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DRAFT EAST AFRICAN STANDARD

Organic fertilizer — 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.

The committee responsible for this document is Technical Committee EASC/TC 020, *Agriculture and agrochemicals*.

Organic fertilizer — Specification

1 Scope

This draft East African Standard specifies requirements, methods of sampling and test for organic fertilizers.

2 Normative references

The following referenced documents 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 document (including any amendments) applies.

AOAC 2006.03, *Arsenic, cadmium, cobalt, chromium, lead, molybdenum, nickel, and selenium in fertilizers — Microwave digestion and inductively coupled plasma-optical emission spectrometry*

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

ISO 8157, *Fertilizers, soil conditioners and beneficial substances — Vocabulary*

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

ISO 10390, *Soil quality — Determination of pH*

ISO 10694, *Soil quality — Determination of organic and total carbon after dry combustion (elementary analysis)*

ISO 4831 – *Microbiology – General guidance for the enumeration of coliforms – Most Probable Number technique (MPN).*

ISO 6579-1 – *Microbiology of food and animal feeding stuffs – Horizontal method for the detection, enumeration and serotyping of Salmonella — Part 1: Detection of Salmonella spp*

ISO 7251 – *Microbiology of food and feeding stuffs – Horizontal method for detection and enumeration of presumptive Escherichia coli – Most Probable Number Technique.*

ISO 5315, *Fertilizers – Determination of Total Nitrogen Content – Titrimetric method after distillation*

AOAC 965.08, *Water (free) in fertilizers — Vacuum-desiccation*

ISO 17184, *Soil quality — Determination of carbon and nitrogen by near-infrared spectrometry (NIRS)*

ISO 5318, *Fertilizers — Determination of potassium content — Potassium tetraphenylborate gravimetric method*

ISO 7899-2, *Water quality — Detection and enumeration of intestinal enterococci — Part 2: Membrane filtration method*

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

ISO 148-2, *Fertilizers and liming materials - Sampling and sample preparation - Part 2: Sample preparation*

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

ISO 11265, *Soil quality — Determination of the specific electrical conductivity*

3 Terms and definitions

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

3.1

biosolids

organic material from sewage and related materials recycled, composted and treated for use as a fertilizer

3.2

blood meal

dried, powdered blood collected from livestock slaughterhouses used as a fertilizer

3.3

cottonseed meal

milled cotton seeds used as a fertilizer

3.4

farmyard manure

a decomposed mixture of livestock dung and urine with straws and litter used as bedding material and residues from the fodder fed to livestock

3.5

fish emulsion fertilizer

a partially decomposed blend of finely pulverized fish that guarantees supply of essential nutrient elements

3.6

green manure

Plants which are mainly succulent and leafy legume crop which are grown for a short duration and then ploughed in the same field and incorporated by ploughing.

3.7

natural mineral deposits

Materials that are directly mined from mineral deposits and only subjected to physical processes such as crushing and drying. Examples of these materials may include: phosphate rock; gypsum; sulphate of potassium-magnesia that has been derived from ores that have been crushed, washed in water, dried and screened.

3.8

night soil

human urine and faeces collected separately or mixed with flush water and amendments such as soil, ash and other organic matter

3.9

organic matter

biomass of animals and plants. For this reason, only products that are solely derived from plant and animal biomass may be identified or described as "organic".

3.10

sewage sludge

a recycled product of sewage treatment plants

3.11

vermicompost

product or process of composting using various worms such as earthworms to create a heterogenous mixture of decomposing vegetable or food waste, bedding materials

3.12

raw manure

Undecomposed animal excreta used to fertilize the land

4 REQUIREMENTS

4.1 General requirements

4.1.1 For solid organic fertilizers:

- a) free of foreign matter and hard lumps
- b) particle size for granular form not less than 90% of the material shall pass through 5 mm IS sieve and shall be retained on 1 mm IS sieve. Not more than 5% shall be below 1 mm
- c) No chemical or inorganic materials shall be added to organic fertilizers
- d) be based on animal and/or plant materials supplemented with only natural products

4.1.2 For liquid organic fertilizers

- a) Biodegradable
- b) not contain any artificial colours
- c) not contain substances that are likely to be harmful or injurious to vegetation, animals, soil health, public health or the environment when used according to its intend use specified by the label;

4.1.1 Manure

organic fertilizer shall be:

- a) of uniform color
- b) homogenous
- c) free from foul smell
- d) free from pathogens.

- e) free from contaminants which include but not limited to residual hormones, antibiotics, pesticides, heavy metals shall not exceed the permitted levels.

