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# International Standard 3944

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

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## Fertilizers — Determination of bulk density (loose)

*Engrais — Détermination de la masse volumique sans tassement*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

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 3944 was developed by Technical Committee ISO/TC 134, *Fertilizers and soil conditioners*.

This second edition was submitted directly to the ISO Council, in accordance with clause 5.10.1 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 3944-1977), which had been approved by the member bodies of the following countries:

Australia	Israel	Romania
Chile	Italy	South Africa, Rep. of
Egypt, Arab Rep. of	Mexico	Turkey
Finland	Netherlands	United Kingdom
France	New Zealand	USSR
Germany, F.R.	Norway	Yugoslavia
Hungary	Poland	
India	Portugal	

No member body had expressed disapproval of the document.

# Fertilizers — Determination of bulk density (loose)

## 1 Scope and field of application

This International Standard specifies a method for the determination of the bulk density (loose) of solid fertilizers, except powder fertilizers.

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.

The method is not suitable for materials which contain a large proportion of particles exceeding 5 mm in diameter.

## 2 Definition

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

The bulk density (loose) is expressed in grams per cubic centimetre ( $\text{g}/\text{cm}^3$ ).

## 3 Principle

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

## 4 Apparatus

**4.1 Balance,** capable of weighing to the nearest 1 g.

**4.2 Apparatus for determination of bulk density (loose),** having the approximate dimensions given in the figure and consisting of:

**4.2.1 Firmly mounted funnel.**

**4.2.2 Removable measuring cylinder,** without a spout. The capacity to the brim shall be known to the nearest cubic centimetre.

NOTE — Those parts of the apparatus which are in contact with the fertilizer shall be made of corrosion-resistant material (glass, plastics, etc.).

**4.3 Spatula,** approximately 120 mm  $\times$  20 mm, or other suitable scraper.

## 5 Procedure

Pour into the closed funnel (4.2.1) a quantity of the fertilizer greater than that needed to fill the measuring cylinder (4.2.2). Fully open the slide of the funnel so that the contents discharge into the measuring cylinder in 6 to 12 s.

NOTE — If the fertilizer does not flow freely, keep the outlet clear by inserting a rod of 3 to 4 mm diameter into the opening.

When the cylinder is overflowing, close the slide of the funnel and scrape away the surplus fertilizer using the spatula or other suitable tool (4.3). Vibration of the filled measuring cylinder shall be avoided.

Remove the measuring cylinder from below the funnel and weigh its contents to the nearest 0,1 % of the total mass.

Carry out two determinations, in rapid succession, on the same test portion.

## 6 Expression of results

### 6.1 Method of calculation and formula

The bulk density (loose)  $D$  of the fertilizer is given, in grams per cubic centimetre, by the formula

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

where

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

$V$  is the capacity 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 6.2) is satisfied.

### 6.2 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 0,01  $\text{g}/\text{cm}^3$ .

## 7 Test report

The test report shall include the following particulars :

- a) identification of the sample;
- b) the 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.

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Dimensions (approximate) in millimetres

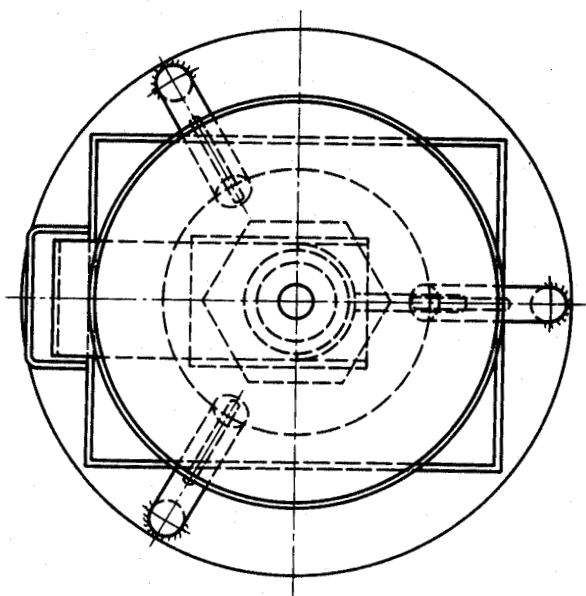
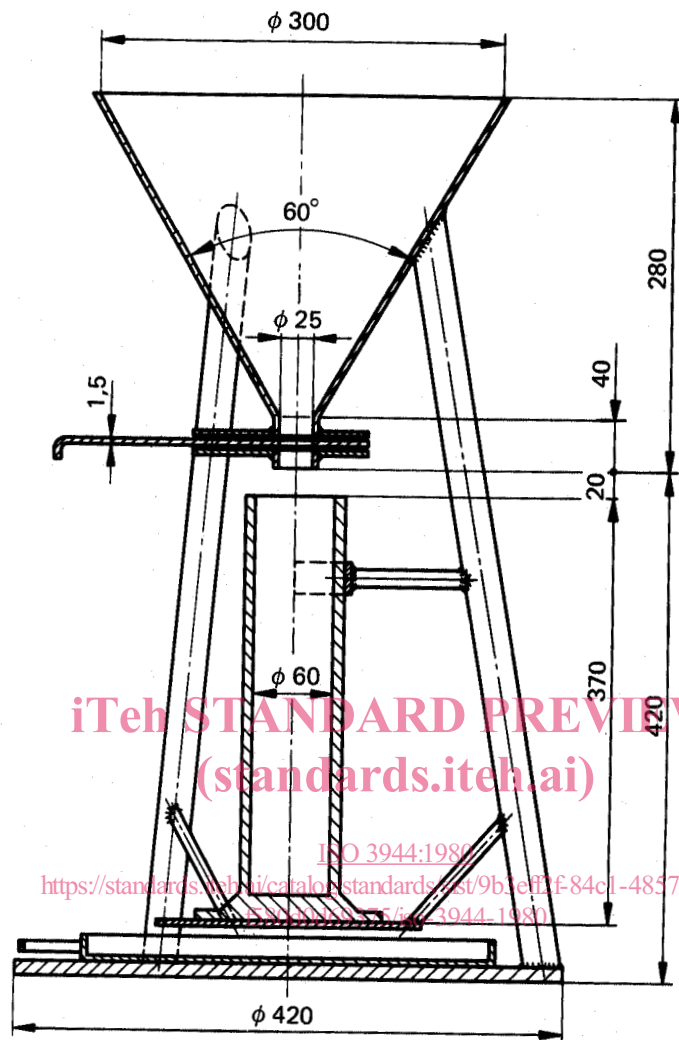


Figure — Apparatus for the determination of bulk density of fertilizers

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