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Coated abrasives — Grain size analysis —

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

Abrasifs appliqués — Granulométrie —

Partie 2: Détermination de la distribution granulométrique des macrograins P12 à P220

Reference number
ISO 6344-2:1998(E)

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.

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 6344-2 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*

Annexes A and B of this part of ISO 6344 are for information only.

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Coated abrasives — Grain size analysis —

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

1 Scope

This part of ISO 6344 sets forth a method for determining or testing the grain size distribution of electro-fused aluminium oxide and silicon carbide macrogrits P 12 to P 220 for coated abrasives as defined in ISO 6344-1.

It applies both to those grits used in the manufacture of coated abrasive products and to those grits removed from products for testing 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 of 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 3310-1:—[1)], *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*.

ISO 6344-1:1997, *Coated abrasives — Grain size analysis — Part 1: Grain size distribution test*.

ISO 9138:1993, *Abrasive grains — Sampling and splitting*.

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

3 Definitions

For the purposes of this part of ISO 6344 the definitions given in ISO 6344-1 apply.

4 Grain size distribution testing

4.1 Apparatus

4.1.1 Test sieving machine

The test shall only be carried out with test sieving machines giving reproducible and comparable results, e. g. RO-TAP test sieving machines in accordance with ISO 9284.

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1) To be published. (Revision of ISO 3310-1:1990)

4.1.2 Time switch

A time switch shall be used to control the test sieving machine for a period of 5 min. The permissible accuracy shall be ± 5 s.

4.1.3 Utility test sieves

The utility test sieves given in table 1 shall be used. They represent a selection of the test sieves according to ISO 3310-1.

The checking of the serviceability of the test sieves is described in clause 5.

4.1.4 Balance

Only balances with an accuracy of ± 0,1 g shall be used.

4.2 Mastergrits

The mastergrits (MG) [2] represent the reference for the grain size testing for coated abrasive products.

The grain size distribution of the mastergrits is given in table 2 (the limits specified in table 1 of ISO 6344-1 are reproduced as table 2 in this part of ISO 6344), with the reservation that the tolerances for Q_3 and Q_4 are only half the indicated value on the test sieving machine of MPA Darmstadt. Each supply of mastergrits shall be accompanied by a test certificate of MPA Darmstadt indicating the sieving analysis and the respective date of test of the mastergrits.

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2) 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 same results.

Table 1

Nominal sizes of openings of test sieves	
mm	µm
3,35	
2,36	
2	
1,7	
1,4	
1,18	
1	
	850
	710
	600
	500
	425
	355
	300
	250
	212
	180
	150
	125
	106
	90
	75
	63
	53

4.3 Checking of the common use utility test sieves

Common use utility test sieves must be free from visible defects such as textural flaws (gaps, broken wires etc.), insufficient tension of the fabric, distortions of the frame (out of roundness, leaks and soldering defects) and free from blinding as these will impair the sieving results.

Mastergrits shall be used for checking the serviceability of these test sieves within the meaning of this standard.

The utility test sieve to be tested shall be mounted into the respective nest of sieves as the 3rd sieve. The 1st sieve and the 2nd sieve must be checked sieves. The sum of the residues on the 1st, 2nd and 3rd sieve each shall not deviate from the mastergrit analysis value as given by MPA Darmstadt by more than 1,5 times the tolerance according to table 2.

Sieves which cannot be inserted as 3rd sieve when assembled in the nest of test sieves according to table 2, shall be tested as 4th sieve. In this case it shall be ensured that the 1st, 2nd and 3rd sieves are checked sieves. The sum of the residues on test sieves 1, 2, 3 and 4 each must be within 1,5 times the tolerance according to table 2 for the mastergrit analysis value given by MPA Darmstadt.

After this test, a sieve is considered as not suitable if the sum of the residues on the 1st, 2nd, and 3rd or on the 1st, 2nd, 3rd and 4th sieve respectively exceeds the permissible deviations of table 2 by more than half the value. The sum of the residues of the mastergrit on the 1st, 2nd and 3rd sieve or on the 1st, 2nd, 3rd and 4th sieve as determined by MPA Darmstadt is applicable as the reference value.

The sieves marked with 3,35 mm, 2,36 mm and 53 μm shall be tested according to ISO 3310-1.

5 Testing of macrogrits P12 to P220

5.1 Preparation

5.1.1 Preparation of the sample

The abrasive grit to be tested must be dry. If it is wet, it must be dried at a temperature of 105 °C until its weight remains constant.

100 g of the dry abrasive shall be weighed out as sample for test sieving.

In the case of grains recovered from the coated abrasive product, the sample shall never be less than 20 g.

For sampling and splitting of abrasive grains, see ISO 9138.

5.1.2 Mounting of test sieves

The five utility test sieves, see table 2, required for testing the respective grain size shall be assembled together with the bottom pan to form a nest of sieves taking into account the prescribed order. The sample shall be poured onto the first test sieve and the cover put on. Then the nest of sieves shall be mounted in the test sieving machine. The tapper shall be placed on the cover of the nest of test sieves.

5.1.3 Determination of the mastergrit values for the utility test sieving

Because of the unavoidable deviations between test sieves of the same designation, it is necessary to carry out a first sieving with mastergrits on the sieves to be used in order to determine the Q values of the mastergrit (MG values), thus checking the test sieves, and to obtain the corrected values for these sieves.

For this purpose, 100 g of mastergrit of the same grain size shall be weighed out and transferred to test sieve 1. The test sieving machine shall be run for 5 min by setting the time switch accordingly.

After the sieving is completed, the residues on the sieves shall be transferred cumulatively to the balance pan and weighed, beginning with the residue on the coarsest test sieve. The residues on the finer test sieves are added to the residue on the coarser test sieves. The residue on the bottom pan shall also be weighed.

