

Bonded abrasives — Determination and designation of grain size distribution —

Part 2: Microgrits F230 to F2000

ICS 25.100.70

National foreword

This British Standard is the UK implementation of ISO 8486-2:2007. It supersedes BS ISO 8486-2:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MTE/13, Grinding wheels, abrasive tools, paper and cloths, and powders.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Bonded abrasives — Determination and designation of grain size distribution — Part 2: Microgrits F230 to F2000

*Abrasifs agglomérés — Détermination et désignation de la distribution
granulométrique —*

Partie 2: Micrograins F230 à F2000



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 8486-2 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 5, *Grinding wheels and abrasives*.

This second edition cancels and replaces the first edition (ISO 8486-2:1996), which has been technically revised.

ISO 8486 consists of the following parts, under the general title *Bonded abrasives — Determination and designation of grain size distribution*:

- *Part 1: Macrogrits F4 to F220*
- *Part 2: Microgrits F230 to F2000*

Bonded abrasives — Determination and designation of grain size distribution —

Part 2: Microgrits F230 to F2000

1 Scope

This part of ISO 8486 sets forth a method for determining or checking the size distribution of microgrits F230 to F2000 in fused aluminium oxide and silicon carbide.

It specifies the grit designation for the testing of those grits used in the manufacture of bonded abrasive products and general industrial applications and those removed from bonded products, as well as loose grits used in polishing.

2 Normative references

The following referenced documents are indispensable for the application 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 8486-1, *Bonded abrasives — Determination and designation of grain size distribution — Part 1: Macrogrits F4 to F220*

3 Terms and definitions

For the purposes of this document, terms and definitions given in ISO 8486-1 and the following apply.

3.1

microgrits

grits with grain size distributions that are determined by sedimentation and mean grain sizes (d_{s50}) of 60 μm or less

4 Method of checking grain size distribution

4.1 Grain size distribution

The grain size distribution of microgrits F230 to F2000 is determined according to the following criteria:

- the grain size (theoretical grain diameter) shall not exceed the maximum permissible d_{s3} value at the 3 % point of the grain size distribution curve;
- the median size (theoretical grain diameter) shall be within the specified tolerances of the d_{s50} value at the 50 % point of the grain size distribution curve;

- c) the grain size (theoretical grain diameter) shall attain at least the d_{s80} , $d_{s94/95}$ values at the 80 % and 94/95 % points of the grain size distribution curve.

The three criteria shall be met simultaneously. The values are specified in Table 1 for a photosedimentometer (94 %) and in Table 2 for a US sedimentation tube (95 %).

The testing of microgrits F230 to F2000 is to be carried out by sedimentation according to Clause 5.

**Table 1 — Grain size distribution of microgrits F230 to F2000
based on photosedimentometer and mastergrits (see 6.1)**

Grit designation	d_{s3} value max. μm	Median grain size d_{s50} value μm	d_{s80} value min. μm	d_{s94} value min. μm
F230	82	53 ± 3	—	34
F240	70	$44,5 \pm 2$	—	28
F280	59	$36,5 \pm 1,5$	—	22
F320	49	$29,2 \pm 1,5$	—	16,5
F360	40	$22,8 \pm 1,5$	—	12
F400	32	$17,3 \pm 1$	—	8
F500	25	$12,8 \pm 1$	—	5
F600	19	$9,3 \pm 1$	—	3
F800	14	$6,5 \pm 1$	—	2
F1000	10	$4,5 \pm 0,8$	—	1
F1200	7	$3 \pm 0,5$	1	—
F1500	5	$2 \pm 0,4$	0,8	—
F2000	3,5	$1,2 \pm 0,3$	0,5	—

Table 2 — Grain size distribution of microgrits F230 to F1200 based on US sedimentation tube and checking minerals

Grit designation	d_{s3} value max. μm	Median grain size d_{s50} value μm	d_{s80} value min. μm	d_{s95} value min. μm
F230	77	$55,7 \pm 3$	—	38
F240	68	$47,5 \pm 2$	—	32
F280	60	$39,9 \pm 1,5$	—	25
F320	52	$32,8 \pm 1,5$	—	19
F360	46	$26,7 \pm 1,5$	—	14
F400	39	$21,4 \pm 1$	—	10
F500	34	$17,1 \pm 1$	—	7
F600	30	$13,7 \pm 1$	—	4,6
F800	26	11 ± 1	—	3,5
F1000	23	$9,1 \pm 0,8$	—	2,4
F1200	20	$7,6 \pm 0,5$	2,4	—
NOTE These values were calculated based on ISO round-robin tests.				

4.2 Grading

The F series is a graduated series of thirteen microgrits, starting at a median particle size of $53 \mu\text{m}$ and ending at $1,2 \mu\text{m}$, as determined by a photosedimentometer. This series follows on from the finest grain in the F series macrogrits F220 ($63 \mu\text{m}$) and uses the same ratio as that series, i.e. $\sqrt[4]{2}$.

