SRI LANKA STANDARD 1104 : 2014
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SPECIFICATION FOR
MAGNESIUM SULFATE MONOHYDRATE (FERTILIZER GRADE)
(First Revision)

SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standard

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SLS 1104 : 2014

Gr. 5

SRI LANKA STANDARDS INSTITUTION
No. 17, Victoria Place
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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 MAGNESIUM SULFATE MONOHYDRATE (FERTILIZER GRADE)
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FOREWORD

This 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 2014-09-02.

This Standard was first published in 1995 under the title of Kieserite Fertilizer Grade. In this revision, the title has been changed and limits for potentially toxic elements have been included.

This standard is subject to the restrictions imposed under the Regulation of Fertilizer Act No. 68 of 1988 of Sri Lanka, amendments and the regulations framed there under, where 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**.

For the purpose of deciding whether a particular requirement of this standard 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 **SLS 102**. The number of significant places 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 are greatly appreciated: AGP fertilizer specification of the of the Food and Agriculture Organization (FAO) of the United Nations and the Association of Official Analytical Chemists (AOAC).

1 SCOPE

This standard prescribes the requirements and methods of sampling test for magnesium sulfate mono hydrate of fertilizer grade.

2 REFERENCES

SLS 102 Rules for rounding off numerical values
SLS 124 Test sieves
SLS 544 Code of practice for handling and storage of bagged fertilizers
SLS 559 Method for sampling of fertilizers
SLS 645 Method of test for fertilizers

Part 2 Determination of moisture content
Part 6 Determination of calcium and magnesium content
Official Methods of Analysis of the Association of Official Analytical Chemists (AOAC), 18th Edition, 2nd Revision 2007

3 REQUIREMENTS

3.1 General requirements

The material shall consist essentially of magnesium sulfate mono hydrate and shall be in the form of a free-flowing crystalline powder or granules, off-white in colour and shall be free from visible foreign matter.

3.2 Other requirements

3.2.1 *Particle size*

Not less than 90 per cent of the material shall passes through a sieve of aperture size of 1.70 mm and not more than 50 per cent of the material shall passes through a sieve of aperture size of 150 µm, when tested in accordance with the method given in Appendix **B**. The sieves shall conform to **SLS 124**.

3.2.2 *Moisture and chemical requirements*

The material shall comply with the requirements given in Table **1** when tested according to the methods given in Column **4** of the table.

TABLE 1 – Requirements for chemical and physical characteristics

SI. No. (1)	Characteristic (2)	Requirement (3)	Method of test (4)
i)	Magnesium content, as MgO per cent by mass, min.	24.0	SLS 645 : Part 6
ii)	Mineral acid soluble sulfate content, as SO_3 per cent by mass, min.	47.7	Appendix C
iii)	Moisture content, per cent by mass, max.	3.5	SLS 645 : Part 2
iv)	Calcium content, as CaO, per cent by mass, max.	2.0	SLS 645 : Part 6
v)	Water solubility, per cent by mass	20 – 40	Appendix D

3.2.3 *Potentially toxic elements*

The material shall also comply with the requirements given in Table **2**

TABLE 2 – Limits for potentially toxic elements

Sl. No. (1)	Element (2)	Limit (3)	Method of test (4)
i)	Arsenic, as As, mg/kg, max.	0.3	AOAC Official Method 2006.3 ***See the note***
ii)	Cadmium, as Cd, mg/kg, max.	0.3	
iii)	Lead, as Pb, mg/kg, max.	0.2	
iv)	Chromium, as Cr, mg/kg, max.	3.0	Atomic Absorption Spectrophotometry after microwave digestion
v)	Mercury, as Hg, mg/kg, max.	0.1	

Note: *Atomic Absorption Spectrophotometry after microwave digestion can be used as an alternative method; AOAC 999.10 for Pb and Cd*

4 PACKAGING AND MARKING

4. 1 Packaging

4.1.1 The material shall be suitably packed in sound, strong, and moisture- proof multiwall paper bags, jute bags or woven polypropylene bags with polyethylene inner lining having a minimum thickness of 50 µm.

4.1.2 Each bag shall contain the mass of the product marked on the bag.

4. 2 Marking

4.2.1 The packages shall be legibly and indelibly marked with the following information:

a) The words MAGNESIUM SULFATE, in capital letters;

b) Name and address of the manufacturer, importer or distributor including the country of origin;
c) Registered trade mark if any;
d) Net mass, in kg;
e) The total Magnesium content as, MgO, per cent by mass
f) Date, month and the year of manufacture;
g) Batch or code number; and
h) The words USE NO HOOKS, in capital letters.

