SLOVENSKI STANDARD
SIST EN 12047:2002

01-november-2002

Trdna gnojila - Merjenje statiļ nega nasipnega kota (ISO 8398:1989, spremenjen)

Solid fertilizers - Measurement of static angle of repose (ISO 8398:1989 modified)

Feste Düngemittel - Bestimmung des statischen Schüttwinkels (ISO 8398:1989 modifiziert)

Engrais solides - Mesurage de l'angle de talus d'éboulement (ISO 8398:1989 modifiée)

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Ta slovenski standard je istoveten z: **EN 12047:1996**

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ICS:

65.080 Gnojila Fertilizers

SIST EN 12047:2002 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12047

September 1996

ICS 65.080

Descriptors: fertilizers, tests, determination, angle of repose

English version

Solid fertilizers - Measurement of static angle of repose (ISO 8398:1989 modified)

Engrais solides - Mesurage de l'angle de talus d'éboulement (ISO 8398:1989 modifiée)

Feste Düngemittel - Bestimmung des statischen Schüttwinkels (ISO 8398:1989 modifiziert)

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This European Standard was approved by CEN on 1996-03-21. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart,36 B-1050 Brussels

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Foreword

The text of the International Standard from technical committee ISO/TC 134 " Fertilizers and soil conditioners" of the International Organisation for Standardization (ISO) has been taken over as a European Standard by the Technical Committee CEN/TC 260 "Fertilizers and liming materials" the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 1997, and conflicting national standards shall be withdrawn at the latest by March 1997.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard : Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

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The text of International Standard ISO 8398:1989 was approved by CEN as a European Standard with agreed common modifications as given below :

- in clause 9, i.e. ISO 8398 has been replaced by i.e. EN 12047 ;

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- in clause 9, a requirement to include the method of sampling and sample preparation in the test report has been added ;

- a bibliography has been added as informative annex ZA.

The common modifications have been inserted in the text of the reference document and indicated by a vertical line in the left margin.

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1 Scope

This International Standard specifies a method for the measurement of the static angle of repose of solid fertilizers. The method is applicable to free flowing fertilizers and is suitable for measuring static angles of repose greater than 20° ; the method is not suitable for materials which contain a large proportion of particles exceeding 5 mm in diameter.

NOTE : The measurement of the static angle of repose is of importance for the calculation of storage capacities. The angle measured according to this method is normally the maximum value resulting in practice. For the determination of the dynamic angle of repose (angle of slide) other methods (e.g. a tilting box method) are available.

2 Normative reference

The following standard contains 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 3944:1980 Fertilizers - Determination of bulk density (loose)

ISO 5725:1986 Precision of test method - Determination of repeatability and reproducibility for a standard test method by inter-laboratory tests.

3 Definition

For the purpose of this international standard, the following definition applies :

static angle of repose : The angle at the base of the cone of fertilizer obtained by allowing a sample to fall onto a horizontal base-plate under specified conditions.

4 Principle

Measurement of the height and diameter of the base of the cone of fertilizer obtained by allowing a sample to fall through a fixed distance from a defined funnel onto a horizontal base-plate. Calculation of the angle of repose.

5 Apparatus

Only the dimensions given in the text are mandatory.

The apparatus (see figure 1) shall be composed of the following parts :

5.1 Funnel, of rigid plastics or stainless steel, having a spout of internal diameter 25 mm and fitted with a slide.

NOTE : The funnel illustrated in figure 1 is identical to that specified in ISO 3944.

5.2 Square base-plate, 750 mm x 750 mm, of rigid construction, made of metal, plastic or wood. The base-plate shall be plain, undeformable and damp-proof. Its surface shall not be polished but shall be matt ; if necessary, this condition can be achieved by fixing a suitable filter paper on the surface of the base-plate. Four straight lines shall be drawn at angles of 45° to each other, intersecting at the centre of the plate.

5.3 Funnel support, comprising a frame of substantial construction to support the funnel (5.1) so that the axis of the funnel passes through the centre of the base-plate and the tip of the funnel spout is 120 mm above the surface of the base-plate.

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6 Procedure

6.1 Test sample

Take a test sample of appropriate size.

NOTE : Usually 10 kg will be sufficient.

6.2 Determination

6.2.1 Carry out the determination at ambient temperature.

6.2.2 Check that the base-plate (5.2) is level and that the funnel (5.1) is properly located and fixed in the support (5.3).

6.2.3 Pour the test sample (6.1) into the funnel (5.1) with the slide closed. Then open the slide and allow the fertilizer to discharge in a steady stream, taking care not to vibrate the apparatus. If the amount of fertiliser is not sufficient, i.e. if the top of the cone which is formed on the base-plate does not reach the tip of the funnel spout, pour an additional amount of the test sample into the funnel in a steady stream with the slide still open until the top of the cone reaches the tip of the funnel spout.

Mark the circumference of the base of the cone on the eight radii drawn on the base-plate, ignoring any grains which form only a single layer around the base of the cone. Remove the fertilizer from the base-plate and measure the four marked diameters.

