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Draft Sri Lanka Standard
SPECIFICATION FOR CALCIUM HYPOCHLORITE USED FOR TREATMENT OF WATER
INTENDED FOR HUMAN CONSUMPTION
(FIRST REVISION) (DSLS 759:)

මිනිස් පරිභෝජනය සඳහා වන ජලය පිරිපහදු කිරීමට යොදා ගන්නා කැල්සියම් හයිපොක්ලෝරයිට් සඳහා වන
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(පළමු ප්‍රතිශෝධනය) (ශ්‍රී ලංකා කෙටුම්පත 759:)

මෙම කෙටුම්පත ශ්‍රී ලංකා ප්‍රමිතියක් ලෙස නොසැලකිය යුතු මෙන් ම භාවිතා නොකළ යුතු ද වේ.
இவ்வரைவு இலங்கைக் கட்டளையெனக் கருதப்படவோ அன்றிப் பிரயோகிக்கப்படவோ கூடாது
This draft should not be regarded or used as a Sri Lanka Standard.

අදහස් එවිය යුත්තේ : ශ්‍රී ලංකා ප්‍රමිති ආයතනය, 17, වික්ටෝරියා පෙදෙස, ඇල්විටිගල මාවත, කොළඹ 08.

Comments to be sent to: SRI LANKA STANDARDS INSTITUTION, 17, VICTORIA PLACE,
ELVITIGALA MAWATHA, COLOMBO 08.

නැඳින්වීම

මෙම ශ්‍රී ලංකා ප්‍රමිති කෙටුම්පත , ශ්‍රී ලංකා ප්‍රමිති ආයතනය විසින් සකසන ලදුව, සියලුම උදෙසාගේ අංශ වලට තාක්ෂණික විවේචනය සඳහා යටත් ලැබේ.

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මෙම කෙටුම්පතට අදාළ යෝජනා හා විවේචන නියමිත දිනට පෙර ලැබෙන්නට සැලැස්වුවහොත් අභ්‍යන්තර සලකුණු, තවද, මෙම කෙටුම්පත පිළිගත හැකි බැව් හැඟෙන අය ඒ බව දන්වන්නේ නම් එය ආයතනයට උපකාරී වනු ඇත.

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කොළඹ 08.

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Introduction

This Draft Sri Lanka Standard has been prepared by the Sri Lanka Standards Institution and is now being circulated for technical comments to all interested parties.

All comments received will be considered by the SLSI and the draft if necessary, before submission to the Council of the Institution through the relevant Divisional Committee for final approval.

The Institution would appreciate any views on this draft which should be sent before the specified date. It would also be helpful if those who find the draft generally acceptable could kindly notify us accordingly.

All Communications should be addressed to:

The Director General
Sri Lanka Standards Institution,
17, Victoria Place,
Elvitigala Mawatha,
Colombo 08.

Draft Sri Lanka Standard
SPECIFICATION FOR CALCIUM HYPOCHLORITE USED FOR TREATMENT
OF WATER INTENDED FOR HUMAN CONSUMPTION
(First Revision)

DSLS 759:

Draft for public comments

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Sri Lanka

Draft Sri Lanka Standard
SPECIFICATION FOR CALCIUM HYPOCHLORITE USED FOR TREATMENT
OF WATER INTENDED FOR HUMAN CONSUMPTION
(First Revision)

FOREWORD

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

This Standard was first published in 1986. In this first revision, the title and the scope of the Standard has been revised. Definition for available Chlorine has been included. The clause Grades has been replaced by Types. Available Chlorine contents have been revised. Limits for heavy metals and test methods have been included. Marking clause has been revised. The test method for determination of bulk density has been revised.

Calcium hypochlorite is simply a carrier of Chlorine. It is mixed with water at the end-use point and it releases the stored Chlorine for the disinfection process. Its' main functions in water treatment are the removal of ammonium compounds, the oxidation of sulphides, the oxidation of iron(ii) to iron(iii) and as a disinfectant. The treatment does depend on the composition of the raw water. Care should be taken not to exceed a maximum concentration of available Chlorine in the water supply.

There are two types of Calcium hypochlorite depending on the available Chlorine content.

All values in this Standard are given 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 result of a test or 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 assistance obtained from the following publications is gratefully acknowledged:

EN	900: 2014	Chemicals used for treatment of water intended for human consumption – Calcium hypochlorite
IS	1065 (part 1): 2019	Stable bleaching powder – Specification Part 1 Household and industrial use (Third revision)
IS	1065 (part 2): 2019	Stable bleaching powder – Specification Part 2 Treatment of water intended for drinking
MS	1584: 2003	Specification for Calcium hypochlorite used for potable water supply
SLS	1577: 2017	Specification for hydrated lime for purification of drinking water supplies

SLS	1744: 2022	Specification for Sodium hypochlorite used for treatment of water intended for human consumption
SLS	1785: 2023	Specification for Polyaluminium chloride used for treatment of water intended for human consumption

1 SCOPE

This Standard prescribes the requirements, and methods of sampling and test for Calcium hypochlorite, used in treatment of water intended for human consumption.

