

INTERNATIONAL STANDARD

ISO 8876

First edition
1989-10-01

Fluorspar — Determination of particle size distribution by sieving

Spathes fluor — Analyse granulométrique par tamisage



Reference number
ISO 8876 : 1989 (E)



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Contents

Page

Foreword	iii
1 Scope	1
2 Normative references	1
3 Definitions	1
4 Principles of sieving	2
5 Apparatus	4
6 Maintenance of sieves	5
7 Test sample for particle size determination	5
8 Sieving procedure	5
9 Expression of results	7
10 Test report	7
Annexes	
A Typical batch-sieving apparatus	8
B Desirable features of mechanical sieving machines	9

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International Organization for Standardization

Case postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

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 approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8876 was prepared by Technical Committee ISO/TC 175, *Fluorspar*.

Annexes A and B of this International Standard are for information only.

Fluorspar — Determination of particle size distribution by sieving

1 Scope

This International Standard specifies sieving procedures to be employed for the determination of the particle size distribution of fluorspar.

The particle size distribution is expressed in terms of the percentage mass of fluorspar which passes through or is retained on selected sieves.

Annexes A and B show examples of sieving apparatus.

The purpose of this International Standard is to provide a basic method for the determination of the particle size distribution of fluorspar which may be used by contracting parties in the sale and purchase of this material.

2 Normative references

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

ISO 565 : 1983, *Test sieves — Woven metal wire cloth, perforated plate and electroformed sheet — Nominal sizes of openings*.

ISO 2591-1 : 1988, *Test sieving — Part 1: Methods using test sieves of woven wire cloth and perforated metal plate*.

ISO 3310-1 : 1982, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*.

ISO 3310-2 : 1982, *Test sieves — Technical requirements and testing — Part 2: Test sieves of metal perforated plate*.

ISO 8868 : 1989, *Fluorspar — Sampling and sample preparation*.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 charge: A sample of fluorspar to be treated simultaneously on an individual sieve or on a nest of test sieves.

3.2 particle: Discrete coherent body of fluorspar of any size.

3.3 particle size (as determined by sieving): The size range according to which a particle is classified, i.e. the size of the smallest sieve opening through which a particle will pass if presented in the most favourable attitude and the size of the largest sieve opening on which the particle is retained.

3.4 nominal top size: Particle size corresponding to the size of the opening of the sieve on which approximately 5 % (m/m) of the fluorspar charge is retained.

3.5 particle size distribution: The quantitative grouping of particles in the sample according to particle size. It is expressed in terms of the percentage mass of particles which pass through or are retained on selected sieves in relation to the total mass of the sample.

3.6 particle size fraction: The portion of the charge separated by one sieve or two sieves with different opening sizes.

3.7 oversize fraction: The portion of the charge which does not pass through the coarsest sieve in the test, e.g. + w_A mm (or μm).

3.8 undersize fraction: The portion of the charge which passes through the finest sieve in the test, e.g. – w_c mm (or μm).

3.9 intermediate particle size fraction: The portion of the sample specified by the smallest sieve opening, e.g. w_A mm (or

ISO 8876 : 1989 (E)

μm), through which the fraction has passed together with the size of the largest sieve opening, e.g. w_B mm (or μm), on which the fraction is retained in the test, e.g. $-w_A + w_B$ mm (or μm).

3.10 specification particle size: Any sieve size (or sizes) selected by the interested parties to define the limit (or limits) of the particle size fraction considered by them to be significant.

3.11 bulk density: The mass in air of a unit volume of fluorspar, including the voids within and between particles, expressed as mass units per unit volume, e.g. kilograms per cubic metre.

3.12 sieve: An apparatus for the purpose of sieving, consisting of a sieving medium mounted in a frame.

3.13 sieving medium: A surface containing regularly arranged openings of uniform shape and size.

3.14 specification sieve: Sieve having an opening size corresponding to the specification particle size (see 3.10).

3.15 sieving: Process of separating a mixture of particles, according to their size, by means of one or more sieves.

NOTE — When sieves are fitted together to form a nest of sieves, the term "nest sieving" may be used.

3.16 hand placing: A sieving operation in which particles are presented individually and by hand to the sieve openings and oriented until either they can be passed through without force being applied or they can be clearly classified as oversize.

3.17 hand sieving: Sieving operation in which the sieve or sieves are supported and agitated manually.

3.18 assisted hand sieving: Sieving operation in which the sieve or sieves are supported mechanically, but are agitated manually.

3.19 mechanical sieving: Sieving operation in which the sieves are supported and agitated by mechanical means. This operation may be either batch or continuous sieving.

3.20 batch sieving: Sieving operation in which a specific quantity of fluorspar is presented to one or more sieves which are agitated either by hand or by mechanical means. Characteristically, the resulting products are retained within the frame of the sieve or sieves until the end of the operation is reached. The number of presentations of particles to the openings is dependent on the length of sieving time (see annex A).

3.21 continuous sieving: A sieving operation in which the fluorspar is fed continuously onto one or several consecutive sieving media over which it travels (e.g. by virtue of the sieving medium being agitated, rotated and/or inclined). The products are continuously discharged. (See annex B.)

4 Principles of sieving

4.1 Planning

Before a particle size determination is carried out, it is necessary to plan the entire sequence of procedures to be followed. The sequence of procedures will depend on

- a) the fluorspar to be evaluated, e.g. a visual examination of the particle size distribution of the sample may be made;
- b) the form in which the fluorspar is received (i.e. as separate increments or as partial samples or the gross sample);
- c) the apparatus available;
- d) the purpose of the analysis.

A typical decision tree to enable the sequence of procedures to be formulated is shown in figure 1.

Sieving shall be carried out under controlled conditions strictly in accordance with ISO 2591-1.

4.2 Selection of sieving operation

The final sieving operation used shall be based on one of the following procedures:

- a) sieving of the complete particle size sample;
- b) sieving separately of each increment or each partial sample or the gross sample.

Each user should consider the respective merits of these two operations in relation to the available apparatus and the quantity of sample to be processed.

4.3 Determination of sieving method

To decide whether the determination of the particle size distribution should be carried out using a manual or a mechanical sieving method, account should be taken of the state of the sample, e.g. its mass, and the number of determinations constituting the sieving operation selected.

4.4 Choice of apparatus

The equipment should be chosen from that available according to the mass (4.6.2) and particle size (4.6.1) of the fluorspar to be sieved.

4.5 Accuracy of sieving operation

For all sieving methods except mechanical sieving, the sum of the fractional masses of each operation should not differ by more than 1 % from the mass of the input to the operation.