

ICS 65.080

Reference number

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Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS 604-1 was prepared by Technical Committee RSB/TC 7, Fertilizers, soil conditioners and beneficial substances.

DRS 604 consists of the following parts, under the general title Organo-mineral fertilizer - Specification:

- Part 1: Solid
- Part 2: Liquid

Committee membership

The following organizations were represented on the Technical Committee on *Fertilizers, soil conditioners and beneficial substances* (RSB/TC 7) in the preparation of this standard.

Rwanda Inspectorate, Competition and Consumer Protection Authority

Ministry of Agriculture and Animal Resources

National Agricultural Export Development Board

Rwanda Forensic Institute

Rwanda Investigation Bureau

University of Rwanda/College of Sciences and Technology

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Organo-mineral fertilizer — Specification — Part 1: Solid

1 Scope

This Draft Rwanda Standard specifies the requirements, sampling and test methods for solid Organo-mineral fertilizer.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

RS ISO 8157, Fertilizers, soil conditioners and beneficial substances - Vocabulary

RS EAS 1167, Organic fertilizer - Specification

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

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

AOAC 2006.03, Arsenic, cadmium, cobalt, chromium, lead, molybdenum, nickel and selenium in fertilizers

RS ISO 7409, Fertilizers — Marking — Presentation and declarations

RS EAS 1166, Handling, storage and disposal of bagged fertilizers and soil conditioners — Code of practice

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

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

AOAC 965.08, Water (free) in fertilizers, Vacuum-desiccatio

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

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

RS ISO 5315, Fertilizers — Determination of total nitrogen content — Titrimetric method after distillation

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

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

ISO 7251, Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive Escherchia coli — Most probable

ISO 6579-1, Microbiology of the food chain — Horizontal method for the detection, enumeration and serotyping of Salmonella — Part 1: Detection of Salmonella spp.

ISO 4831, Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of coliforms — Most probable number technique

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

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in RS ISO 8157 apply.

- 4 Requirements
- 4.1 General requirements
- **4.1.1** The solid organo-mineral fertilizer shall be a co-formulation of:
- a) one or more inorganic fertilizers complying to the requirements of relevant standards, and
- b) one or more materials containing organic carbon and nutrients of solely biological origin as defined in RS EAS 1167.
- 4.1.2 The solid organo-mineral fertilizer shall:
- a) be in the form of granular, pellet, tablet or powder;
- b) be of uniform in color that can vary from brown, black, gray of greenish, depending on the organic and mineral content;
- c) be free form hard caking; and
- d) have no perceptible odour.

4.1.3 The particle size for granular form shall not be less than 90 % of the material passing through a 5mm IS sieve and I be retained on a 1-mm IS sieve. Not more than 5 % shall pass through a 1-mm IS sieve, when tested in accordance with RS ISO 8397.

4.2 Specific requirements

The solid organo-mineral fertilizer shall comply with the requirements given in table 1 when tested in accordance with the test methods specified therein.

Table 1 – Specific red	uirements for solid	l organo-mineral fertilizer
		l'organe minerarieranizer

S/N	Parameters	Requirements	Test methods
i.	Moisture content, % m/m, max.	20	AOAC 965.08
ii.	Organic carbon content, % m/m, min.	7.5	RS ISO 10694
iii.	Carbon/Nitrogen ratio	10:1 – 20:1	RS ISO 17184
iv.	Total primary nutrients (N+ P2O5+ K2O), %	8	RS ISO 5315
	m/m, min.		RS ISO 6598
٧.	Total nitrogen (as N), % m/m, min.	2.5	RS ISO 17319
vi.	Total phosphorus (as P2O5), % m/m, min.	2	
vii.	Total potassium (as K ₂ O), % m/m, min.	2	
5 Co	ontaminants		
5.1 F	leavy metals contaminants		

5 Contaminants

5.1 Heavy metals contaminants

Heavy metal contaminants in solid organo-mineral fertilizer shall conform to the limits given in Table 2 when tested in accordance with the test methods specified therein.

Table 0 Limite			
Table 2 – Limits	for heavy	metal cont	aminants

S/N	Heavy metal	Limit (mg/kg, max.)	Test method
i.	Arsenic (As)	10	
ii.	Cadmium (Cd)	5	
iii.	Mercury (Hg)	0.1	RS ISO 17318
iv.	Lead (Pb)	20	
v.	Chromium (Cr)	2	
vi.	Nickel (Ni)	50	AOAC 2006.03

5.2 Microbiological contaminants

Solid organo-mineral fertilizers shall comply with the limits for microbiological contaminants specified in Table

3 when tested in accordance with the methods specified therein;

Table 3. — Limits for microbiological contaminants

Microorganisms	Limit	Method of test
E. coli, CFU/g MPN/g	Absent	ISO 7251
Salmonella spp., CFU/g fresh mass	Absent	ISO 6579-1
Faecal streptococci, CFU/g, max.	250	Annex A
Total coliforms, CFU/g, max.	100	ISO 4831
Enterococci CFU/g	Absent	ISO 7899-2

6 Packaging

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

7 Labelling

Each package shall be legibly and indelibly labeled in accordance with RS ISO 7409, in English and/or any other official language in the destination country with the following information:

- a) name of the fertilizer as "Organo-mineral fertilizer"
- b) physical form as "solid"
- c) brand name if any;
- d) name and address of the manufacturer/packer/ distributor;
- primary nutrient content; e)
- f) organic matter content;
- carbon/nitrogen ratio; g)
- net content by mass in metric units; h)
- country of origin; i)
- j) production date
- k) expiry date;
- I) batch number;
- m) instruction for use, and
- n) storage and handling conditions.

Storage, handling and transportation 8

The organo-mineral fertilizer shall be stored, handled and transported in accordance with RS EAS 1166.

Sampling 9

Sampling and sample preparation of ammonium chloride fertilizer shall be done in accordance with RS ISO 14820-1 and RS ISO 14820-2, respectively.

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Annex A (normative)

Determination of faecal streptococci

A.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	
Sodium azide, NaN3	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 \pm 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
Tryptone
Oxgall
Esculin 1.0 g
Ferric ammonium citrate0.5 g
Sodium chloride 5.0 g
Sodium azide 0.15 g

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Agar.....15.0 g

Reagent-grade water1 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.

A.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 MI. Incubate inoculated tubes at $35\pm 0.5^{\circ}$ 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.

A.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 $35 \pm 0.5^{\circ}$ 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 $35 \pm 0.5^{\circ}$ 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 presense 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 ± 0.50 C, positive pyrrolidonylarylamidase (PYR) activity, and positive leucine aminopeptidase (LAP) reaction 3,4 using a commercially available test kit.

A.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±0.5°C after 48 ±4 h. Compute the combination of positive and negative tubes and record as the most probable number (MPN).

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Bibliography

[1] Regulation (EU) 2019/1009 of 5th June 2019, laying down rules on the making available on the market of EU fertilizing products and amending Regulations (EC) No. 1069/2009 and (EC) No. 1107/2009 and repealing

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