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COMPOUND FERTILIZERS — SPECIFICATION

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Compound fertilizers — Specification



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Compound fertilizers — Specification

1 Scope

This African Standard specifies requirements, sampling and test methods for compound fertilizers.

2 Normative references

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

EN 12048, *Solid fertilizers and liming materials — Determination of moisture content — Gravimetric method by drying at 105±2 °C*

EN 13475, *Liming materials — Determination of calcium content — Oxalate method*

EN 15477, *Fertilizers — Determination of the water-soluble potassium content*

EN 15925, *Fertilizers — Extraction of total sulfur present in various forms*

EN 15926, *Fertilizers — Extraction of water soluble sulfur where the sulfur is in various forms*

EN 16197, *Fertilizers — Determination of magnesium by atomic absorption spectrometry*

EN 16198, *Fertilizers — Determination of magnesium by complexometry*

EN 16963, *Fertilizers — Determination of boron, cobalt, copper, iron, manganese, molybdenum and zinc using ICP-AES*

EN 16965, *Fertilizers — Determination of cobalt, copper, iron, manganese and zinc using flame atomic absorption spectrometry (FAAS)*

ISO 6598, *Fertilizers — Determination of phosphorus content — Quinoline phosphomolybdate gravimetric method*

ISO 7409, *Fertilizers — Marking — Presentation and declarations*

ISO 8157, *Fertilizers and soil conditioners — Vocabulary*

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

ISO 14820-1, *Fertilizers and liming materials — Sampling and sample preparation — Part 1: Sampling*

ISO 14820-2, *Fertilizers and liming materials — Sampling and sample preparation — Part 2: Sample preparation*

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

ISO 17319, *Fertilizers and soil conditioners — Determination of water-soluble potassium content — Potassium tetraphenylborate gravimetric method*

ISO 25475, *Fertilizers — Determination of ammoniacal nitrogen*

3 Terms and definitions

For the purpose of this standard, the terms and definitions in ISO 8157 and the following apply.

3.1

fertilizer

any substance containing one or more recognized plant nutrients essential for plant growth

3.2

compound fertiliser

fertilizer, obtained chemically or by blending or both, having a declarable content of at least two of the primary nutrients.

NOTE 1 Fertilizers having a declarable content of two of the primary nutrients are known as binary fertilizers.

NOTE 2 Fertilizers having a declarable content of nitrogen, phosphorus and potassium are known as NPK compound fertilizers

3.3

primary nutrients

elements needed in relatively large quantities (Nitrogen, Phosphorus, and Potassium only) essential for plant growth

3.4

trace element

an element such as boron, manganese, iron, zinc, copper, molybdenum, or cobalt, essential in relatively small quantities, for plant growth.

3.5

bulk container

refers to a container holding more than 50 kilograms (kg) of the product

4 Requirements

4.1 Physical requirements

4.1.1 General

Compound fertiliser shall be in the form of solid (as granules, powder, pellets, crystals). The product shall be homogeneous and free flowing.

4.1.2 Particle size

The procedure for determining particle size shall be in accordance with ISO 8397.

4.1.2.1 Granules: 90% of the material shall pass through a 4 mm international standard sieve and be retained on the 1 mm sieve. But not more than 5 % shall pass through the 1 mm sieve.

4.1.2.2 Powder: 95 % of the material shall pass through 1 mm international standard sieve and be retained on the 0.1 mm sieve. But not more than 5 % shall pass through the 0.1 mm sieve.

4.2 Chemical requirements

4.2.1 Primary nutrients

Compound fertilizer shall contain at least two of the primary nutrients nitrogen (N), phosphorus (P) and potassium (K).

4.2.2 Trace elements

Compound fertilizer should also contain at least one of the following trace elements:

- a) Boron (B);
- b) Calcium (Ca);
- c) Cobalt (Co);
- d) Copper (Cu);
- e) Iron (Fe);
- f) Manganese (Mn);
- g) Molybdenum (Mo);
- h) Zinc (Zn).

4.2.3 Specific requirements

Compound fertilizer shall comply with the requirements in Table 1.

Table 1 — Specific chemical requirements for compound fertilizer

Characteristic	Requirement	Method of test
Moisture content, % m/m, maximum	2.0	EN 12048
pH of 10 % solution, minimum	4.5	Annex A
Ammoniacal nitrogen, as N, % m/m, minimum	to be declared	ISO 25475
Phosphorus, as P, % m/m, minimum	to be declared	ISO 6598
Potassium, as K, % m/m, minimum	to be declared	ISO 17319
Magnesium, as Mg, % m/m, minimum	to be declared	EN 16197/ EN 16198
Boron, as B, % m/m, maximum	0.02	EN 16963/ EN 16965
Calcium, as Ca, %, m/m, maximum	1.00	EN 13475
Cobalt, as Co, %, m/m, maximum	0.0005	EN 16963/ EN 16965
Copper, as Cu, %, m/m, maximum	0.05	EN 16963/ EN 16965
Iron, as Fe, %, m/m, maximum	0.10	EN 16963/ EN 16965
Manganese, as Mn, %, m/m, maximum	0.50	EN 16963/ EN 16965
Molybdenum, as Mo, %, m/m, maximum	0.0005	EN 16963/ EN 16965
Sulphur, as S, %, m/m, maximum	1.00	EN 15925/ EN 15926
Zinc, as Zn, %, m/m, maximum	0.05	EN 16963/ EN 16965

5 Sampling

Sampling shall be carried out in accordance with ISO 14820-1.

