INTERNATIONAL STANDARD

ISO 6344-1

First edition
1998-04-15

Corrected and reprinted
1999-02-01

Coated abrasives — Grain size analysis —

Part 1:
Grain size distribution test

Abrasifs appliqués — Granulométrie —

Partie 1: Contrôle de la distribution granulométrique

Reference number
ISO 6344-1:1998(E)

Foreword

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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.

International Standard ISO 6344-1 was prepared by Technical Committee ISO/TC 29, *Small tools*, subcommittee SC 5, *Grinding wheels and abrasives*.

ISO 6344 consists of the following parts, under the general title *Coated abrasifs - Grain size analysis*:

— *Part 1: Grain size disribution test*

— *Part 2: Determination of grain size distribution of macrogrits P12 to P220*

— *Part 3: Determination of grain size distribution of microgrits P240 to P2500*

Annex A of this part of ISO 6344 is for information only.

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Printed in Switzerland

Coated abrasives — Grain size analysis —

Part 1:
Grain size distribution test

1 Scope

This part of ISO 6344 sets forth definitions and grain size distribution test for electro-fused aluminium oxide and silicon carbide grits for coated abrasives, i.e.:

— macrogrits P12 to P220

— microgrits P240 to P2500

Tests for grain size distribution analysis are defined in ISO 6344-2 for macrogrits and in ISO 6344-3 for microgrits.

This part of ISO 6344 applies both to those grits used in the manufacture of coated abrasive products and to those grits recovered from products for test purposes.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 6344. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part os ISO 6344 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 6344-2:1998, *Coated abrasives — Grain size analysis — Part 2: Determination of grain size distribution of macrogrits P12 to P220*.

ISO 6344-3:1998, *Coated abrasives — Grain size analysis — Part 3: Determination of grain size distribution of microgrits P240 to P2500*.

ISO 8486-2:1996, *Bonded abrasives — Determination and designation of grain size distribution – Part 2: Microgrits F230 to F1200.*

ISO 9284:1992, *Abrasive grains — Test-sieving machines.*

3 Definitions

For the purposes of this part of ISO 6344 the following definitions apply.

3.1 Macrogrits: Abrasive grits of diameter between 3,35 mm and 0,053 mm whose grain size distribution is determined by sieving.

3.2 Microgrits: Abrasive grits having a median equivalent diameter (see 4.2 and 4.3) from 58,5 µm to 8,4 µm whose grain size distribution is determined by sedimentation.

3.3 Grain size distribution: Percentage of grains of different sizes composing the macrogrit or microgrit.

4 Requirements

4.1 Macrogrits

These grits shall satisfy the criteria in table 1 according to the method of grain size distribution testing as defined in 5.1.

Macrogrits are classified into 15 categories between P12 and P220 and their grain size distribution is determined by comparative sieving with mastergrits.

A method for testing the grain size distribution of macrogrits is given in ISO 6344-2.

4.2 Microgrits

These grits shall satisfy the criteria in table 2 and table 3 according to the method of grain size distribution testing as defined in 5.2 and 5.3.

Microgrits are classified into 13 categories between P240 and P2500 and their grain size distribution is tested by sedimentation, the results of which shall comply with the criteria of tables 2 and 3.

A method for testing the grain size distribution of microgrits is given in ISO 6344-3.

5 Grain size distribution testing

5.1 Macrogrits

Macrogrits are defined as those grits whose grain size distribution is determined by means of sieving i.e. by residues on or grains passing through the test sieves corresponding to the nest of sieves shown in table 1.

In the case of internal operational tests the macrogrits are determined on common use utility test sieves by comparative sieving with mastergrits (MG)[1)].

The mastergrits are made of fused aluminium oxide. They are checked at the Staatliche Materialprüfungsanstalt Darmstadt (MPA) on the reference RO-TAP test sieving machine in accordance with ISO 9284, with their precisely calibrated series of reference sieves, on which the mastergrits (MG) are checked. These test sieves correspond to the nominal dimensions of the aperture sizes in accordance with the test sieve designation table 1. They are optically measured and considered as reference basis for the testing of grain sizes for coated abrasive products.

Utility test sieves (table 1) are test sieves for the internal operational testing of macrogrits for coated abrasive products. They must achieve reproducible test results in the test with mastergrits.

— For the assessment of the sieving results the values from testing with utility test sieves must be related to the mastergrit values resulting from the testing with reference test sieves.

The grain size distribution of grits when sieved through the specified test sieves shall meet the following criteria:

— that no grains shall be retained on the first test sieve i.e. the residue $Q_1 = 0$,

— that the residue Q_2 does not exceed the maximum value specified for test sieve 2,

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1) Mastergrits can be obtained by:
Staatliche Materialprüfungsanstalt Darmstadt, Grafenstraße 2, D-64283 Darmstadt.

This information is given for the convenience of users of this part of ISO 6344 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.

— that the sum Q_3 of the residues on test sieves 1, 2 and 3 and the sum Q_4 of the residues on test sieves 1, 2, 3 and 4 are within the specified tolerances,

— that the sum Q_5 of the residues on test sieves 1, 2, 3, 4 and 5 is not less than the specified minimum value,

— that the difference ΔQ (remainder in the pan) between the sum of the residues Q_5 and the total weight of the sample does not exceed the specified maximum value.

5.2 Microgrits P240 to P1200

Microgrits are defined as grain whose size distribution is determined by sedimentation.

For the grain size distribution of microgrits P240 to P1200 the following criteria have to be met:

— the maximum grain size (equivalent grain diameter) of the first sedimented grain (d_{s0}-value),

— the maximum grain size (equivalent grain diameter) of those grains corresponding to 3 % of the total sedimented volume (d_{s3}-value),

— the median grain size (equivalent grain diameter) of those grains corresponding to 50 % of the total sedimented volume (d_{s50}-value),

— the smallest grain size (equivalent grain diameter) of those grains corresponding to 95 % of the total sedimented volume (d_{s95}-value).