5. HANDLING AND STORAGE

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

6. METHODS OF TEST

6.1 Tests shall be carried out as prescribed in AOAC Official Method **2006**, **983.02** and **999.10**, **Part 2**, and **6** of **SLS 645**.

6.2 Unless otherwise stated, use only reagents of analytical grade and only distilled water or water of equivalent purity.

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 as given in **4.**

A.2.2 Tests for the 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** satisfies the relevant requirements.

APPENDIX B
DETERMINATION OF PARTICLE SIZE

B.1 PROCEDURE

B.1.1 Weigh, to the nearest 0.1 g, 50 g of the material and transfer to a sieve of 1.70-mm aperture size (conforming to **SLS 124**) with the lower receiver attached.

Shake the sieve for 5 minutes, frequently tapping the sides. Disintegrate soft lumps which can be crumbled by the application of the fibres of a soft brush, taking care that the hard part of the brush does not make contact with the sieve, and that the brush is not used to brush particles through the sieve. Brush out the powder in the lower receiver and weigh. Replace the receiver and repeat the shaking and tapping procedure for 2 minutes. Add the material in the receiver to the first portion and weigh. Repeat the process until not more than 0.04 g passes through the sieve during 2 minutes. Calculate the mass of the material passed through the sieve as a percentage by mass of the material taken for the test.

B.1.2 Weigh, to the nearest 0.01 g, about 50 g of the material and transfer to a sieve of 150 µm aperture size (conforming to **SLS 124**) with the lower receiver attached and proceed as in **B.1.1**.

B.2 CALCULATION

Calculate the mass of the material passed through the sieve as a percentage by mass of the material taken for the test.

APPENDIX C
DETERMINATION OF MINERAL ACID SOLUBLE SULFATE CONTENT

C.1 REAGENTS

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

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

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

C.2 APPARATUS

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

C.2.2 Oven, maintained at a temperature of $120\ ^0C \pm 5\ ^0C$

C.2.3 Muffle furnace, maintained at a temperature of $800\ ^0C \pm 50\ ^0C$

C.3 PROCEDURE

C.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 (**C.1.1**). Bring to the boil and continue boiling for 10 minutes, cool, transfer to a one-mark 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.

C.3.2 Transfer 100 ml of the filterate (**C.3.1**) to a 800-ml beaker. Make up with water to 300 ml and add 20 ml of Hydrochloric acid (**C.1.1**). Boil the mixture, while mixing thoroughly, add drop by drop to the boiling solution 20 ml of the barium chloride solution (**C.1.2**). Continue boiling for a few minutes. Place the beaker on a hot-plate set at $60\ ^0C$ and cover it with a watch-glass. Allow to stand at $60\ ^0C$ for 3 hours.

C.3.3 Dry the filter crucible (**C.2.1**) in the muffle furnace (**C.2.3**). Allow it to cool in a desiccators to room temperature and weigh to the nearest 0.1 mg.

C.3.4 Decant the clear supernatant liquid (**C.3.2**) from the breaker through the dried crucible(**C.3.3**). 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 absence of chloride ions has been established by means of the silver nitrate solution (**C.1.3**). Dry the crucible with the precipitate for 1 hour in the oven (**C.2.2**). Place the crucible with the precipitate in the muffle furnace (**C.2.3**) for 30 minutes. Allow the crucible to a cool in a desiccator and weigh to the nearest 0.1 mg.

C.4 CALCULATION

Mineral acid-soluble sulfate content,

(as SO_3), per cent by mass $= 85.75 \times \frac{m_1}{m_0}$

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

APPENDIX D
DETERMINATION OF WATER SOLUBILITY

D.1 PROCEDURE

Weigh, to the nearest milligram, about 10 g of the sample and dissolve in 100 ml of water at room temperature. Stir for 1 hour and filter through a dried and tared sintered glass crucible (G.No.4). Wash the residue thoroughly with water. Dry the crucible and residue at 105^0 C $\pm$ 2^0 C, cool in a desiccator and weigh. Repeat the drying, cooling and weighing procedures until the difference in mass between two successive weighings does not exceed 1 mg.

D.2 CALCULATION

Water solubility, per cent by mass $= \frac{m_2 - m_1}{m_2} \times 100$

where,
m_1 is mass, in g, of residue; and
m_2 is mass, in g, of sample.

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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