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SPECIFICATION FOR LIQUID ORGANIC FERTILIZER
(FIRST REVISION) (DSLS 1702 :)

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Sri Lanka Standard
SPECIFICATION FOR LIQUID ORGANIC FERTILIZERS
(First Revision)

DSLS 1702:

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Sri Lanka Standard
SPECIFICATION FOR LIQUID ORGANIC FERTILIZERS
(First Revision)

FOREWORD

This Sri Lanka Standard was approved by the Sectoral Committee on Agriculture and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on

Liquid organic fertilizers are concentrated with plant nutrients. They are diluted in water and applied to soils and/or foliage. Liquid organic fertilizers provide water soluble and readily utilizable forms of nutrients by crops. Liquid organic fertilizers consist of primary nutrients and may contain beneficial microorganisms and/or micronutrients.

This Standard was first published in 2021. In this First Revision, scope was updated and general requirements were revised. Pathogenic requirements and a new method for estimation of fecal *coliforms* were incorporated to assure the quality and the safety of the product.

This Standard is subjected to the provisions under the Fertilizer Act No. 68 of 1988, the National Environmental Act No. 47 of 1980, the Soil Conservation Act No. 25 of 1951, the Fauna and Flora Protection Ordinance No. 02 of 1937, the Plant Protection Act No. 35 of 1999, the Food Act No. 26 of 1980, the Animal Diseases Act No. 59 of 1992 and Quarantine and Prevention of Diseases Ordinance No. 3 of 1897, and the regulations and amendments framed thereunder, and any other regulatory and statutory requirements wherever applicable.

Guidelines for the determination of compliance of a lot to the requirements of this Standard based on statistical sampling and inspection are given in Appendix A.

All values given in this Standard are in SI units.

For the purpose of deciding whether a particular requirement of this Standard is complied with, the final value, observed or calculated, expressing the results of a test shall be rounded off in accordance with **SLS 102**. The number of significant figures to be retained in the rounded off value shall be the same as that of the specified value in this Standard.

In the preparation of this Standard, the valuable assistance derived from the following publications is gratefully acknowledged:

EU 2019/1009	EU Fertilising Products Regulation
MS 2555	Liquid fertilizers - Specification
PNS BAFS 183	Organic soil amendments

1 SCOPE

1.1 This Standard specifies the requirements and methods of sampling and tests for liquid organic fertilizers.

1.2 This Standard does not cover liquid organic fertilizers those contain, enriched and/or fortified with alien (non-indigenous) and genetically modified organisms.

1.3 This Standard is not applicable for liquid biofertilizers or liquids that contain plant growth regulators or plant growth promoting substances or nano fertilizers.

2 REFERENCES

- SLS83 SI units and recommendations for use of their multiples and of certain other units
- SLS102 Rules for rounding off numerical values
- SLS428 Random sampling methods
- SLS645 Methods of test for fertilizers
Part 1: Determination of Nitrogen content
Part 4: Determination of Potassium content
Part 5: Determination of Phosphorus content
- SLS 516 Methods of test for microbiology of food and animal feeding stuffs
Part 5: Horizontal method for the detection of *Salmonella* spp.
Part 7/Section 1: Horizontal method for the detection of potentially enteropathogenic *Vibrio* spp. - Detection of *Vibrio parahaemolyticus* and *Vibrio cholerae*
Part 15/Section 1: Horizontal method for the detection and enumeration of *Listeria monocytogenes* and of *Listeria* spp. – Detection method
- SLS 1324 Requirements for organic agriculture production and processing
- SLS 1526 Method of test for determination of soil pH
- SLS ISO 11265 Soil quality - Determination of the specific electrical conductivity
- DSLS ISO 14820-1 Fertilizers and liming materials - Sampling and sample preparation
Part 1: Sampling
- DSLS ISO 14820-2 Fertilizers and liming materials - Sampling and sample preparation
Part 2: Sample preparation
- United States Environmental Protection Agency (USEPA)
National Plant Quarantine Service (NPQS) Standard Test Methods
Official methods of Analysis, Association of Official Analytical Chemists (AOAC) 20th edition, 2016

For undated references the latest version of the referenced document (including any amendments) shall apply.