6 Tests

6.1 Methods of test

Samples of compound fertilizer shall be prepared in accordance with ISO 14820-2 and tested in accordance with the methods of test indicated in Table 1.

6.2 Inspection

From the bulk samples obtained from ISO 14820-1, inspect the lot for the characteristics relating to the packing and marking of the product.

7 Compliance

The lot shall be deemed to comply with the standard if after inspection and testing it complies with the requirements of this standard.

8 Packaging and labelling

8.1 Packaging

Compound fertiliser shall be packed in clean, non-defective and strong containers. The material for which the container is made shall be such as to protect the contents from moisture and also not lead to easy rupture during handling, transportation and storage.

NOTE The product may also be supplied in bulk containers.

8.2 Labelling

8.2.1 Each container of compound fertiliser shall bear a label in indelible marking in accordance with Globally Harmonized System (GHS) and with the following particulars:

- a) Name of the product
- b) Name and physical address of manufacturer / distributor/supplier, and registered trade mark, or trade name if any;
- c) List and guaranteed percentage by mass of each of the primary nutrients present. If the nutrient percentages are expressed in the conventional sequence N - P - K, then they need not be named. However, if the nutrients are expressed in the terms of N - P₂O₅ - K₂O, that is, the oxides, then they shall be named
- d) pH value
- e) Name and guaranteed percentage of any other nutrient element present
- f) The form in which nitrogen is present;
- g) The percentage of water-soluble phosphate;
- h) Net mass, in kg;
- i) Lot identification;
- j) Country of origin;
- k) Any information required by the country of origin or destination;
- l) The dates of production and expiry

8.2.2 Bulk containers

Where the product is distributed in bulk, the larking information shall accompany the delivery notice to the purchaser.

9 Certificate of analysis

A certificate of analysis stating the minimum percentage levels of plant nutrient elements and magnesium shall accompany every lot or consignment of compound fertilizer.

10 Material safety

Each container must be accompanied by a Material Safety Data Sheet (MSDS) and Technical Data Sheet (TDS).

Annex A (normative)

Determination of pH

A.1 Principle

Measurement at 20 °C of the pH of 100 g/L solution of compound fertilizer, using pH meter fitted with glass and calomel electrodes.

A.2 Reagents

All reagents shall be of recognized analytical purity. The water used shall be distilled water or water of at least equivalent quality.

A.2.1 Disodium tetraborate buffer solution, prepared as follows:

Dissolve 3.81 ± 0.01 g of sodium tetraborate decahydrate in water, transfer quantitatively to a 1000 mL one-mark volumetric flask, dilute to the mark and mix thoroughly. Store the solution away from atmospheric carbon dioxide. The pH of this buffer solution at 20 °C is 9.22.

A.2.2 Potassium hydrogen phthalate buffer solution, prepared as follows:

Dissolve 10.21 ± 0.01 g of potassium hydrogen phthalate in water, transfer quantitatively to a 1000 mL one-mark volumetric flask, dilute to the mark and mix thoroughly. Store the solution away from atmospheric carbon dioxide. The pH of this buffer solution at 20 °C is 4.00.

A.3 Apparatus

Ordinary laboratory apparatus, and

A.3.1 pH meter, fitted with a glass measuring electrode and a calomel reference electrode, of sensitivity 0.05 pH units.

A.4 Procedure

A.4.1 Weigh to the nearest 0.001 g, 10 g of the test sample.

A.4.2 Preparation of test solution

Place the test sample (A.4.1) in a clean beaker (250 ml capacity) and dissolve in about 50 ml of water, stirring with a glass rod taking care to maintain the temperature at $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$. Transfer the solution quantitatively to a 100 mL one-mark volumetric flask, dilute to the mark and mix thoroughly.

A.4.3 Calibration of pH meter

Calibrate the pH meter (A.3.1) at a temperature of $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$ using the two buffer solutions (A.2.1) and (A.2.2).

A.4.4 Determination

Transfer the test solution (A.4.2) into a clean dry beaker (250 mL capacity), introduce the two electrodes of the pH meter (A.3.1) and determine the pH of the solution at a temperature of $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$, that is under the same conditions as used for the calibration (A.4.3).

A.5 Number of determinations

Carry out two determinations on test portions taken from the laboratory sample.

A.6 Expression of results

Express the results in pH units, to the nearest 0.1 unit, taking the mean of the two determinations. State the temperature at which the measurement was carried out.

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