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भारतीय मानक मसौदा

दानेदार उर्वरक मिश्रण — विशिष्टि

(*आई एस 9024 का पहला पुनरीक्षण*)

Draft Indian Standard

GRANULATED FERTILIZER MIXTURES — SPECIFICATION

(*First Revision of IS 9024*)

ICS 65.080

Soil Quality and Fertilizers Sectional Committee, FAD 07

Last date of comments: 17 May 2024

FOREWORD

(*Adoption clauses will be added later*)

NP and NPK fertilizer mixtures in granulated form are made in this country in increasing quantities. In order that these mixtures continue to remain in serviceable physical condition from the time they are packed to their use by a farmer, it is necessary to control their physical characteristics during production and to follow good practices in their packing, handling and storage during transit and marketing. The detailed analysis of these mixtures varies in order to suit different soils and crops, and presently the State Governments have permitted specific mixtures to be manufactured and marketed. Therefore, while the analysis of individual mixtures has been left open in this standard, the provisions with regard to the manner of marking the analysis on the bags and the tolerances in the variation of the actual analysis from that marked on the bag are prescribed in this standard.

In the preparation of this standard, reference has been made to Method No. 5.120 Particle hardness of solid fertilizers, of the National Plant Food Institute, Washington, USA, and the assistance obtained is gratefully acknowledged.

This standard was first published in 1978. In this revision, the standard has been brought out in the latest style and format of the Indian Standards, and references to Indian Standards wherever applicable have been updated. It also incorporates two amendments issued to the previous version of this standard.

For particle size, the use of IS Sieves conforming to IS 460 (Part 1) : 2020 ‘Test sieves – Specification Part 1 Wire cloth test sieves (*fourth revision*)’ is prescribed. Where IS Sieves are not available, other standard sieves as judged from aperture size may be used.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

1.1 This standard prescribes the requirements for fertilizer mixtures in granulated form, and also prescribes the permissible tolerances in the analysis of the mixtures.

1.2 Fertilizer mixtures in pulverized form are not covered by this standard.

2 REFERENCE

The following Indian Standards contain provisions which through reference in this text constitutes provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below:

IS No.	*Title*
IS 460 (Part 1) : 2020	Test Sieves — Specification: Part 1 Wire cloth test sieves (*fourth revision*)
IS 5985 : 1985	Code of practice for handling and storage of bagged fertilizers (*first revision*)
IS 6092 (Part 1) : 1985	Methods of sampling and test for fertilizers: Part 1 Sampling (*first revision*)
IS 6092 (Part 2) : 1985	Methods of sampling and test for fertilizers: Part 2 Determination of nitrogen (*first revision*)
IS 6092 (Part 3/ Sec 2) : 1985	Methods of sampling and test for fertilizers: Part 3 Determination of phosphorus: Sec 2 Test methods not covered under dual number standards (*second revision*)
IS 6092 (Part 4) : 1985	Methods of sampling and test for fertilizers: Part 4 Determination of potassium (*first revision*)
IS 6092 (Part 6) : 1985	Methods of sampling and test for fertilizers: Part 6 Determination of moisture and impurities (*first revision*)

3 REQUIREMENTS

3.1 Description — The material shall be in the form of free-flowing granules.

3.2 Particle Size

The particle size of the material shall be such that 90 percent of the material lies between 4 mm IS Sieve and 1 mm IS Sieve, and not more than 5 percent by mass shall pass through 1 mm IS Sieve [*see* IS 460 (Part 1)].

3.3 Resistance to Breakdown of Granules

A single granule of the material, taken from the size range 2.80 mm to 3.35 mm, shall resist a load of 1.0 kg, when tested as prescribed in Annex A.

3.4 Free Acidity and Moisture

The material shall also comply the requirements given in Table 1.