3 DEFINITIONS

For the purpose of this Standard, the following definitions shall apply:

3.1 alien organism: Non-native species, which does not exist naturally in an ecosystem, and introduced accidentally or intentionally for various purposes.

NOTE:

Any organism which does not exist in ecosystems in Sri Lanka are considered as alien for this standard.

3.2 batch: Liquid organic fertilizers that are produced from the same type of materials, at the same time and location, by the same manufacturer/producer, or made during the same cycle or period of manufacture.

3.3 liquid organic fertilizer: Any product in the liquid form, of plant (except byproducts from petroleum industries) or animal origin, which has undergone substantial decomposition that can supply nutrients to plants.

3.4 liquid form: A suspension and/or a solution, where a suspension is a two-phase dispersion in which solid particles are maintained in suspension in the liquid phase.

3.5 naturally occurring minerals: Materials that are directly mined from mineral deposits and only subjected to physical processes including crushing, drying and sieving.

3.6 primary nutrient: Elements nitrogen, phosphorus and potassium only.

4 RAW MATERIALS

The raw materials used in manufacturing liquid organic fertilizers shall be in accordance with the substances listed in the Appendix A of the SLS 1324.

5 REQUIREMENTS

5.1 General requirements

5.1.1 Liquid organic fertilizers shall be manufactured by a process adhering to Good Manufacturing Practices (GMP) complying with the requirements imposed by the relevant regulatory authorities in Sri Lanka.

5.1.2 Liquid organic fertilizers shall be in liquid form.

5.1.3 The product shall be biodegradable.

5.1.4 The product shall not contain any added colours.

5.1.5 The product shall be free from any organisms and substances, which would be harmful or potentially injurious to human, animal, plant and other biota, and ecosystems as a

whole. Self-declaration regarding such organisms and substances shall be submitted by the manufacturer if a request is made by the regulatory body.

5.2 Chemical and physical requirements

The product shall conform to the requirements given in Table 1, when tested according to the methods given in Column 4 of the Table 1.

TABLE 1 – Chemical and physical requirements for liquid organic fertilizers

SINo. (1)	Characteristic (2)	Requirement (3)	Method of test (4)
i)	pH	6.0-8.5	SLS 1526
ii)	Electrical conductivity, dS/m, max.	10.0	SLS ISO 11265
iii)	Total Nitrogen content as N, per cent by mass, min.	2.0	SLS 645: Part 1
iv)	Total Potassium content as K ₂ O, per cent by mass, min.	1.0	SLS 645: Part 4
v)	Total Phosphorus content as P ₂ O ₅ , per cent by mass, min.	0.5	SLS 645: Part 5
vi)	Organic carbon per cent by mass, min.	5.0	Appendix B
vii)	Total solid, mg/l, max	5.0	USEPA Method 1684

5.3 Biological requirements

5.3.1 The imported products shall be free from any microorganism when tested using the specified molecular characterization methods by an accredited laboratory and/or recommended by national authoritative institution.

5.3.2 The product shall be free from any organisms harmful, injurious, and destructive to plants and sanitation of plants, when tested as prescribed in the standard test methods and/or procedures defined by NPQS in Sri Lanka.

NOTE: In case of local products, the test can be accommodated by an accredited laboratory and/or recommended by national authoritative institution.

5.3.3 The product shall not exceed the limits for microorganisms given in the Table 2 when tested using the methods prescribed in Column 4 of the Table 2.

TABLE 2 – Microbiological limits for liquid organic fertilizers

SI No. (1)	Test organism (2)	Limit (3)	Method of test (4)
i)	Faecal Coliforms MPN, per ml	Absent	USEPA Method 1680
ii)	<i>Salmonella</i> , per 25 ml	Absent	SLS 516: Part 5
iii)	<i>E. coli</i> O157, per 25 ml	Absent	SLS 516 Part 13
iv)	<i>Vibrio cholerae</i> , per 25 ml	Absent	SLS 516: Part 7/ Section 1
v)	<i>Vibrio parahaemolyticus</i> , per 25 ml	Absent	SLS 516: Part 7/ Section 1
vi)	<i>Listeria monocytogenes</i> , per 25 ml	Absent	SLS 516: Part 15/Section 1

5.4 Limits of potentially toxic elements

The product shall not exceed the limits of potentially toxic elements given in Table 3, when tested as prescribed in Column 4 of the Table 3.