4.1.2 Raw manures

All Raw manures shall be subjected to appropriate treatment. However, where they are used, the following conditions shall apply:

- a) Raw manures shall not be used as preplant or side dress fertilizers on vegetables that are eaten raw.
- b) Untreated dog, cat or pig manures and those derived from equines (donkey and horse family) shall not be used as these species share many parasites with humans.
- c) Raw manure may NOT be applied to food crops within 120 days of harvest where edible portions have soil contact.
- d) Raw manure may NOT be applied to food crops within 90 days of harvest where edible portions do not have soil contact (i.e., grain crops, and most tree fruits.) contaminants.
- e) Untreated human wastes shall not be used as fertilizer

4.2 Specific requirements

Organic fertilizers shall conform to the composition requirements set out in Table 1

Table 1: Composition requirements

S/No.	Parameter	Limit		Method of test
		Solid	Liquid	
I	pH in H ₂ O	6.0 – 9.0	6.0 – 8.0	ISO 10390
ii	Carbon: Nitrogen ratio	≤ 20:1		ISO 17184
iii	Moisture content, (solid) %, m/m	10-30		AOAC 965.08
V	Total Nitrogen, %, m/m, min.	1	1	ISO 5315
Vi	Dry matter content (Solid), %, m/m, min.	70		AOAC 965.08
Vii	Organic carbon, %, m/m, min.	12	5	ISO 10694
viii	Total primary nutrients — N+P ₂ O ₅ +K ₂ O (solid and liquid organic fertilizer), %, m/m, min. ^{a)}	5	5	ISO 5315, ISO 6598 and ISO 5318
ix	Electrical conductivity, mS/cm, max	5	20	ISO 11265

^{a)} When product processed to provide one or two nutrients, the sum of declared nutrients should not be less than 5%

5 Contaminants

5.1 Heavy metal contamination in Organic fertilizers shall not exceed the limits given in table 2 when determined by the methods prescribed in AOAC 2006.03.

Table 2 — Heavy metal contaminants limits

S/No.	Parameter	Requirement in mg/kg		Test methods
		solid	liquid	
i)	Arsenic, As, max.	10.0	0.5	AOAC 2006.03
ii)	Cadmium, Cd, max.	5.0	0.5	
iii)	Mercury, Hg, max.	0.1	0.1	
iv)	Chromium, Cr, max.	50.0	0.5	
v)	Lead, Pb, max.	30.0	1.0	

6 Hygiene

Organic fertilizers shall comply with the limits for pathogenic microorganisms specified in Table 3 when tested in accordance with the methods specified therein;

Table 3. — Pathogenic microorganism limits

Microorganisms	Limit	Method of test
<i>E. coli</i> MPN/g,	Absent	ISO 7251
Salmonella spp in 25 g fresh mass	Absent	ISO 6579-1
Faecal streptococci cfu/g	<500	Annex B
Total coliforms cfu/g	5×10^2	ISO 4831
Enterococci cfu/g	Absent	ISO 7899-2

7 Sampling and Testing

Sampling and sample preparation of organic fertilizers shall be carried out as prescribed in ISO 14820-1 and ISO 14820-2 respectively

7.1 Sampling for laboratory analysis

All finished products should be subjected to lot sampling for laboratory analysis using the following procedure:

For composite sampling of solid products:

- (1) Present to the inspector the production documents containing the number of bags per batch number and bag number.
- (2) The inspector will randomly select the bag number (See Table 4).

(3) The selected bags will be emptied into a clean area. All contents of the selected bags will be thoroughly mixed.

(4) Submit five kilograms (5 kg) of the composite sample to the laboratory.

(5) Information relative to the sample taken must be accurate and complete to allow traceability of the sample back to the lot from which it was sampled.

Table 4 — Required Number of Samples for Solid Products

Number of bags* per batch	Bags to be sampled
≤50	2
51 to 100	3
101 to 300	8
301 to 500	15
501 to 1000	20
More than 1000	For every extra 100 bags sample 1 additional bag from 20
* NOTE 1 bag = 50 kg	

For composite sampling of liquid products:

(1) Present to the inspector the production documents containing the number of containers per batch number and container number.

(2) The inspector will randomly select the container number and subject the selected containers for analysis.

(3) Information relative to the sample taken must be accurate and complete to allow traceability of the sample back to the lot from which it was sampled.