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7 Expression of results

The angle of repose, α, expressed in degrees, is given by the equation :

$$\alpha = \arctan\left(\frac{240}{\bar{d} - 25}\right)$$

or

$$\alpha = \arctan\left(\frac{2h}{\bar{d} - d_i}\right)$$

where :

h is the height of the cone, in millimetres ;

$\bar{d}$ is the arithmetic mean of the four diameters measured as specified in 6.2.3, in millimetres ;

d_i is the internal diameter of the funnel spout, in millimetres.

8 Precision

The precision of the method was established by an inter-laboratory test carried out in accordance with ISO 5725. For the obtained repeatability limit and reproducibility limit a probability level of 95 % holds.

8.1 Repeatability

The absolute difference between two single test results, obtained under repeatability conditions, will exceed 1° on average not more than once in 20 cases. Both results should be considered suspect if this limit is exceeded.

NOTE : **Repeatability conditions** : Conditions where mutually independent test results are obtained with the same method on identical test material in the same laboratory by the same operator using the same equipment under the same conditions within short intervals of time.

8.2 Reproducibility

The absolute difference between two single test results, obtained under reproducibility conditions, will exceed by more than 2° on average not more than once in 20 cases. Both results should be considered suspect if this limit is exceeded.

NOTE : **Reproducibility conditions** : Conditions where test results are obtained with the same method on identical test material in different laboratories with different operators using different equipment under different conditions.

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9 Test report

The test report shall include the following particulars :

a) the reference of the method used, i.e. EN 12047 ;

b) the method of sampling and sample preparation ;

c) the results and the method of expression used ;

d) details of any unusual features noted during the determination ;

e) details of any operations not specified in this international standard, or in the international standard to which reference is made, or regarded as optional.

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Dimensions in millimetres

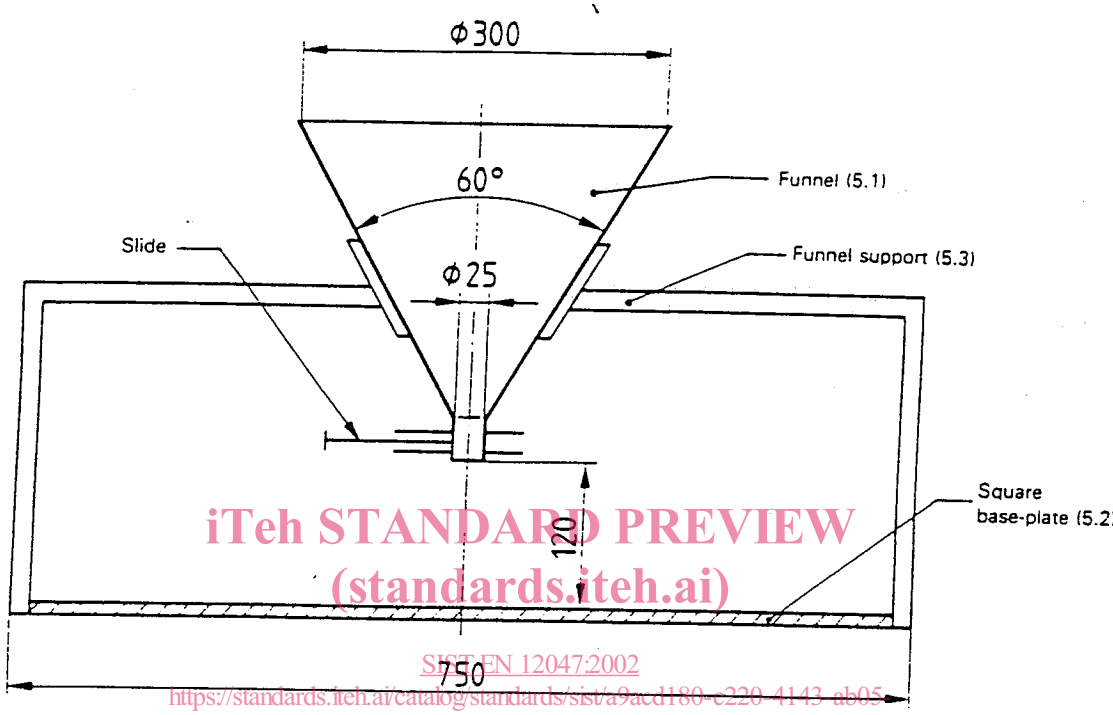

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Figure 1 - Apparatus for the determination of static angle of repose

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ANNEX ZA
(informative)

Bibliography

ISO 3963:1977	Fertilizers - Sampling from a conveyor by stopping the belt
ISO 7742:1988	Solid fertilizers - Reduction of samples
ISO 8358:1991	Solid fertilizers - Preparation of samples for chemical and physical analysis
ISO 8633:1992	Solid fertilizers - Simple sampling method for small lots
EN 1482:1996	Sampling of solid fertilizers and liming materials

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