Table 1 Requirements for Mixtures

(*Clause* 3.4)

Sl No.	Characteristic		Requirements	Method of Test (Ref to)
i)	Free acidity, percent by mass, *Max*	For mixtures containing superphosphate or triple superphosphate as an ingredient	2.0 (as phosphorus pentoxide)	IS 6092 (Part 3/ Sec 2)
		For mixtures not containing superphosphate or triple superphosphate as an ingredient	1.0 (as sulphuric acid)	IS 6092 (Part 6)
ii)	Moisture, percent by mass, *Max*	For mixtures containing superphosphate or triple superphosphate as an ingredient	1.5	IS 6092 (Part 6)
		For mixtures not containing superphosphate or triple superphosphate as an ingredient	1.5	

3.5 NPK Analysis

The percent content of nitrogen, phosphorus and potassium in the material shall be in accordance with the rules and regulations prescribed by the Government and shall be marked on the bag. When the material is actually analysed according to the methods laid down in IS 6092 (Part 2), IS 6092 (Part 3/ Sec 2), and IS 6092 (Part 4); the actual analysis found shall not differ from the marked analysis by more than the following tolerances:

a) For percent total nitrogen content, total phosphorus (as P_2O_5) content, water soluble phosphorus (as P_2O_5) content, and water soluble potash (as K_2O) content	± 0.5 unit of the marked percent content for each of them
b) For the sum of all percent nutrient contents mentioned above.	± 2·5 percent of the sum of the marked percent contents of all nutrients mentioned in (a)

4 PACKING

4.1 As most of the fertilizer mixtures are hygroscopic, it is essential that the packing should be capable of providing adequate protection to the contents from absorption of moisture by the use of inner plastics liner. Further, the packing should be physically strong enough to withstand the normal stresses of handling in stacking, transport and storage.

4.2 It is recommended that fertilizer mixtures are packed in bags as agreed to between the purchaser and the supplier.

5 MARKING

5.1 The packages shall be securely closed and marked with the following information:

a) (N-P-K) Analysis of the mixtures, N standing for total nitrogen ammoniacal/nitrate/urea) content, P for total phosphorus (as P_2O_5) content and K for total potash (as K_2O) content. In addition, the water soluble phosphorus (as P_2O_5) content shall also be shown;

b) The words 'Granulated Fertilizer Mixtures' and specific information if superphosphate or triple superphosphate is one of the ingredients;

c) Gross and net quantity in kg;

d) Name of the manufacturer and recognized trade-mark, if any; and

e) Batch number and date of manufacture.

f) Any other requirements as specified under the *Fertilizer* (*Control*) *Order*, 1985 and the *Legal Metrology* (*Packaged Commodities*) *Rules*, 2011.

5.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

6 HANDLING AND STORAGE

Factors to be borne in view in the handling and storage of fertilizer mixtures shall be as prescribed in IS 5985.

7 SAMPLING

7.1 The methods for drawing representative samples of the material shall be as prescribed in IS 6092 (Part 1).

7.2 Number of Tests

Tests for all the requirements given under **3** shall be conducted on the composite test sample.

7.3 Criteria for Conformity

For declaring the conformity of the lot to the requirements of this specification, the test results on the composite test sample shall satisfy all the requirements specified in **3**.

ANNEX A
(*Clauses* 3.3, *and Table* 1)
METHODS OF TEST FOR GRANULATED FERTILIZER MIXTURES

A-1 TEST FOR RESISTANCE TO BREAKDOWN OF GRANULES

A-1.1 General

Two alternative methods are described here. The methods are used to determine comparative hardness of granules and applicable to granulated or pelleted forms of solid fertilizers. The choice of the method shall be agreed to in the case of dispute.

A-1.2 Method A

A-1.2.1 *Apparatus*

A-1.2.1.1 *Hardness tester — See* Fig. 1.