TABLE 3 - Limits of potentially toxic elements for liquid organic fertilizers

SI No. (1)	Elements (2)	Limit, mg/kg (maximum) (3)	Method of test (4)
i)	Arsenic, as As	0.5	AOAC 2006.03
ii)	Cadmium, as Cd	0.5	AOAC 2006.03
iii)	Chromium, as Cr	0.5	AOAC 2006.03
iv)	Lead, as Pb	1.0	AOAC 2006.03
v)	Mercury, as Hg	0.5	AOAC 2006.03
vi)	Nickel, as Ni	0.5	AOAC 2006.03

6 PACKAGING

Liquid Organic fertilizers shall be packed in a well sealed container which shall not provide deleterious effect on the product from the light, humidity and temperatures.

7 STORAGE

Liquid Organic fertilizers shall be stored in a cool, dark place.

8 MARKING AND/ OR LABELLING

The following shall be marked or labelled legibly and indelibly on each bottle or package:

- a) Name of the product as “Liquid Organic Fertilizers”;
- b) Name and address of the manufacturer, packer or distributor (see Note);
- c) Registered trade mark, if any;
- d) Batch or code number;
- e) Net content in metric units;
- f) Date of manufacture;
- g) Date of expiry/Best before;
- j) Primary nutrient content;
- k) Crops for which it is intended;
- m) Dilution ratio/ application methods and time;
- n) Storage/disposal instructions; and
- o) Safety precautions in handling and application.

NOTES:

Name and address of the manufacturer and the distributor need to be marked on imported products.

7 SAMPLING

Representative samples of the product for ascertaining conformity to the requirements of this Standard shall be drawn as prescribed in Appendix A.

8 METHODS OF TEST

8.1 Tests shall be carried out as prescribed in Appendices B given in this Standard, SLS 1526, SLS ISO 11265, Part 1, Part 4 and Part 5 of SLS 645, Part 5, Part 13, Section 1/Part 7 and Section 1/ Part 15 of SLS 516, USEPA Method 1680, USEPA Method 1684, NPQS Standard Test Methods and Methods of Analysis of the Association of Official Analytical Chemists (AOAC), 2016.

8.2 Unless otherwise specified, quality reagents, chemicals and distilled water shall be used in tests.

APPENDIX A

COMPLIANCE OF A LOT

The sampling scheme given in Appendix A shall be applied where compliance of a lot to the requirements of this standard is to be assessed based on statistical sampling and inspection.

Where compliance with this standard is to be assured based on manufacturer's control systems coupled with type testing and check tests or any other procedure, appropriate schemes of sampling and inspection should be adopted.

A.1 LOT

All units (packages/ containers) in a single consignment of material belonging to the same batch of manufacture or supply shall constitute a lot. If a consignment consists of different batches of the manufacture the containers of the same batch shall be separated and shall constitute a separate lot.

A.2 GENERAL REQUIREMENTS OF SAMPLING

In drawing, preparing, storing and handling samples, following precautions and directions shall be taken.

A.2.1 Sampling shall be carried out by a trained and experienced person as it is essential that the sample should be representative of the lot to be examined.

A.2.2 The sampling equipment/s shall be perfectly clean, dry and sterile. It shall be properly sterilized by heating in a hot air-oven at 160°C for not less than 2 h or by autoclaving for not less than 20 min at 120°C and held in suitable containers to prevent re-contamination.

A.2.3 Samples in their original unopened containers shall be drawn and sent to the laboratory to prevent possible contamination of sample during handling and to help in revealing the true condition of the material.

A.2.4 The samples shall be protected against extraneous contamination while drawing and handling the samples and to preserve them in their original condition till they are ready for examination in the laboratory.

A.2.5 No preservative or bactericidal/fungicidal agent shall be added to samples required for microbiological analysis

A.2.6 Samples shall be drawn from a protected place not exposed to dampness, air, light, dust or soot.

A.2.7 The sample containers shall be need to be filled only up to 80% of the full volume leaving provision for gas exchange.