The calculation of the individual grain size values (see Table 3) has been made as follows:

- the ratio of the median grain sizes F230 and F240 is $\sqrt[4]{2} \cdot f^0$, i.e. it corresponds approximately to the progressive ratio of the test sieves for macrogrits;
- the ratio of the median grain sizes of the following grits F240 and F280 is $\sqrt[4]{2} \cdot f^1$;
- the ratio of the succeeding grain sizes is $\sqrt[4]{2} \cdot f^n$

where $n = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11$ and where the following equation applies to the factor f :

$$53 = 1,2 \left(\sqrt[4]{2} \right)^{12} \cdot f^{(0+1+2+3+\dots+11)}$$

$$f = \sqrt[66]{\frac{53}{1,2 \left(\sqrt[4]{2} \right)^{12}}} = 1,026$$

This produces a series of ratios starting at 1,189 and ending at 1,581.

Table 3 — Calculation of the f^n factors (photosedimentation)

Grit designation	Median grain size μm	Formula
F230	53	Starting point
F240	44,5	$f^0 = 1 = \frac{53}{44,5} \cdot \frac{1}{\sqrt[4]{2}}$
F280	36,5	$f^1 = \frac{44,5}{36,5} \cdot \frac{1}{\sqrt[4]{2}}$
F320	29,5	$f^2 = \frac{36,5}{29,5} \cdot \frac{1}{\sqrt[4]{2}}$
F360	22,8	$f^3 = \frac{29,5}{22,8} \cdot \frac{1}{\sqrt[4]{2}}$
F400	17,3	$f^4 = \frac{22,8}{17,3} \cdot \frac{1}{\sqrt[4]{2}}$
F500	12,8	$f^5 = \frac{17,3}{12,8} \cdot \frac{1}{\sqrt[4]{2}}$
F600	9,3	$f^6 = \frac{12,8}{9,3} \cdot \frac{1}{\sqrt[4]{2}}$
F800	6,5	$f^7 = \frac{9,3}{6,5} \cdot \frac{1}{\sqrt[4]{2}}$
F1000	4,5	$f^8 = \frac{6,5}{4,5} \cdot \frac{1}{\sqrt[4]{2}}$
F1200	3	$f^9 = \frac{4,5}{3} \cdot \frac{1}{\sqrt[4]{2}}$
F1500	2	$f^{10} = \frac{3}{2} \cdot \frac{1}{\sqrt[4]{2}}$
F2000	1,2	$f^{11} = \frac{2}{1,2} \cdot \frac{1}{\sqrt[4]{2}}$

5 Testing microgrits F230 to F2000

5.1 General

Microgrits F230 to F2000 are tested by means of sedimentation.

The criteria for determining the grain size distribution are

- the theoretical grain size at the 3 % point of the grain size distribution curve (d_{s3} value),
- the theoretical grain size at the 50 % point of the grain size distribution curve (d_{s50} value), and
- the theoretical grain size at the 80 %, 94/95 % point of the grain size distribution curve (d_{s80} , $d_{s94/95}$ values).

5.2 Permissible deviations

When retesting the measured results, allowance shall be made for the variations due to the measuring technique (sampling, sample preparation, different operators and instruments). These permissible deviations, given in Tables 4 and 5, have been determined on the basis of the standard deviation resulting from a cooperative test carried out by the members of ISO TC 29/SC 5. The tolerances given in Tables 1 or 2 are to be increased by these values.

**Table 4 — Permissible deviations resulting from variations due to measuring technique —
Method based on mastergrits**
(Determination, for example, by sedimentation or electrical resistance method)

Dimensions in micrometres

Grit designation	Permissible deviations for values			
	d_{s3}	d_{s50}	d_{s80}	d_{s94}
F230	+ 3,5	± 2,5	—	– 1,5
F240				
F280	+ 2,5	± 1,5	—	– 0,8
F320				
F360				
F400				
F500	+ 2	± 1	—	– 0,5
F600				
F800				
F1000	+ 1,5	± 0,5	—	– 0,4
F1200			– 0,4	—
F1500	+ 1,0	± 0,4	– 0,3	—
F2000	+ 1,0	± 0,3	– 0,2	—

Table 5 — Permissible deviations resulting from the variations due to the measuring technique — US sedimentation tube method

Dimensions in micrometres

Grit designation	Permissible deviations for the values			
	d_{s3}	d_{s50}	d_{s80}	d_{s95}
F230	+ 1,5	$\pm 1,5$	—	– 1,5
F240				
F280	+ 1,5	± 1	—	– 1,5
F320				
F360				
F400				
F500	+ 1,5	$\pm 0,8$	—	– 1,5
F600				
F800				
F1000	+ 1,5	$\pm 0,5$	—	– 1,5
F1200			– 1,5	—

5.3 Designation of test method

The designation of the method for testing microgrits F230 to F2000 shall include an indication of the measuring instrument used:

- test-MICRO F — Sedigraph series¹⁾;
- test-MICRO F — US sedimentation tube¹⁾;
- test-MICRO F — Coulter counter¹⁾.

1) Sedigraph, US sedimentation tube and Coulter counter are examples of suitable products available commercially. This information is given for the convenience of users of this part of ISO 8486 and does not constitute an endorsement by ISO of these products.