The determined residues Q_1 to Q_5 are the MG values of the nest of utility test sieves used for the same grain size.

5.2 Test sieving procedure

100 g of the abrasive grain to be tested shall be weighed out as sample and transferred to test sieve 1. The sieving procedure shall be the same as described for the mastergrit.

If grains recovered from the coated abrasive product are to be tested, the quantity of the sample shall be not less than 20 g.

The sieving result shows the grain size distribution of the sample.

5.3 Evaluation

Sieving results for mastergrit and the sample can best be compared using a typical form as shown below:

Column 1: Sieve designation according to aperture sizes as given in table 2.

Column 2: Sieving analysis of the mastergrit as given by the certificate of MPA Darmstadt.

Column 3: Sieving analysis of the mastergrit determined on the nest of utility test sieves.

Column 4: Difference between the sieving analysis of the mastergrit in Column 3 and the sieving analysis of the mastergrit by MPA Darmstadt in column 2.

Attention shall be paid to the signs!

Column 5: Sieving analysis of the sample determined on the same nest of test sieves.

Column 6: Corrected sieving analysis of the sample, determined from the difference between column 5 and column 4.

Attention shall be paid to the signs!

Column 7: Permissible limiting values according to table 2.

If the results in column 6 are within the permissible tolerance limits given in column 7, then the sample is in compliance with the standard.

If the values in column 6 are not within the permissible tolerance limits, a second sample shall be taken and a new sieving carried out.

6 Designation

The designation of macrogrits for fused aluminium oxide or silicon carbide in accordance with the requirements of this part of ISO 6344 shall comprise

a) the type of abrasive;

b) the designation of the grit including the letter "P" for a coated abrasive followed by a characteristic number representing the grit size.

EXAMPLE:

7 Marking

When packing grits of fused aluminium oxide and silicon carbide for coated abrasive products, the grit designation, i. e. P 80, shall be marked on each of the smallest packing units.

Table 2 — 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			
	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.	Remainder in bottom pan 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

8 Form for recording the results of sieving analysis of P macrogrits

Testing of P12 to P220 macrogrits

Abrasive: ..... Supplier: .....

Girt designation: ..... Date of delivery: .....

Test sieving machine: ..... Quantity of sample: .....

Test sieve	**Sieve designation**		**Sieving analysis of the mastergrit**		**Difference** (column 3 minus column 2)	**Sieving analysis of the sample on set of utility test sieves**	**Corrected sieving analysis of the sample** (column 5 minus column 4)	**Permissible limiting values according to table 2**	**Remarks**
			according to MPA certificate	**on set of utility test sieves**					
	mm	µm	%	%	%	%	%	%	
	1		2	3	4 (= 3 - 2)	5	6 (= 5 - 4)	7	8
1									
2									
3									
4									
5									
Bottom pan contents (ΔQ)									

Date: Operator:

Annex A
(informative)

Example of presentation of test data for macrogrit P grain size distribution

Testing of sample of electro-fused aluminium oxide of grit size P 80 on two different sets of sieves, A and B. The results of examples A and B are recorded on the same form.

A.1 Grain size distribution analysis with sieves set A

Testing of P12 to P220 macrogrits

Abrasive: Electro-fused aluminium oxide — Supplier: X

Girt designation: P 80 — Date of delivery: 1984-06-15

Test sieving machine: C2 — Quantity of sample: 100 g

Test sieve	Sieve designation		Sieving analysis of the mastergrit		Difference (column 3 minus column 2)	Sieving analysis of the sample on set of utility test sieves	Corrected sieving analysis of the sample (column 5 minus column 4)	Permissible limiting values according to table 2	Remarks
			according to MPA certificate	on set of utility test sieves					
	mm	µm	%	%	%	%	%	%	
	1		2	3	4 (= 3 - 2)	5	6 (= 5 - 4)	7	8
1		355	0	0	0	0	0	0	
2		250	1	4	+ 3	4	1	3 max.	
3		212	24,5	27	+ 2,5	31	28,5	20 to 32	
4		180	77,5	86	+ 8,5	88	79,5	66 to 84	
5		150	98	98	0	98	98	96 min.	
Bottom pan contents (ΔQ)			2	2	0	2	2	4 max.	

Date: 1984-06-19 — Operator: Y

A.2 Grain size distribution analysis with sieves set B

Testing of P 12 to P 220 macrogrits								
Abrasive: Electro-fused aluminium oxide				Supplier: X				
Grit designation: P 80				Date of delivery: 1984-06-15				
Test sieving machine: A3				Quantity of sample: 100 g				
Test sieve	**Sieve designation**		**Sieving analysis of the mastergrit**		**Difference** (column 3 minus column 2)	**Sieving analysis of the sample on set of utility test sieves**	**Corrected sieving analysis of the sample** (column 5 minus column 4)	**Permissible limiting values according to table 2**	**Remarks**
			according to MPA certificate	**on set of utility test sieves**					
	mm	µm	%	%	%	%	%	%	
	1		2	3	4 (= 3 - 2)	5	6 (= 5 - 4)	7	8
1		355	0	0	0	0	0	0	
2		250	1	1	0	1	1	3 max.	
3		212	24,5	22	- 2,5	25	27,5	20 to 32	
4		180	77,5	81	+ 3,5	83	79,5	66 to 84	
5		150	98	98	0	98	98	96 min.	
Bottom pan contents (ΔQ)			2	2	0	2	2	4 max.	
Date: 1984-06-19					Operator: Y				

The interpretation of the test results shows that despite the use of different sets of utility sieves the sample conforms to this part of ISO 6344 in both cases.

Annex B
(informative)

Bibliography

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

ICS 25.100.70

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

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