A.2.8 The sample containers shall be sealed air-tight after filling and marked with necessary details of sampling.

A.3 SCALE OF SAMPLING

A.3.1 Samples shall be tested from each lot separately for ascertaining conformity of material to the requirements of this Standard.

A.3.2 The sampling shall be drawn as per procedure specified in **DSLIS ISO 14820-1**, as appropriate for physical and chemical testing requirements.

A.3.3 The sample preparation shall be done as per the procedure specified in **DSLIS ISO 14820-2**, as appropriate for physical and chemical testing requirements.

A.3.4 Unopened package/ container or homogenous sample taken from products in bulk shall be selected at random for microbiological testing.

A.3.5 Preparation of homogenous sample from products in bulk shall be done as per the procedure given below. Sample shall be drawn from the top, middle and bottom portions of the bulk product using an appropriate sterilized sampling instrument under aseptic condition to form final sample for microbiological tests. The sample shall be put into sterile sample container and marked with necessary details of sampling. The two samples shall be drawn and approximately 250 ml for each.

A.3.6 The packages or containers shall be selected at random. In order to ensure the randomness of selection, tables of random numbers as given in **SLS 428** shall be used.

A.4 NUMBER OF TESTS

A.4.1 Each package or container shall be selected as in Clause **A.3.2** shall be inspected at the point of sampling for packaging and marking and/or labelling requirements specified in Clause **6** and **7**.

A.4.2 Each package or container shall be selected as in Clause **A.3.2** and prepared as in Clause **A.3.3** shall be tested for the chemical and physical requirements specified in Clause **5.2** and requirements of potentially toxic elements limits specified in Clause **5.4**.

A.4.3 Specimens selected as in Clause **A.3.4** and **A.3.5** shall be tested for the requirements of microbiological requirements specified in Clause **5.3**.

A.5 CRITERIA FOR CONFORMITY

A lot shall be declared as conforming to the requirements of this Standard if the following conditions are satisfied.

A.5.1 Each package or container inspected as in Clause **A.4.1** shall satisfies the relevant requirements.

A.5.2 All test specimens tested as in Clause **A.4.2** shall satisfy the relevant and applicable requirements.

A.5.3 All test specimens tested as in Clause **A.4.3** shall satisfy the relevant and applicable requirements.

APPENDIX B
DETERMINATION OF ORGANIC CARBON (WALKLEY – BLACK METHOD)

B.1 APPARATUS

B.1.1 *Erlenmeyer flask*

B.2 REAGENTS

B.2.1 *Potassium dichromate solution* – Dissolve 49.04 g of potassium dichromate dried at 200°C for 2 hours.

B.2.2 *Sulfuric acid*- concentrated

B.2.3 *Phosphoric acid* (85 per cent)

B.2.4 *Diphenylamine indicator* –Dissolve 0.5 g diphenylamine in 20 ml of distilled water. Add 100 sulfuric acid and mix.

B.2.5 *Ferrous sulfate solution* (0.5 N) - Dissolve 140 g of ferrous sulfate of 200 g of ferrous ammonium sulfate in 15 ml concentrated sulfuric acid and make up to 1000 ml with distilled water.

B.3 PROCEDURE

B.3.1 Weigh 0.025 g of the sample. Transfer to the Erlenmeyer flask using 10 ml of Potassium dichromate. Add 20 ml of Sulfuric acid. If the colour changes immediately to green, reduce the sample. Leave for 30 minutes and dilute to 200 ml.

B.3.2 Add 10 ml of 85 per cent Phosphoric acid, then add 1.0 ml Diphenylamine indicator. Titrate against Ferrous sulfate solution till the colour changes to blackish green. Perform a black titration.

B.4 CALCULATION

$$\text{Normality of ferrous sulfate solution (N)} = \frac{10}{V_b}$$

$$\text{Organic matter per cent by mass} = \frac{(V_b - V_s) N \times 0.399}{M}$$

Where;

N is the normality of Ferrous sulfate solution;

V_s is the volume in milliliters of ferrous sulfate used for the sample;

V_b is the volume in milliliters of Ferrous sulfate used for the black; and

M is the mass in grams of the sample used.