INTERNATIONAL STANDARD

ISO 7837

Second edition
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Fertilizers — Determination of bulk density (loose) of fine-grained fertilizers

Engrais — Détermination de la masse volumique sans tassement des engrais fins

Reference number
ISO 7837:1992(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 7837 was prepared by Technical Committee ISO/TC 134, *Fertilizers and soil conditioners*, Sub-Committee SC 3, *Physical properties*.

This second edition cancels and replaces the first edition (ISO 7837:1983), which has been technically revised.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

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Introduction

A method for the determination of the bulk density (loose) of solid fertilizers having particle sizes within the frequently encountered range from about 0,5 mm to 5 mm is specified in ISO 3944:1992, *Fertilizers — Determination of bulk density (loose)*. This method is not, however, suitable for fine-grained fertilizers having a large proportion of particles of diameters less than 0,5 mm. Such fertilizers pass with difficulty, in most cases, from the specified funnel into the measuring cylinder, generally cause considerable dust nuisance, and are inclined to form hollow spaces (air cavities) within their bulk volume. The bulk density values obtained are, thus, too low.

In the case of fine-grained fertilizers, therefore, it is necessary to use a dust-tight, non-clogging apparatus, with a relatively wide measuring cylinder.

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Fertilizers — Determination of bulk density (loose) of fine-grained fertilizers

1 Scope

This International Standard specifies a method for the determination of the bulk density (loose) of solid fine-grained fertilizers.

The method is applicable to fertilizers which contain a large proportion of particles of diameters less than 0,5 mm.

NOTE 1 For fertilizers which contain a large proportion of particles of diameters within the range from 0,5 mm to 5 mm, a method is specified in ISO 3944.

The method is applicable to dry fertilizers only. If the fertilizer has absorbed moisture during transport or storage, it is necessary to dry it in an environmental chamber, with constant low humidity, prior to the determination.

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

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

3 Definition

For the purposes of this International Standard, the following definition applies.

3.1 bulk density (loose) of a fertilizer: The mass per volume of a material after it has been tipped freely into a container under specified conditions.

The bulk density (loose) is expressed in grams per cubic centimetre (g/cm^3).

4 Principle

Pouring of the fertilizer from a specified filling device into a specified measuring cylinder of known volume and weighing of the contents of the cylinder.

5 Apparatus

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

5.2 Apparatus for determination of bulk density (loose), having the approximate dimensions given in figure 1 and consisting of the following.

5.2.1 Filling device (4) with **spring-suspended locking lever (5)**, for holding or loosening the hinged cover. The hinged cover is opened by manipulating the lever so that the contents of the filling device discharge into the measuring cylinder.

CAUTION — It is important that those parts of the apparatus which are in contact with the fertilizer are made of corrosion-resistant material (glass, plastics, etc.).

5.2.2 Measuring cylinder (1), of capacity 1 000 $cm^3 \pm 5$ cm^3.

5.2.3 Intermediate piece (2) with **hinged cover (3)**.

5.3 Spatula, approximately 200 mm x 20 mm, or other suitable scraper.

6 Preparation of test sample

Prepare the test sample by the methods given in ISO 7742 and ISO 8358, ensuring that the sample is sufficient to carry out two separate determinations.

7 Procedure

Pour the fertilizer into the filling device (5.2.1) up to the brim. Open the hinged cover by manipulating the locking lever.

After 2 min, remove the empty filling device and the intermediate piece (5.2.3) from the measuring cylinder (5.2.2). Scrape away the surplus fertilizer from the measuring cylinder using the spatula or other suitable tool (5.3).

Weigh the contents of the measuring cylinder to the nearest 1 g.

Carry out two determinations, in rapid succession, on separate test portions taken from the same test sample.

8 Expression of results

8.1 Method of calculation

The bulk density (loose), ρ, of the fertilizer, in grams per cubic centimetre, is given by the equation

$$\rho = \frac{m}{V}$$

where

m is the mass, in grams, of the test portion;

V is the volume up to the brim, in cubic centimetres, of the measuring cylinder.

Take as the result the arithmetic mean of the two determinations provided that the requirement for repeatability (see 8.2) is satisfied.

8.2 Repeatability

The difference between the results of two determinations, carried out in rapid succession by the same operator using the same apparatus, shall not exceed 0,02 g/cm^3.