Table 5 — Required number of samples for liquid products

Number of containers* per batch	Containers to be sampled
≤ 50	1
51 to 100	2
101 to 300	3
301 to 500	4
More than 500	5
*NOTE: 1 container should be at least 1 L	

7.2 sample preparation for laboratory analysis

(a) For solid samples with uniform fineness

Place sample on a clean piece of paper and mix thoroughly. Reduce sample to a quantity sufficient for analysis by quartering. Mix and store in air-tight container.

(b) For organic liquid fertilizers

For liquid fertilizers without suspended particles, stir the sample until it is thoroughly mixed before taking a sample.

For liquid fertilizers with suspended particles, take a sample while mixing the material in order to obtain a representative sample.

7.3 Testing

Testing of the fertilizer shall be done as prescribed in the methods of analysis indicated in respective test methods standards.

8 Packaging and labelling

8.1 Packaging

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

8.2 Labelling

8.2.1 The following shall be legibly and indelibly marked in accordance with ISO 7409 in either English or any other official language with the following information;

- i. Name of the fertilizer i.e. Organic fertilizer (only if it conforms to this standard)
- ii. Name and address of the manufacturer/packer/importer
- iii. Nutrient content
- iv. Carbon/Nitrogen ratio
- v. Organic matter content
- vi. Moisture content
- vii. Batch number
- viii. Production date and Expiry Date
- ix. Handling instructions
- x. Directions for Use
- x. Storage instructions
- xi. product registration number
- xii. Country of origin

Annex A

(Informative)

Substances that may be used as Fertilizers or Soil Conditioners

Substance	Description; Compositional requirements; Conditions of use
Plant and animal origin	
Farmyard and poultry manure	Products comprising a mixture of animal excrements and vegetable matter (animal bedding). Indication of animal species. Coming from extensive farming, but if sourced from intensive farming or not sourced from organic production systems, need recognition by the approved certifying organisation and shall be composted.
Slurry or urine (not from human origin)	If not from organic farming sources, need recognition by the approved certifying organisation. Use after controlled fermentation and/or appropriate dilution. Factory farming sources not permitted. Indication of animal species.
Composted animal excrements, including poultry manure	Need recognition by the approved certifying organisation. Indication of animal species.
Dried farmyard manure and dehydrated poultry manure	Need recognition by the approved certifying organisation. Indication of animal species. Coming from extensive farming, but if from intensive farming sources it must be composted.
Guano	Need recognition by the approved certifying organisation.
Straw	Need recognition by the approved certifying organisation.
Composts from spent mushroom and dejecta of worms and insects (vermiculture substrates)	The initial composition limited to products on this list.
Composted or fermented organic household refuse	Organic vegetable and animal waste separated from household waste, which has been subjected to composting or anaerobic fermentation for biogas production. Need recognition by the approved certifying organisation.
Composted or fermented plant residues	Need recognition by the approved certifying organisation. Mixtures of plant matter which has been subjected to composting or anaerobic fermentation for biogas production.
Products and by-products of animal origin from slaughterhouses & fish industries: — blood meal — hoof meal — horn meal — bone meal or degelatinized bone meal — fish meal — meat meal — feather, hair and	Need recognition by the approved certifying organisation. — — — Heavy metal contamination monitoring necessary — —

Substance	Description; Compositional requirements; Conditions of use
"chiquette" meal — wool — fur — hair — dairy products	— —
By-products of food & textile industries	Not treated with synthetic additives. Need recognition by the approved certifying organisation.
Seaweeds and seaweeds products	Need recognition by the approved certifying organisation. Directly obtained by — physical processes; extraction with water or acid and/or alkaline solution; and fermentation.
Sawdust, bark and wood waste	From wood not chemically treated after felling.
Wood ash	From wood not chemically treated after felling.
Calcium lignosulfate	Recognized by the competent authority
Naturally occurring biological organisms e.g. worms	
Peat	Should not be extracted or treated using inorganic chemicals; permitted for seed, potting module composts.
By-products of industries processing ingredients from organic agriculture	Need recognition by the approved certifying organisation.
Night soil-faeces and material containing faecal matter	Subjected to either of the following treatments: composting, incineration/drying, anaerobic digestion and ammonia treatment
Sewage Sludge	Subjected to anaerobic digestion/fermentation, composting or long-time treatments
Human urine	Proper storage (based on the action of ammonia in combination with temperature.
Stillage and stillage extract	Ammonium stillage excluded.

