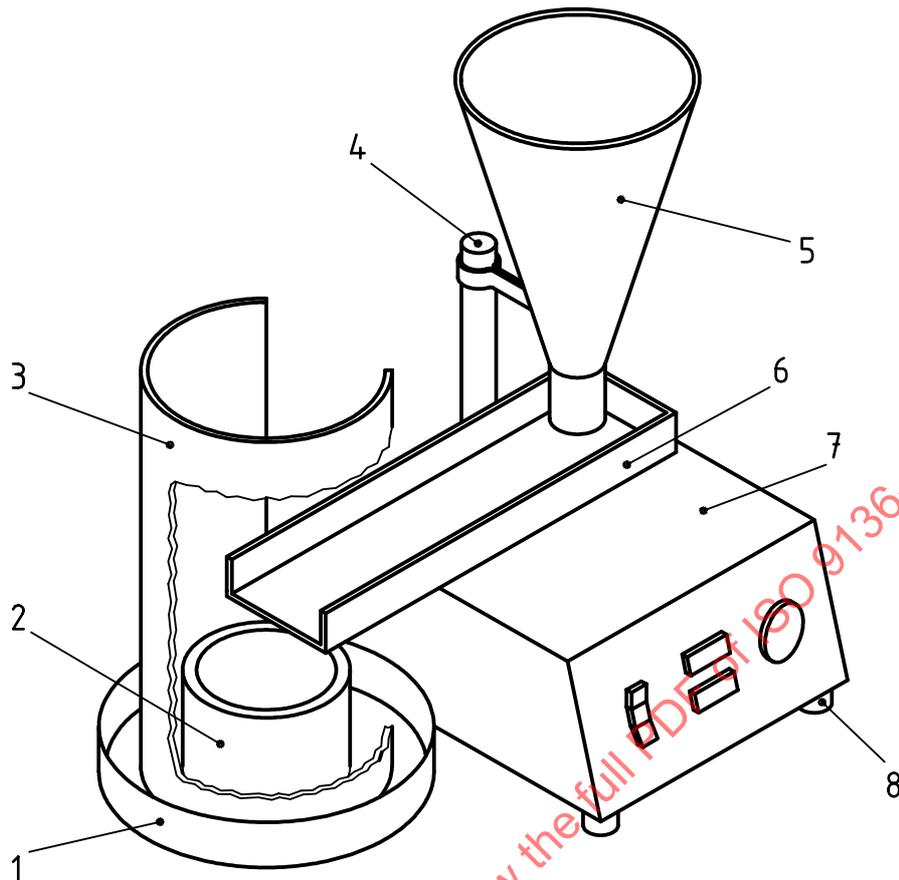
bulk density

ρ_B

this, of a pourable abrasive grain which is poured in a certain way, is the quotient of the mass and the volume, specified in g/cm³

3 Testing equipment

The testing equipment is shown in Figure 1.

**Key**

- 1 Overspill tray
- 2 Measuring cylinder
- 3 Shield
- 4 Stand
- 5 Funnel
- 6 Vibration channel
- 7 Vibration generator
- 8 Rubber feet

} Metering device

Figure 1 — Equipment for the determination of bulk density of microgrits

3.1 Metering Device

The metering device¹⁾ is isolated by rubber feet, so that vibrations are not transmitted to the surroundings. The most important components are:

- a) vibration generator;
- b) stainless steel funnel with a polished inner surface and the following main dimensions:

- 1) total height of funnel: 290 mm;

1) Metering device type DR1000/40 can be obtained from Fa. F. Kurt Retsch GmbH & Co. KG, PO Box 1554, D-42759 Haan. This information is given for the convenience of users of this part of ISO 9136 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 similar results.

- 2) top diameter: 190 mm;
- 3) inside diameter of cylindrical outlet: 28 mm;
- 4) height of cylindrical outlet: 38 mm;
- c) stainless steel horizontal vibration channel, with the following dimensions (210 mm × 40 mm × 30 mm) ± 1 mm (length × width × depth). The distance from the lower edge of the funnel to the bottom of the vibration channel must be (8 ± 4) mm;
- d) stand.