9 Test report

The test report shall include the following particulars:

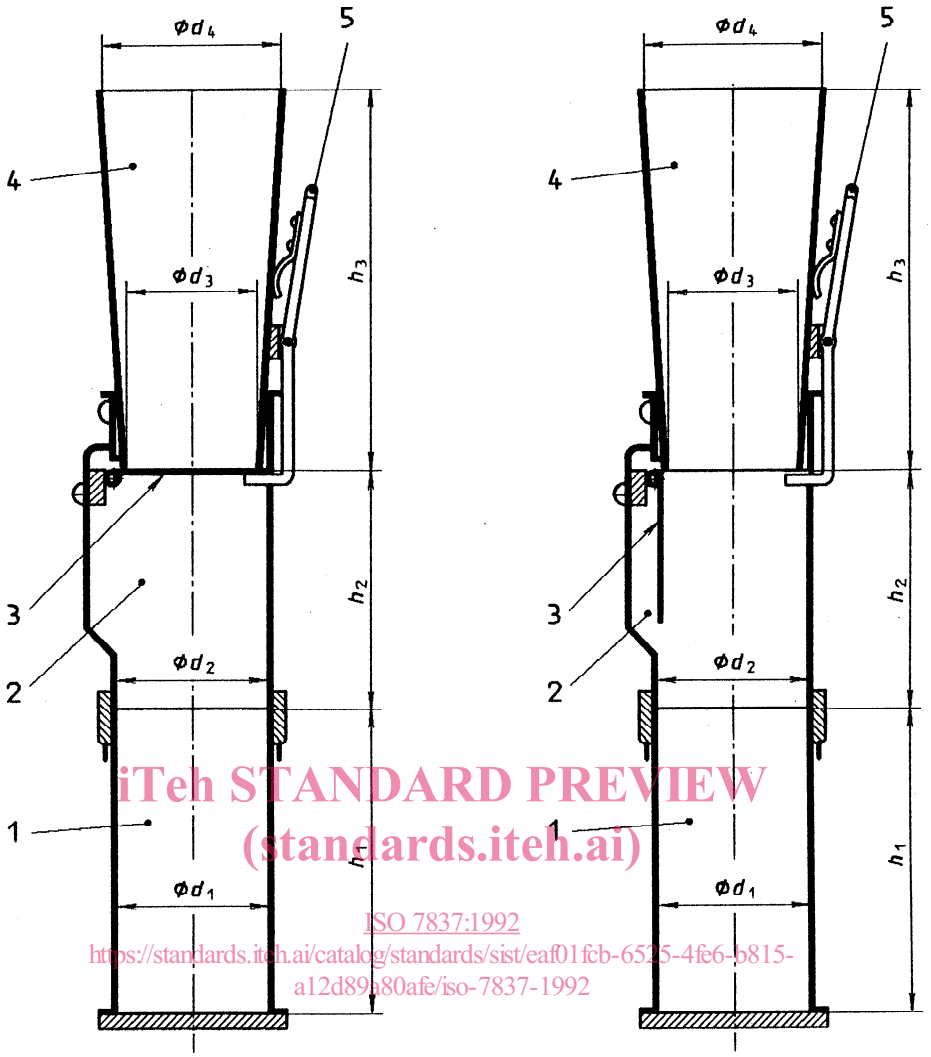
a) identification of the sample;

b) reference to the method used;

c) the result and the method of expression;

d) any unusual features noted during the determination;

e) any operation not included in this International Standard or regarded as optional.



1 Measuring cylinder
  Internal diameter — d_1 = 87 mm ± 1 mm
  Internal height — h_1 corresponding to a capacity of 1 000 cm³ ± 5 cm³

2 Intermediate piece
  Internal diameter — d_2 = 87 mm ± 1 mm
  Height — h_2 = 135 mm ± 1 mm

3 Hinged cover

4 Filling device
  Lower internal diameter — d_3 = 79 mm ± 1 mm
  Upper internal diameter — d_4 = 99 mm ± 1 mm
  Height — h_3 = 199 mm ± 1 mm

5 Spring-suspended locking lever

Figure 1 — Apparatus for determination of bulk density (loose) of fine-grained fertilizers

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