DEAS 912:2018

DRAFT EAST AFRICAN STANDARD

Fertilizer — Nitrogen, Phosphorus & Potassium (NPK) compound — Specification

EAST AFRICAN COMMUNITY

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

In order to achieve this objective, the Community established an East African Standards Committee mandated to develop and issue East African Standards.

The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

Fertilizer – Nitrogen, Phosphorus & Potassium (NPK) compound – Specification

1 Scope

This Draft East African Standard specifies requirements and methods of sampling and test for NPK fertilizer (compound and blended)

2 Normative References

The following referenced standards are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced standard (including any amendments) applies:

ISO 8157, *Fertilizers and Soil Conditioners – Vocabulary*

DEAS 913, *Fertilizer – Methods of sampling*

ISO 17318, *Fertilizers and soil conditioners -- Determination of arsenic, cadmium, chromium, lead and mercury contents*

ISO 8397, *Solid fertilizers and soil conditioners – Test sieving*

AOAC 937.02, *Magnesium (Water-Soluble) in Fertilizers*

AOAC 967.01, *Iron in fertilizers. Titrimetric method*

AOAC 973.01, *Zinc in fertilizers. Zinc ion exchange method*

AOAC 972.03, *Manganese (Water-soluble) in fertilizers*

3 Terms and Definition

For the purpose of this Tanzania standard, terms and definition given in ISO 8157 shall apply.

4 Requirements

4.1 General requirements

4.1.1 Description

NPK fertilizer shall be inorganic fertilizer containing Nitrogen, Phosphorus & Potassium which may be in granular, prilled or crystalline forms. It shall be free from any foreign matter. The granules shall be smooth, free flowing and of uniform colour. NPK fertilizers may contain other micro and secondary nutrients.

4.1.2 Particle size

The particle size of the granular material, shall be such that not less than 90 per cent by mass of fertilizer, shall be of particles size range of 2 mm – 5 mm and for prilled material shall be of particles size range of 1mm - 4mm when tested by the method given in ISO 8397

4.2 Specific requirements

4.2.1 NPK fertilizer shall have a moisture content of not more than 1 % w/w maximum when tested in accordance with Annex A.

4.2.2 A compound fertilizer shall contain two or more of the following primary plant nutrient elements intended for fertilizing of crops: nitrogen (N), phosphorus (P) and potassium (K). The lower limit of the declared value of any of the primary nutrients shall comply with the tolerances depending on the amount of Primary nutrient guaranteed as 1% when tested in accordance with ISO 5315.

4.2.3 Besides the primary nutrient elements, the fertilizer may also contain one or more of the following elements: Sulphur, Calcium, Magnesium, Boron, Cobalt, Copper, Iron, Manganese, Molybdenum, and Zinc, which, when present for the purpose of fertilizing of crops and mentioned in any form or manner, shall be guaranteed on the elemental basis. Sources of the elements guaranteed and proof of availability shall be provided upon request. The elements shall be mentioned and guaranteed if their percentage values by mass are equal to or more than the values shown in Table 1

Table 1— Minimum percentage for guarantee

Element	%
Sulphur (S)	1.00
Calcium (Ca)	1.00
Magnesium (Mg)	0.60
Copper (Cu)	0.05
Iron (Fe)	0.10
Manganese (Mn)	0.050
Molybdenum (Mo)	0.0005
Zinc (Zn)	0.05

5 Contaminants

Heavy metal contaminants in NPK fertilizer shall conform to the limits given in Table 2 when tested with the method specified therein.

Table 2 — Requirements for heavy metal contaminants

Heavy metal	Requirement	Method of test
Arsenic, mg/kg, max	20	ISO 17318
Cadmium, mg/kg, max.	60	
Mercury, mg/kg, max	0.1	
Lead, mg/kg, max.	30	
Chromium, mg/kg, max.	500	

6 Sampling and testing

6.1 Sampling

Sampling of NPK fertilizer shall be done as prescribed in DEAS 913.

6.2 Testing

Testing of NPK fertilizer shall be done as prescribed in the referenced standards and annex within this standard.

7 Packaging and labelling

7.1 Packaging

The fertilizer shall be packaged in materials that are clean and non-defective that protects the product from physical, chemical and moisture contamination and withstand multiple stages of handling (transportation and storage).