3.2 Measuring cylinder

The measuring cylinder has a polished inner surface and a volume V of (200 ± 0,5) cm³; this volume is achieved by an inner diameter of 64 mm and an inner height of 62,2 mm. The measuring cylinder is placed centrally under the stream coming from the vibration channel.

The height of fall of the microgrit to be tested (from the upper edge of the channel bottom to the bottom of the measuring cylinder) shall be (140 ± 1) mm.

Calibration of the measuring cylinder can be achieved by the following two methods.

Method A

The dry, empty measuring cylinder is weighed together with a flat glass plate. The measuring cylinder is filled with water and the glass plate placed on the cylinder in such a way that no air bubble is present. The glass plate is held in this position, the surplus water removed and the total weight determined.

The volume is calculated in the following way:

$$V = \frac{m_0}{\rho_{\text{H}_2\text{O}}} \quad (1)$$

where

V is the volume of the measuring cylinder, in cubic centimetres;

m_0 is the mass of water, in grams;

$\rho_{\text{H}_2\text{O}}$ is the density of water, in grams per cubic centimetre, at the measuring temperature.

Method B

The volume is calculated by measuring the internal dimensions of the cylinder (margin of error 0,01 mm).

It is recommended that the volume of the measuring cylinder be checked regularly.

3.3 Overspill tray

The overspill tray with a flat bottom serves as a collector for overflowing microgrit. The measuring cylinder is placed in the drip tray.

3.4 Shield

The shield is a glass cylinder of approximately 2 mm wall thickness with a diameter of approximately 110 mm and a height of approximately 200 mm; the recess for the channel is approximately 125 mm × 65 mm, permitting a free fall for the microgrit to be tested.

4 Procedure

4.1 Number of observations

For each microgrit to be tested, the bulk density shall be determined from three samples taken from one sampling.

4.2 Sample preparation

The microgrit to be tested shall be dried for 1 h at a temperature of 110 °C, and then cooled to room temperature before measuring.

4.3 Procedure

The test shall preferably take place at an air temperature of (23 ± 2) °C, and a relative humidity of (50 ± 6) %.

The microgrit to be tested is placed, in its dried form, in the funnel of the metering device. The metering speed, determined by the amplitude of vibration of the built-in vibrator in combination with the distance from the lower edge of the funnel to the bottom of the vibration channel, is regulated according to the grains in such a way that

- an even uninterrupted and regular stream flows into the vibration channel, and
- the filling time of the cylinder is between 30 s and 90 s.

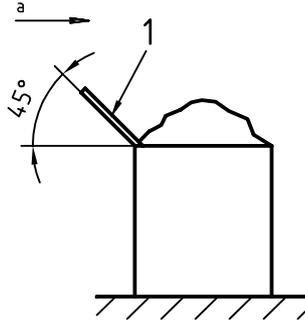
Before each measurement, the test conditions shall be verified.

The measuring cylinder shall be filled in such a way that the test material is heaped in the middle, 2 cm to 3 cm above the rim of the measuring beaker.

The test material heaped above the rim of the measuring cylinder shall be removed using a straight blade with the leading edge at an angle of approximately 45° to the rim of the measuring beaker (see Figure 2).

Vibration shall be avoided throughout the measuring procedure (risk of compaction).

The measuring cylinder filled with microgrits shall be weighed to within 0,01 g.

**Key**

- 1 Straight blade
- a Moving direction

Figure 2 — Procedure for removing the heaped material

5 Calculation

The bulk density, ρ_B , expressed in grams per cubic centimetre, is calculated as follows:

$$\rho_B = \frac{m_1}{V} \quad (2)$$

where

m_1 is the net weight, in grams, of the microgrit held in the measuring cylinder;

V is the volume of the measuring cylinder, in cubic centimetres.

6 Results of measurements

The result of the test is the arithmetic mean of the three measurements.

7 Repeatability

Duplicate determinations by the same operator and apparatus shall not differ by more than $\pm 0,02 \text{ g/cm}^3$.

Bibliography

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