All four criteria, whose numerical values are given in table 2, shall be met simultaneously.

NOTE — Testing of microgrits P240 to P1200 is carried out by sedimentation in accordance with ISO 6344-3. The US-sentimentometer is described in ISO 8486-2.

5.3 Microgrits P1500 to P2500

The microgrits P1500 to P2500 are defined as grits which were determined and confirmed by sedimentation. The test method is based on the micro-P-mastergrits P1500, P2000 and P2500 (made of fused aluminium oxide).

Criteria for the determination of the grain size distribution of microgrits P1500 to P2500 are:

— the maximum grain size of the first grain (d_{s0}-value),

— the grain size (theoretical grain diameter) at the 3 % point of the grain size distribution curve must not exceed the maximum tolerable d_{s3}-value,

— the median grain size (theoretical grain diameter) at the 50 % point of the grain size distribution curve must be within the tolerable limits for the d_{s50}-value,

— the grain size (theoretical grain diameter) at the 95 % point of the grain size distribution curve must at least attain the minimum tolerable d_{s95}-value.

These four conditions, whose nominal values are given in table 3, must be fulfilled at the same time.

Table 1 — Grain size distribution of macrogrits P12 to P220

Grit designation	Test sieve 1			Test sieve 2			Test sieve 3			Test sieve 4			Test sieve 5			Remainder in bottom pan
	Aperture size sieve 1 w_1		Residue on test sieve 1 Q_1	Aperture size sieve 2 w_2		Residue on test sieves 1 and 2 Q_2 max.	Aperture size sieve 3 w_3		Residue on test sieves 1, 2 and 3 Q_3	Aperture size sieve 4 w_4		Residue on test sieves 1, 2, 3 and 4 Q_4	Aperture size sieve 5 w_5		Residue on test sieves 1, 2, 3 4 and 5 Q_5 min.	ΔQ max.
	mm	µm	%	mm	µm	%	mm	µm	%	mm	µm	%	mm	µm	%	%
P12	3,35	–	0	2,36	–	1	2	–	14 ± 4	1,7	–	61 ± 9	1,4	–	92	8
P16	2,36	–	0	1,7	–	3	1,4	–	26 ± 6	1,18	–	75 ± 9	1	–	96	4
P20	1,7	–	0	1,18	–	7	1	–	42 ± 8	–	850	86 ± 6	–	710	96	4
P24	1,4	–	0	1	–	1	–	850	14 ± 4	–	710	61 ± 9	–	600	92	8
P30	1,18	–	0	–	850	1	–	710	14 ± 4	–	600	61 ± 9	–	500	92	8
P36	1	–	0	–	710	1	–	600	14 ± 4	–	500	61 ± 9	–	425	92	8
P40	–	710	0	–	500	7	–	425	42 ± 8	–	355	86 ± 6	–	300	96	4
P50	–	600	0	–	425	3	–	355	26 ± 6	–	300	75 ± 9	–	250	96	4
P60	–	500	0	–	355	1	–	300	14 ± 4	–	250	61 ± 9	–	212	92	8
P80	–	355	0	–	250	3	–	212	26 ± 6	–	180	75 ± 9	–	150	96	4
P100	–	300	0	–	212	1	–	180	14 ± 4	–	150	61 ± 9	–	125	92	8
P120	–	212	0	–	150	7	–	125	42 ± 8	–	106	86 ± 6	–	90	96	4
P150	–	180	0	–	125	3	–	106	26 ± 6	–	90	75 ± 9	–	75	96	4
P180	–	150	0	–	106	2	–	90	15 ± 5	–	75	62 ± 12	–	63	90	10
P220	–	125	0	–	90	2	–	75	15 ± 5	–	63	62 ± 12	–	53	90	10

Table 2 — Grain size distribution of microgrits P240 to P1200

Grit designation	d_{s0}-value max. µm	d_{s3}-value max. µm	Median grain size d_{s50}-values µm		d_{s95}-value min. µm
P240	110	81,7	58,5	± 2	44,5
P280	101	74	52,2	± 2	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	25,8	± 1	18,0
P800	67	38,1	21,8	± 1	15,1
P1000	63	33,7	18,3	± 1	12,4
P1200	58	29,7	15,3	± 1	10,2

NOTE — These values apply only to measurement by means of the US-sedimentometer according to ISO 8486-2.

Table 3 — Grain size distribution of the microgrits P1500 to P2500

Grit designation	d_{s0}-value[1] max. µm	d_{s3}-value max. µm	Median grain size d_{s50}-value µm	d_{s95}-value min. µm
P1500	58	25,8	12,6 ± 1	8,3
P2000	58	22,4	10,3 ± 0,8	6,7
P2500	58	19,3	8,4 ± 0,5	5,4
NOTE — These values apply only to measurement by means of the US-sedimentometer according to ISO 8486-2.				
1) Determined on the basis of the standard deviations resulting from an ISO round robin test.				

Annex A
(informative)

Bibliography

[1] ISO 565:1990, *Test sieves – Metal wire cloth, perforated metal plate and electroformed sheet – Nominal sizes of openings.*

[2] ISO 3310-1:—[2], *Test sieves – Requirements and tests – Part 1: Metal wire cloth sieves.*

[3] ISO 9138:1993, *Abrasive grains – Sampling and splitting.*

2) To be published. (Revision of ISO 3310:1990)

ICS 25.100.70

Descriptors: tools, abrasives, grain size analysis, tests, determination, size classification, definitions.

Price based on 6 pages