SRI LANKA STANDARD 1105 : 1995

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SPECIFICATION FOR EPSOM SALT (FERTILIZER GRADE)

SRI LANKA STANDARDS INSTITUTION

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SLS 1105 : 1995

Gr. 5

SRI LANKA STANDARDS INSTITUTION
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Sri Lanka.

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

Sri Lanka Standard
SPECIFICATION FOR EPSOM SALT (FERTILIZER GRADE)

FOREWORD

This standard was approved by the Sectoral Committee on Chemicals and Chemical Technology and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 1995-11-23.

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

For the purpose of deciding whether a particular requirement of this specification is complied with, the final value, observed or calculated, expressing the result of a test or an analysis, shall be rounded off in accordance with CS 102. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this specification.

1 SCOPE

This specification prescribes the requirements and methods of test for epsom salt (magnesium sulfate hepta hydrate), fertilizer grade.

2 REFERENCES

CS 102 Presentation of numerical values
CS 124 Test sieves
SLS 544 Code of practice for handling and storage of bagged fertilizers
SLS 559 Sampling of fertilizers
SLS 645 Methods of test for fertilizers
Part 2 Determination of moisture content
Part 6 Determination of calcium and magnesium content

3 REQUIREMENTS

3.1 General requirements

3.1.1 The material shall be in the form of free flowing colourless crystals, and free from visible foreign matter. It shall be completely soluble in water.

3.2 Other requirements

The material shall also comply with the requirements given in Table 1, when tested according to the relevant test method given in Column 4 of the table.

TABLE 1 - Requirements for epsom salt

Sl. No. (1)	Characteristic (2)	Requirement (3)	Methods of test (4)
i)	Magnesium content(as MgO), per cent by mass, min.	16.0	SLS 645 : Part 6
ii)	Mineral acid soluble sulfate content, (as SO_3), per cent by mass, min.	32.5	Appendix B
iii)	Matter insoluble in water, per cent by mass, max.	0.2	Appendix C
iv)	Chlorides (as Cl), per cent by mass, max.	1.0	Appendix D
v)	Moisture content, per cent by mass, max.	13.0	SLS 645 : Part 2

4 PACKAGING AND MARKING

4.1 Packaging

The material shall be supplied in sound, strong and moisture proof packages or containers. Suitable packages include polypropylene or jute bags with an inner lining of low density polyethylene having a minimum thickness of 37.5 µm or any other material having barrier properties superior or equal to low density polyethylene of 37.5 µm thickness. The material may also be supplied in bulk containers as agreed to between the purchaser and the supplier.

4.2 Marking

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

a) The words *epsom salt, fertilizer grade*, in capital letters;
b) MgO content, per cent by mass;
c) Name and address of the manufacturer;
d) Registered trade mark, if any;
e) Net mass, in kilograms;
f) Batch or code number;
g) Date or month and year of manufacture; and
h) The words *use no hooks*, in capital letters.

Note

Attention is drawn to certification marking facilities offered by the Sri Lanka Standards Institution. See the inside back cover of the standard.

5 HANDLING AND STORAGE

The handling and storage of the material shall be as prescribed in SLS 544.

6 METHODS OF TEST

Tests shall be carried out as prescribed in Parts 2 and 6 of SLS 645 and Appendices B to D of this specification.

APPENDIX A
COMPLIANCE OF A LOT

The sampling scheme given in this appendix should 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 SCALE OF SAMPLING

A.1.1 The sampling shall be carried out as prescribed in SLS 559.

A.2 NUMBER OF TESTS

A.2.1 Each package selected as prescribed in SLS 559 shall be inspected for packaging and marking requirements.

A.2.2 Tests for requirements specified in 3 shall be carried out on the composite sample prepared as in SLS 559.

A.3 CRITERIA FOR CONFORMITY

A lot shall be declared as conforming to the requirements of this specification, if the following conditions are satisfied:

A.3.1 Each package inspected as in A.2.1 satisfies the relevant requirements.

A.3.2 The test results on the composite sample when tested as in A.2.2 satisty the relevant requirements.

APPENDIX B
DETERMINATION OF MINERAL-ACID-SOLUBLE SULFATE CONTENT

B.1 REAGENTS

B.1.1 Hydrochloric acid, concentrated rel. den. = 1.19.

B.1.2 Barium chloride dihydrate, c($BaCl_2.2H_2O$) = 122 g/l solution.

B.1.3 Silver nitrate, c($AgNO_3$) = 5 g/l solution.

B.2 APPARATUS

B.2.1 Filter crucible, with porcelain disc of pore size between 4 µm to 10 µm.

B.2.2 Oven, maintained at a temperature of 120 °C ± 5 °C.

B.2.3 Muffle furnace, maintained at a temperature of 800 °C ± 50 °C.

B.3 PROCEDURE

B.3.1 Weigh, to the nearest 0.1 mg, about 1 g of the sample into a 400-ml beaker, add 170 ml of water and 15 ml of hydrochloric acid (B.1.1). Bring to the boil and continue boiling for 10 minutes, cool, transfer to a 250-ml volumetric flask and dilute to the mark with water. Mix well and filter the solution through a dry, folded filter paper into a dry bottle.