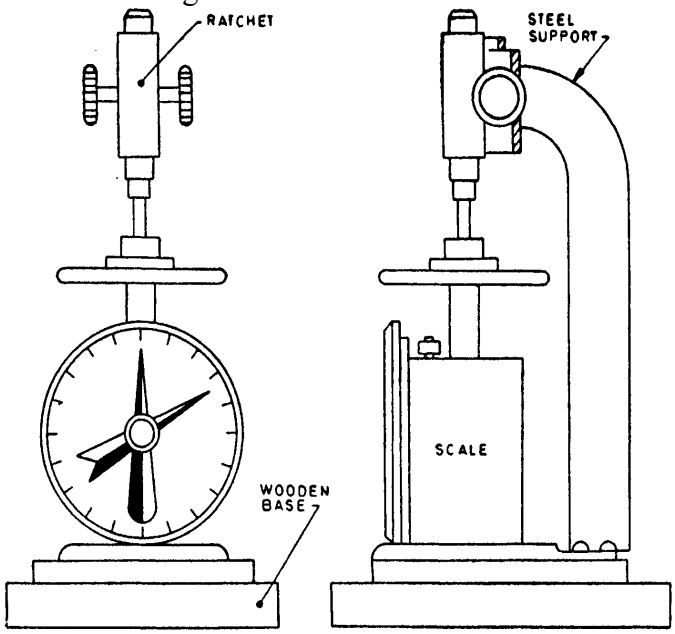

Fig. 1 Hardness Tester

A-1.2.2 *Procedure*

A-1.2.2.1 Collect a portion of the sample lying in the size range 2.80 mm to 3.55 mm. From the portion obtained pick out at random 25 granules.

A-1.2.2.2 Test each granule successively. Place each granule under the ratchet and slowly screw it down until the particle crushes. Note the crush point on the scale indicator and record the load-required to crush it.

A-1.2.3 *Calculation* — Calculate the mean of the 25 observations in terms of kg and report the result.

A-1.3 Method B

A-1.3.1 *Apparatus* — The apparatus, made of mild steel, is shown in Fig. 2. It consists of two parts, a frame and a plunger. The frame is made of three circular plates and three rods fitted with nut and bolt. These rods are fitted vertically on the base plate and the other two plates are fixed tightly in position one above the other. Circular holes are made at the centre in these two plates, through which the plunger rod can pass through smoothly. The plunger, of mass 150 g consists of a circular plate at the top (for keeping additional mass) and a narrow stem, of diameter 4 mm, at the base which can rest either on the base plate or on the fertilizer granule.

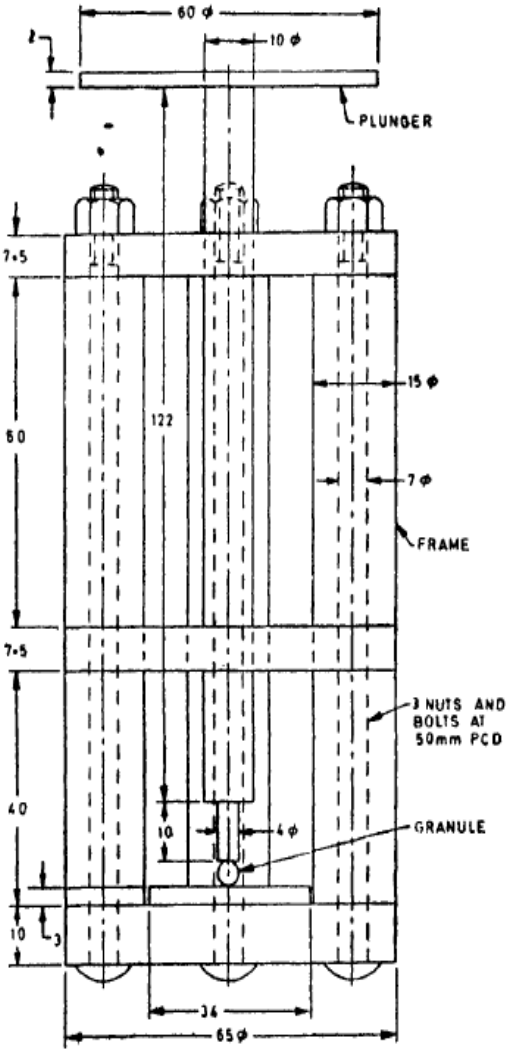

Fig. 2 Granule Hardness Tester

A-1.3.2 Procedure

A-1.3.2.1 Collect a portion of the sample lying in the size range 2.80 mm to 3.35 mm. From the portion obtained pick out at random 25 granules.

A-1.3.2.2 Test each granule successively. Place each granule at the centre of the base plate and keep the stem of the plunger just on its top. Put additional mass on the top of the plunger incrementally and note: the total mass of the plunger itself plus the additional mass at which the granule crushes.

A-1.3.3 *Calculation* — Calculate the mean of the 25 observations in terms of kg and report the result.