

INTERNATIONAL STANDARD

ISO
8633

First edition
1992-12-01

Solid fertilizers — Simple sampling method for small lots

Engrais solides — Méthode simple d'échantillonnage pour petits lots



Reference number
ISO 8633:1992(E)

Foreword

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International Standard ISO 8633 was prepared by Technical Committee ISO/TC 134, *Fertilizers and soil conditioners*, Sub-Committee SC 2, *Sampling*.

Annex A of this International Standard is for information only.

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International Organization for Standardization

Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Introduction

Correct sampling is a difficult operation which requires great care. The need to obtain a fully representative sample for the chemical and physical testing of fertilizers cannot be stressed too much. Sampling plans have been produced to cover a range of quantities of fertilizer and these form the basis of other International Standards. The sampling plan given in this International Standard is not based on strict statistical principles and further information on the statistical theory of sampling fertilizers may be found elsewhere, for example in ISO/TR 5307. Samples obtained by following the procedures described in this International Standard may be considered as representative of the original lot or sample portion.

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Solid fertilizers — Simple sampling method for small lots

1 Scope

This International Standard defines a sampling plan for the control of quantities of solid fertilizer not more than 250 t and outlines the method to be used. It is applicable to all solid fertilizers which may be in bulk or in packages.

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 indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5306:1983, *Fertilizers — Presentation of sampling reports*.

ISO 5308:—¹⁾, *Solid fertilizers — Method of checking the performance of mechanical devices for the sampling of product moving in bulk*.

ISO/TR 7553:1987, *Fertilizers — Sampling — Minimum mass of increment to be taken to be representative of the total sampling unit*.

ISO 7742:1988, *Solid fertilizers — Reduction of samples*.

ISO 8157:1984, *Fertilizers and soil conditioners — Vocabulary*.

ISO 8358:1991, *Solid fertilizers — Preparation of samples for chemical and physical analysis*.

1) To be published.

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 8157 and the following definitions apply.

3.1 lot; sample portion: The total quantity of material, assumed to have the same characteristics, to be sampled using a particular sampling plan.

3.2 delivery: A quantity of material transferred at one time.

3.3 sampling unit: A defined quantity of material having a boundary which may be physical, for example a container, or hypothetical, for example a particular time or time interval in the case of a flow of material.

3.4 increment: A representative quantity of material taken from a sampling unit.

3.5 aggregate sample: A combination of all increments from the lot.

3.6 reduced sample: A representative part of the aggregate sample obtained by a process of reduction in such a manner that the mass approximates to that of the final (laboratory) samples.

3.7 final sample: A representative part of the reduced sample or, where no intermediate reduction is required, of the aggregate sample.

4 Apparatus

It is important that all sampling apparatus be made from materials which cannot affect the characteristics of the fertilizer being sampled.

4.1 Flat-bottomed shovel or scoop with vertical sides, for manual sampling.

NOTES

1 The use of sampling spears is not recommended for the taking of samples for the determination of physical properties. Spears can only be accepted for other sampling provided they can collect increments of more than the minimum mass defined in ISO/TR 7553. In any case, the dimensions of the spear have to be appropriate to the characteristics of the sample portion and to the particle size of the fertilizer.

2 Sampling from a running bulk stream by mechanical devices is to be preferred.

4.2 Mechanical sampling device, for the sampling of fertilizer in motion.

Any device should be checked for bias as described in ISO 5308.

4.3 Apparatus for sample division

The use of a tool which deals with the complete sampling unit is generally preferable (riffle, cone sample divider, automatic rotary sample divider, etc.) provided it does not give rise to elutriation phenomena (separating out of the fine particles, centrifuging of the coarse particles, etc.).

NOTE 3 Further information on apparatus for sample division may be found in ISO 7742.

5 General plan of application

The application of this International Standard involves a number of successive operations described in 5.1 to 5.5.

5.1 Determinations prior to sampling

Determination of the number of sampling units to be sampled (see clause 6).

5.2 Designation of the sampling units

- Fertilizer in bags (see 7.1).
- Fertilizer in bulk (see 7.2 or 7.3).

5.3 Increments from the sampling units

- Fertilizer in bags (see 7.1).
- Fertilizer in bulk (see 7.2 or 7.3).

5.4 Preparation of the aggregate sample

See 7.4.

5.5 Preparation of the sampling report

See clause 8.

6 Determination of the number of sampling units (increments)

6.1 Product in bags

In this case the sampling unit is a bag and the number of individual bags to be sampled is obtained from the table 1. In this context, a bag is taken to contain no more than 50 kg — larger containers such as intermediate containers (IBCs) should be treated as product in bulk (see 6.2).