B.3.2 Transfer 100 ml of the filterate (B.3.1) to a 800-ml beaker. Make up with water to 300 ml and add 20 ml of hydrochloric acid (B.1.1). Boil the mixture, while mixing thoroughly, add drop by drop to the boiling solution 20 ml of the barium chloride solution (B.1.2). Continue boiling for a few minutes. Place the beaker on a hot-plate set at 60 °C and cover it with a watch-glass. Allow to stand at 60 °C for 3 hours.

Dry the filter crucible (B.2.1) in the muffle furnace (B.2.3) Allow it to cool in a desiccator to a room temperature and weigh to the nearest 0.1 mg.

Decant the clear supernatant liquid from the beaker through the dried crucible. Wash the precipitate in the beaker several times by decanting with hot water. Transfer the precipitate to the dried crucible by means of a hot water jet. Wash the precipitate with hot water in order to remove chloride ions. Continue washing until the absance of chloride ions has been established by means of the silver nitrate solution (B.1.3). Dry the crucible with the precipitate for 1 hour in the oven (B.2.2). Place the crucible with the precipitate in the muffle furnace (B.2.3) for 30 minutes. Allow the crucible to cool in a desiccator and weigh to the nearest 0.1 mg.

B.4 CALCULATION

$$\text{Mineral-acid-soluble sulfate content, (as } SO_3\text{), per cent by mass} = 85.75 \times \frac{m_1}{m_0}$$

where,

m_1 is mass, in g, of the dried and heated precipitate; and
m_0 is mass, in g, of the sample.

APPENDIX C
DETERMINATION OF MATTER INSOLUBLE IN WATER

C.1 PROCEDURE

Weigh, to the nearest 0.001 g, about 5 g of the sample and dissolve in 100 ml of water by stirring the solution well. Filter through a dried and tared sintered glass crucible. (G No. 4). Wash the residue thoroughly till it is free from all soluble compounds and dry the crucible and residue at 105 °C $\pm$ 2 °C, cool and weigh. Repeat the drying, cooling and weighing procedures until the difference in mass between two successive weighing does not exceed 1 mg.

C.2 CALCULATION

$$\text{Matter insoluble in water, per cent by mass} = \frac{m_1}{m_2} \times 100$$

where;

m_1 is mass, in g, of dried insoluble matter; and
m_2 is mass, in g, of the sample.

APPENDIX D
DETERMINATION OF CHLORIDES

D.1 PRINCIPLE

The chlorides, dissolved in water, are precipitated in an acid medium by an excess of standard solution of silver nitrate. The excess is titrated with a solution of ammonium thiocyanate in the presence of ferric ammonium sulfate.

D.2 REAGENTS

D.2.1 **Nitrobenzene or diethyl ether**

D.2.2 **Nitric acid**, 10 mol/l

D.2.3 **Indicator solution**

Dissolve 40 g of ferric ammonium sulfate [$Fe_2(SO_4)_3(NH_4)_2 \cdot 24H_2O$] in water and make up to 1 litre.

D.2.4 **Silver nitrate**, 0.1 mol/l standard solution.

D.2.5 **Ammonium thiocyanate**, standard volumetric solution, $c(NH_4CNS)$ = 0.1 mol/l

Weigh approximately 9 g of ammonium thiocyanate, dissolve in water and make up the volume to one litre. Standardize by titrating against 0.1 mol/l silver nitrate solution (D.2.4).

D.3 APPARATUS

D.3.1 **Rotary shaker**, 35 to 40 turns per minute

D.4 PROCEDURE

D.4.1 Weigh, to the nearest 0.001 g, about 5 g of the prepared sample and place in a 500-ml graduated flask and add 450 ml of water. Mix for half an hour on the shaker (D.3.1), make up to 500 ml with distilled water, mix and filter into a beaker.

D.4.2 Take an aliquot of the filtrate containing not more than 0.150 g of chloride. If the sample taken is smaller than 50 ml it is necessary to make up the volume to 50 ml with distilled water. Add 5 ml of nitric acid (D.2.2), 20 ml of indicator solution (D.2.3), and two drops of ammonium thiocyanate standard solution (D.2.5) from a burette adjusted to zero. Add silver nitrate solution (D.2.4), from a burette until there is an exess of 2 to 5 ml silver nitrate solution. Add 5 ml of nitrobenzene or 5 ml of diethyl ether (D.2.1) and shake well to agglomerate the precipitate. Titrate the excess silver nitrate with ammonium thiocyanate (D.2.5) from the burette used initially (without readjusting to zero) until a red-brown colour appears which remains after the flask has been shaken slightly.

NOTE

Nitrobenzene or diethyl ether (especially the former) prevents the silver chloride from reacting with thiocyanate ions; thus a clear colour change is obtained.

D.4.3 **Blank test**

Make a blank test under the same conditions, omitting the sample and allow for it when calculating the final result.

D.5 CALCULATION

$$\text{The chlorides (as Cl), per cent by mass} = \frac{0.003\,546 \times (V_1 - V_2) - (V_3 - V_4)}{m} \times 100$$

where;

V_1 is number of ml, of silver nitrate added;
V_2 is number of ml, of silver nitrate used in the blank test;
V_3 is number of ml, of ammonium thiocyanate used for the titration of the sample;
V_4 is number of ml, of ammonium thiocyanate used for the titration of the blank; and
m is mass, in g, of the sample in aliquot volume taken for titration.

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

Further particulars of the terms and conditions of the permit may be obtained from the Sri *Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.*

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SRI LANKA STANDARDS INSTITUTION

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The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

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