International Standard 8397

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Solid fertilizers and soil conditioners — Test sieving

Matières fertilisantes solides — Tamisage de contrôle

First edition — 1986-11-01

UDC 631.8 : 620.168.32 **Ref. No. ISO 8397-1986 (E)**

Descriptors : fertilizers, grain size analysis, sieve analysis

Price based on 3 pages

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8397 was prepared by Technical Committee ISO/TC 134, *Fertilizers and soil conditioners.*

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Printed in Switzerland

Solid fertilizers and soil conditioners — Test sieving

1 Scope and field of application

This International Standard specifies a method for the determination of the particle size distribution of solid fertilizers and soil conditioners by test sieving.

NOTE — The applicability of the method has been tested with sieves of nominal sizes of openings between 100 µm and 5,60 mm.

2 References

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

ISO 2395, *Test sieves and test sieving — Vocabulary.*

ISO 2591, *Test sieving.*

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

ISO 3944, *Fertilizers — Determination of bulk density (loose).*

ISO 3963, *Fertilizers — Sampling from a conveyor by stopping the belt.*

ISO 7410, *Fertilizers and soil conditioners — Final samples — Practical arrangements.*

3 Definitions

For the purpose of this International Standard, the definitions of ISO 2395 apply.

4 Principle

Dry sieving of a fertilizer sample with one or more test sieves using a mechanical sieving machine.

5 Apparatus

5.1 Balance, capable of weighing to the nearest 0,1 g.

5.2 Stainless steel woven wire test sieves, 200 mm diameter, complying with ISO 3310/1, with a lid and receiver for the sieves.

5.3 Mechanical shaker (sieving machine), capable of imparting both horizontal and vertical motion to material inside a nest of sieves.

5.4 Stopwatch.

5.5 Soft brush.

6 Sampling

See ISO 3963 and ISO 7410.

7 Preparation of the test portion

Reduce the sample (a method will form the subject of a future International Standard) to the quantity required for the sieving test. This quantity should be approximately that indicated in column 2 of table 1 for the sieve corresponding to the dominant size fraction of the sample, provided that the size distribution does not cause excess volume on any of the sieves in the set as indicated in column 3 of table 1.

Table 1 — Recommended charges for test sieving

Nominal aperture size	Bulk volume of material*	
	Recommended volume of charge	Maximum volume of residue permitted on the sieve at the completion of sieving
	cm^3	cm^3
8,00 mm	500	250
5,60 mm	400	200
4,00 mm	350	175
2,80 mm	240	120
2,00 mm	200	100
1,40 mm	160	80
1,00 mm	140	70
710 µm	120	60
500 µm	100	50
355 µm	80	40
250 µm	70	35
180 µm	60	30
For non-friable and non-adhesive materials only		
125 µm	50	25
90 µm	40	20

* The mass of material can be calculated by multiplying the volume by the bulk density, determined by the method described in ISO 3944, of the material to be sieved.

8 Procedure

8.1 Select a maximum of seven test sieves from the range of principal sizes listed in ISO 565 to cover the range of particle size expected. Assemble the sieves in ascending order of aperture size on top of the receiver.

NOTE — Normally the principal sizes (R 20/3) should be used. In special cases, however, it may be necessary to use supplementary sizes (R 20).

8.2 Weigh the test portion to the nearest 0,1 g, place it on the top sieve and fit the cover.

8.3 Place the assembled nest of sieves on the mechanical shaker and shake for 10 min.

8.4 Remove the sieves from the nest and weigh the quantity retained on each sieve and in the receiver to the nearest 0,1 g. Particles caught in the mesh of the sieve may be removed by brushing the reverse side of the sieve.

8.5 Carry out at least two tests on separate test portions prepared from the same laboratory sample.

9 Expression of results

9.1 Sum the masses of the fractions retained on the sieves and in the receiver.

NOTE — The sum of these masses should not differ by more than 1 % from the original mass of the test portion.

9.2 Calculate each fraction mass as a percentage of the sum of these masses.

10 Precision

The statistical information given here is only intended as a guideline to what can be expected. The values are based on the evaluation of collaborative studies which have been carried out using sieves of nominal sizes of openings between 100 µm and 5,60 mm.

10.1 Repeatability, r

The difference between two single results found on identical test material by one operator using the same apparatus within the shortest feasible time interval shall exceed the repeatability value r, expressed as a percentage, given by equation (1), on average not more than once in 20 cases in the normal and correct operation of the method. Both results should be considered suspect if the repeatability value r is exceeded.

$$r = 0{,}5\sqrt{\bar{x}} \qquad \ldots \quad (1)$$

10.2 Reproducibility, R

Single results on identical test material reported by two laboratories shall differ by more than the reproducibility value R, expressed as a percentage, given by equation (2), on average not more than once in 20 cases in the normal and correct operation of the method. Both results should be considered suspect if the reproducibility value R is exceeded.

$$R = 2{,}5\sqrt{\bar{x}} \qquad \ldots \quad (2)$$

10.3 Examples (see table 2)

Table 2

$\bar{x}$	r	R	For r		For R	
			x_{min}*	x_{max}**	x_{min}*	x_{max}**
1	0,5	(2,5)	0,8	1,3	0	2
4	1	5	3,5	4,5	1,5	6,5
9	1,5	7,5	8,3	9,8	5,3	12,8
16	2	10	15	17	11	21
25	2,5	12,5	23,8	26,3	18,8	31,3
36	2,5	12,5	34,8	37,3	29,8	42,3

* x_{min} is the smaller of the two corresponding fractions x, expressed as a percentage by mass.

** x_{max} is the larger of the two corresponding fractions x, expressed as a percentage by mass.