Table 1 — Sampling of product in bags

Sample portion	Minimum number of sampling units
< 10 bags	All bags
10 to 400 bags	10 ¹⁾
> 400 bags	20 ¹⁾
1) As a guide, above 100 bags the number of sampling units may be taken as the square root of the total number of units present.	

For packages weighing 5 kg or less, the entire container is taken as the sample.

For packages weighing less than 1 kg each, it may be necessary to increase the number taken, to ensure a sufficiently large aggregate sample.

6.2 Product in bulk

In this case the size of the sampling unit depends on the total mass. The minimum number of sampling units is 10 for all sample portions up to 5 t. Above 5 t, the number should be taken as the square root of 20 times the tonnage present in the sample portion.

7 Sampling

7.1 Product in bags

Number the bags in the sample portion consecutively and, by using a source of random numbers, select the bags to be sampled. Take one increment from each of the selected bags either by using a mechanical divider (4.3) or by emptying the contents of the bag onto a clean dry area, mixing with the shovel or scoop (4.1) and collecting one shovelful.

7.2 Product in bulk during loading or unloading

If the loading or unloading operation is carried out using grabbing equipment (grabbing crane, automatic shovel loader), the sampling unit is composed of the quantity of material corresponding to one grab.

If the operation is carried out, at least in part, using continuous apparatus (conveyor belt, pneumatic device, etc.), each sampling unit is made up of a mass of approximately 50 kg taken during the operation.

Knowing the mass of the lot (sample portion) to be sampled, calculate the number of sampling units contained in the lot. The sampling units from which increments are taken shall be designated at random throughout the duration of the loading or unloading operation.

Number the sampling units in chronological order of their actual formation (grabbing equipment) or virtual formation (continuous apparatus). In the latter case, the time intervals are numbered, taking into account the operating rate of the apparatus.

By using a source of random numbers, select the sampling units to be sampled and take one increment from each sampling unit using the shovel or scoop (4.1) or, in the case of a continuous apparatus, the mechanical sampling device (4.2).

7.3 Product in bulk, in storage or in transport

Make an imaginary division of the lot (sample portion) into a number of approximately equal parts. The number of parts shall correspond to the number of sampling units to be selected (see 6.2). Take an increment from each sampling unit using the shovel or scoop (4.1). As far as possible, the parts of the sample portion should be such that all constituent parts of the lot are sampled. If this is not possible, for example for quantities above 25 t, the sampling should be carried out when the lot is moved, following the procedure in 7.2.

For sampling product in quantities below 25 t, the standard sampling pattern should be used (see figure 1), so that each increment represents an approximately equal fraction of the whole.

7.4 Treatment of the increments

Thoroughly mix all the increments (collected as in 7.1, 7.2 or 7.3) to form a single aggregate sample

using a device such as a double-cone mixer or, if this is not available, by hand. Place the aggregate sample in a clean, sealable, airtight container.

The further treatment of this aggregate sample will depend on the purpose of the sampling and the analysis to be performed. For information on sample reduction and division see ISO 7742, and on sample preparation see ISO 8358.

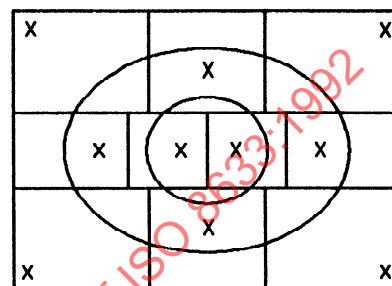


Figure 1 — Sampling pattern

8 Sampling report

The sampling report should comprise:

- a reference to this International Standard;
- date and location of sampling;
- date of arrival of the lot of fertilizer, if sampling has taken place on the client's premises;
- characteristics of the fertilizer sampled according to the information given on the bags or on the sale documents, if it is in bulk, with the statement of the guaranteed nutrients;
- nominal size of the lot;
- number of increments taken;
- all observations which could, in the opinion of the sampler, be of importance (e.g. packaging).

It shall, in addition, mention all operating details not covered in this International Standard or which are optional, together with any events which may have an effect on the results.

For a more detailed form of sampling report, see ISO 5306.

Annex A
(informative)

Bibliography

- [1] ISO/TR 5307:1991, *Solid fertilizers — Derivation of a sampling plan for the evaluation of a large delivery*.
- [2] ISO 8634:1991, *Solid fertilizers — Sampling plan for the evaluation of a large delivery*.

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