Annex B

Determination of Fecal streptococci

1. Materials and Culture Media

Preferably use commercially available medium. Follow manufacturer's instructions for storing and discarding after preparation. If the medium must be prepared from basic ingredients, follow directions below.

a. Azide dextrose broth:

Beef extract	4.5 g
Tryptone or polypeptone	15.0 g
Glucose.....	7.5 g
Sodium chloride, NaCl	7.5 g
Sodium azide, NaN ₃	0.2 g
Reagent-grade water	1 L

CAUTION: Sodium azide is a dangerous chemical requiring special attention and care. It is toxic and mutagenic. Take precautions to avoid contact with this compound. Azide also can form explosive compounds if it contacts metal pipes.

Adjust pH so it is 7.2 ± 0.2 at 25°C after sterilization. If pH is out of range, adjust and retest pH; discard if pH remains out of range. The media described in this section are available commercially; follow manufacturer's instructions for storage and disposal after preparation.

b. Bile esculin azide agar:

Yeast extract.....	5.0 g
Proteose peptone No. 3.....	3.0 g
Tryptone	17.0 g
Oxgall	10.0 g
Esculin.....	1.0 g
Ferric ammonium citrate	0.5 g
Sodium chloride	5.0 g
Sodium azide.....	0.15 g
Agar.....	15.0 g
Reagent-grade water	1 L

CAUTION: Sodium azide is a dangerous chemical requiring special attention and care. It is toxic and mutagenic. Take precautions to avoid contact with this compound. Azide also can form explosive compounds if it contacts metal pipes.

2. Presumptive Test Procedure

Inoculate a series of tubes of azide dextrose broth with appropriate graduated quantities of sample. Use sample volumes of 10 mL or less. Use double-strength broth for 10-mL inocula. The sample portions used will vary in size and number with the sample character. Use only decimal multiples of 1 ml. Incubate inoculated tubes at $35 \pm 0.5^\circ\text{C}$. Examine each tube for turbidity at the end of 24 ± 2 h. If no definite turbidity is present, reincubate, and read again at the end of 48 ± 4 h.

3. Confirmed Test Procedure

After 24 or 48 h incubation, subject all azide dextrose broth tubes showing turbidity to the confirmed test for streptococci. Streak a portion of growth from each positive azide dextrose broth tube on bile esculin azide agar (BEA). Invert and incubate the dish at $35 \pm 0.5^\circ\text{C}$ for 24 ± 2 h. Brownish-black colonies with brown halos confirm the presence of fecal streptococci. Then, transfer brownish-black colonies with brown halos to two tubes of brain– heart infusion (BHI) broth: one with 6.5% NaCl and one without NaCl. If growth is observed when tube is incubated at $35 \pm 0.5^\circ\text{C}$ after 48 ± 4 h (BHI broth with 6.5% NaCl) or 24 ± 2 h (BHI broth without NaCl), the colony is confirmed as a member of the *Enterococcus* genus. The aforementioned procedure is expected to offer an acceptably accurate confirmation of the presence of the *Fecal Streptococci*. However, more accuracy ($\geq 90\%$) can be achieved by doing all of the following: observing gram-positive cocci, a catalase-negative reaction, growth on BHI agar at $10 \pm 0.5^\circ\text{C}$, positive pyrrolidonylarylamidase (PYR) activity, and positive leucine aminopeptidase (LAP) reaction 3,4 using a commercially available test kit.

4. Computing and Recording MPN

Calculate the total fecal streptococci density from the number of confirmed positive cultures on bile esculin azide agar and corresponding positive tubes of BHI broth with 6.5% NaCl at $35 \pm 0.5^\circ\text{C}$ after 48 ± 4 h. Compute the combination of positive and negative tubes and record as the most probable number (MPN).

Annex C

(Informative)

Additional guidelines

- a) **Other claims** — Any reference to the activity of a product containing plant nutrients that is not generally associated with its nutritional value must be substantiated with statistically significant efficacy data derived from field trials.
- b) **Nutrient guarantees** — Any product represented as a source of plant nutrients must carry a guaranteed analysis.
- c) Any product containing organic materials or plant nutrients may represent a potential hazard when misused. Thus, unnecessary blanket statements suggesting that the product is completely safe and non-toxic to humans, animals or the environment must not appear on the label.
- d) **Miscellaneous terms** — Words, such as balanced and healthy, should be avoided as they are often misunderstood and consequently misleading.
- e) Also objectionable are comparatives such as best, superior, and greener, as they imply a comparison without indicating the basis of this comparison
- f) **Environmentally beneficial** — Any product represented as "environmentally sound", etc. must identify the rationale for the claim and list all ingredients in order to allow the consumer to determine the validity of the statement.

Bibliography

- EAS 456, Organic production standard.
- KS 2290, Organic fertilizer — Specification

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