7.2 Labelling

Each package shall be indelibly labeled in English and/or any other language with the following information:

a) name of the fertilizer i.e. "Nitrogen Phosphorus Potassium (NPK)"

b) name and address of the manufacturer/packer and importer/ distributor

c) NPK Grade

d) net content by mass in kg;

e) country of origin;

f) handling instructions including the words “Use No Hooks”;

g) production date and expiry date;

h) batch number; and

i) storage conditions.

Annex A
(normative)

Determination of moisture content

A.1 Oven dry method

A.1.1 General

The method does not apply to fertilizers that yield volatile substances other than water at drying temperature.

A.1.2 Procedure

A.1.2.1 Weigh accurately 2 g of the prepared sample in a pre-weighed, clean and dry weighing bottle or petridish.

A.1.2.2 Heat in an oven for about 5 hours at 105 C + 2 C to constant weight. Cool in a desiccator and weigh. For urea, heat at 70 C + 5 C for five hours to constant weight.

A.1.3 Calculation

Moisture per cent by weight (%) = $100 \times \frac{B-C}{B-A}$

where,

A is the weight in gram of the empty bottle;

B is the weight of the bottle plus the material in gram, before drying;

C is the weight of the bottle plus the material in gram, after drying.

A.2 Vacuum desiccator method

A.2.1 General

The method is applicable to Ammonium Chloride, Calcium Ammonium Nitrate (CAN), Di-Ammonium Phosphate (DAP) and all types of complex and mixtures of NPK fertilizers.

A.2.2 Procedure

Weigh accurately in duplicate 5g of prepared sample in a weighed shallow porcelain dish. Put the sample in a desiccator over concentrated sulphuric acid, close and introduce vacuum for about 10 minutes, then stop the vacuum pump and leave the sample for 24 hours, then release vacuum, remove the sample from the desiccator and weigh.

A.2.3 Calculation

Moisture per cent by weight = $100 \times \frac{(W_2 - W_3)}{(W_2 - W_1)}$

where,

W_1 is the Weight in gram of empty porcelain dish;

W_2 is the Weight in gram of porcelain dish with sample before putting the sample for 24 hours in the desiccator;

W_3 is the Weight in gram of porcelain dish with sample after putting the sample for 24 hours in the desiccator.

A.3 Karl Fischer method

A.3.1 General

This method is applicable to fertilizers like CAN, Urea and urea based complexes. This method is not suitable for phosphate rock based fertilizers and fertilizers containing monocalcium phosphate, calcium sulphate, alkali carbonates as well as aldehydes and ketone groups.

A.3.2 Apparatus

Karl Fischer titrator

A.3.3 Reagents

A.3.3.1 Karl Fischer reagent (KF) – Karl Fischer solution (pyridine free) (single solution).

A.3.3.2 Di-sodium tartarate dihydrate ($Na_2C_4O_62H_2O$) analytical grade

A.3.3.3 Methanol-KF grade/spectroscopy grade containing less than 0.05 % water.

A.3.4 Procedure

A.3.4.1 Standardization of KF reagent.

A.3.4.1.1 Set up the instrument as per manufacturer's manual.

A.3.4.1.2 Add methanol to the titration vessel until the electrodes are dipped and titrate with Karl-Fischer reagent to a pre-set end point persists for 30 seconds.

A.3.4.1.3 Add 100mg of the disodium tartarate dehydrate to the titration vessel carefully and titrate with Karl Fischer reagent to a pre-set end point (the pre-set end point should persist for 30 seconds). Note the volume of KF reagent used as V_1 ml.

A.3.4.2 Determination of moisture of sample

A.3.4.2.1 Weigh accurately 1 g of the prepared sample and transfer to the titration vessel carefully and stir until dispersed.

A.3.4.2.2 Titrate with KF reagent to the same pre-set end point as above and note the volume of KF reagent used as V_2 ml.

A.3.5 Calculation

$$\text{Factor (F)(mg}H_2O\text{/1 ml of KF reagent)} = \frac{0.1566 \times \text{mg of sodium tartarate dihydrate added}}{V_1}$$

$$\text{Moisture per cent by weight} = \frac{F \times V_2 \times 100}{\text{Weight of sample (gram)} \times 1\,000}$$