
International Standard



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Metallic powders — Determination of particle size by dry sieving

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4497 was developed by Technical Committee ISO/TC 119, *Powder metallurgy*, and was circulated to the member bodies in August 1982.

It has been approved by the member bodies of the following countries :

Canada	Italy	Spain
China	Mexico	Sweden
Czechoslovakia	Norway	United Kingdom
Egypt, Arab Rep. of	Poland	USA
France	Romania	USSR
Germany, F. R.	South Africa, Rep. of	

No member body expressed disapproval of the document.

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Metallic powders — Determination of particle size by dry sieving

1 Scope and field of application

This International Standard specifies a method of determining the particle size distribution of metallic powders by dry sieving into size fractions.

The method is applicable to dry, unlubricated metallic powders, but not applicable to powders in which the morphology differs markedly from being equiaxial, for example flake-type powders.

The method is not applicable to metallic powders having a particle size wholly or mostly under 45 μm .

2 References

ISO 565, *Test sieves — Woven metal wire cloth, perforated plate and electroformed sheet — Nominal sizes of openings.*

ISO 2591, *Test sieving.*

3 Principle

Separation of the metallic powder into particle size fractions by shaking through a set of wire cloth test sieves arranged in consecutive order of size of aperture openings.

Weighing of the fractions retained on each sieve and the fraction passing the finest sieve.

4 Apparatus

4.1 Calibrated series of non-magnetic wire cloth sieves, having different nominal aperture sizes. Each sieve cloth shall be mounted in a non-magnetic metal frame having a nominal diameter of 200 mm and a nominal depth within the range 25 mm to 50 mm.

NOTE — ISO 2591 specifies a nominal depth of 50 mm.

The test sieve frames shall nest snugly with one another, and the set shall be completed with a lid on top and a collecting pan below the bottom sieve.

The calibration of sieves shall be carried out according to ISO 2591, sub-clause 3.1.3.

The aperture size of the test sieves shall be chosen from the principal size (R 20/3) sieves of ISO 565, but if this is not appropriate the principal sizes can be partly or totally replaced from one of the intermediate sizes (R 40/3 or R 20). The aperture sizes of the test sieves shall be chosen so as to determine adequately the particle size distribution of the test portion (see clause 7).

NOTE — An irregular or partial set of test sieves may be selected, if agreed between the supplier and the purchaser.

4.2 Mechanical sieving machine, if used (see 6.2).

4.3 Balance, capable of weighing at least 100 g to an accuracy of $\pm 0,05$ g.

4.4 Soft brush.

5 Preparation of test portion

5.1 In general, the powder shall be tested in the as-received condition. If necessary, the powder may be dried. However, if the powder is susceptible to oxidation, the drying shall take place in vacuum or an inert gas.

5.2 The test portion shall have a mass of approximately 100 g for powders having an apparent density greater than 1,50 g/cm³. If the apparent density of the powder is 1,50 g/cm³ or less, the mass of the test portion shall be approximately 50 g.

6 Procedure

6.1 The series of test sieves selected shall be assembled complete with lid and collecting pan in consecutive order of size of apertures, with the sieve having the largest aperture on top. The test portion shall be placed on the top sieve and this should be closed by a lid.

6.2 The sieving shall be performed either by hand or by means of a mechanical sieving machine.

NOTE — As different types of sieving machines are known to give different results when using the same sieves and the same powder, it is generally possible to establish a correlation between different machines for a particular powder.

6.3 The sieving process shall be continued either until the end point of the sieving is reached or for a time to be agreed between the supplier and the purchaser. The end point is reached when the quantity passing through the sieve retaining the largest fraction of the test portion in 1 min is less than 0,1 % of the test portion in accordance with ISO 2591.

6.4 After the sieving process, weigh the fraction contained on each sieve and in the pan to the nearest 0,1 g in the case of 100 g test portion and to the nearest 0,05 g in the case of 50 g test portion, commencing with the coarsest fraction and finishing with the fraction in the pan.

The powder fraction retained on each sieve shall be collected for weighing as follows :

Remove the sieve from the nest. Gently tip the contents of the sieve to one side and, with the aid of a soft brush, transfer them onto a sheet of glazed paper. Brush any powder adhering to the bottom of the sieve and its frame with a soft brush into the next finer sieve. Invert the sieve over the glazed paper and gently tap the sieve frame.

Collect the fraction in the pan for weighing in a similar manner.

6.5 The sum of the masses of all the fractions shall be not less than 98 % of the mass of the test portion.

7 Expression of results

The mass of the fractions retained on each sieve and of the one collected in the pan shall be expressed as percentages of the sum of the masses of all the fractions and reported to the nearest 0,1 %. Any fraction whose percentage is less than 0,1 % shall be reported as "trace".

The following table of results is given by way of example only.

Table

Sieve size range		Sieve fractions	
		g	% (m/m)
µm			
	> 180	trace	trace
< 180	> 150	0,2	0,2
< 150	> 106	21,3	21,6
< 106	> 75	25,5	25,9
< 75	> 63	11,6	11,8
< 63	> 45	14,1	14,3
< 45		25,8	26,2
Total		98,5	100,0
Mass of test portion		99,9	
Loss		1,4	

8 Test report

The test report shall include the following information :

- reference to this International Standard;
- all details necessary for identification of the test sample;
- the drying procedure, if the powder has been dried;
- method of sieving and details of the sieving machine if used;
- duration of the sieving;
- the result obtained;
- all operations not specified by this International Standard or in the International Standards to which reference is made, or regarded as optional;
- details of any occurrence which may have affected the result.