2 REFERENCES

SLS	102	Presentation of numerical values
SLS	124	Test sieves
SLS	428	Random sampling methods

3 DEFINITIONS

3.1 available Chlorine: The Chlorine equivalent of the Hypochlorite Chlorine present in Calcium hypochlorite

4 TYPES

There shall be two types of the material, depending on available Chlorine content.

- a) Type 1; or
- b) Type 2

5 REQUIREMENTS

5.1 General requirements

5.1.1 The material shall be white to slightly yellowish-white in appearance and shall be free from hard lumps and any visible impurities. It shall be dry and free-flowing.

5.1.2 The material shall be partly soluble in water and in 96 per cent (V/V) solution of Ethanol.

5.1.3 The material shall evolve Chlorine copiously on the addition of 2 mol/ L solution of Hydrochloric acid. When the material is shaken with water and filtered, the filtrate shall yield the two reactions prescribed in Appendix B which are characteristic of Calcium salts and Chlorides.

5.2 Other requirements

Calcium hypochlorite shall also conform to the relevant requirements prescribed in Table 1 when tested according to the methods given in Column 5 of the table.

TABLE 1 – Requirements for Calcium hypochlorite used for treatment of water intended for human consumption

Sl. NO. (1)	Characteristic (2)	Requirement		Method of test (5)
		Type 1 (3)	Type 2 (4)	
i)	Available Chlorine, per cent by mass, min.	35	65	Appendix C
ii)	Loss of available Chlorine on heating, on the basis of initial available Chlorine, per cent by mass, max.	6.6	10.0	
iii)	Moisture, per cent by mass, max.	0.3	0.5	Appendix D
iv)	Particle size :			Appendix E Appendix F
	a) Particles passing through 1.70 mm sieve, per cent by mass, min.	99.5		
	b) Particles passing through 1.40 mm sieve, per cent by mass, min.		75.0	
v)	Bulk density, g/mL, min.	0.8	0.8	Appendix G
vi)	Arsenic (as As) mg/kg, max.	5	5	Appendix H
vii)	Cadmium (as Cd) mg/kg, max.	5	5	Appendix H
viii)	Chromium (as Cr) mg/kg, max.	15	15	Appendix H
ix)	Nickel (as Ni) mg/kg, max.	10	10	Appendix H

Continued

Continued

x)	Lead (as Pb) mg/kg, max.	10	10	Appendix H
. xi)	Antimony (as Sb) mg/kg, max.	15	15	Appendix H
xii)	Selenium (as Se) mg/kg, max.	10	10	Appendix H
x iii)	Manganese (as Mn) mg/kg, max.	25	25	Appendix H
x iv)	Mercury (as Hg) mg/kg, max.	0.5	0.5	Appendix J

6 PACKAGING

The material shall be packaged in air-tight, galvanized steel drums with suitable inner-linnings or other similar containers, as agreed to between the buyer and the supplier. The containers used shall be free from grease, dirt or any other foreign matter likely to cause decomposition of the material.

7 MARKING AND/ OR LABELLING

Each container shall be legibly and indelibly marked and/ or labelled with the following:

- a) Name of the product;
- b) Available Chlorine content;
- c) Date of manufacture and best before date;
- d) Name and address of the manufacturer and/ or distributor (including country of origin);
- e) Trademark, if any;
- f) Net mass of the content;
- g) Batch or code number;
- h) Storage instructions with words “**KEEP AWAY FROM HEAT AND MOISTURE**”; and
- j) Safety instructions

8 SAMPLING

The method of drawing representative samples of the material for ascertaining conformity to the requirements of this Standard shall be as prescribed in Appendix A.

9 METHODS OF TEST

9.1 Tests for the requirements laid down in 5.1.3 and 5.2 shall be carried out as prescribed in Appendices B to J.

9.2 During the analysis, unless otherwise stated, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

APPENDIX A COMPLIANCE OF A LOT

The sampling scheme given in Appendix A 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, appropriate schemes of sampling and inspection shall be adopted based on manufacturer's control systems coupled with type tests and testing procedures.

A.1 LOT

A.1.1 All the containers containing material belonging to a single batch of manufacture or supply and of the same type shall constitute a lot.

A.2 GENERAL REQUIREMENTS OF SAMPLING

A.2.1 Samples shall not be exposed to the atmosphere for a longer time than necessary and sampling shall be done as rapidly as possible.

A.2.2 To draw representative samples from the containers selected for sampling, an appropriate sampling instrument (galvanized iron sampling tube, scoop) shall be used.

A.2.3 The sampling instrument shall be clean and dry when used.

A.2.4 The samples shall be placed in clean, dry and air-tight containers on which the material has no action.

A.2.5 Each sample container shall be sealed air-tight after filling and marked with necessary details of sampling.

A.2.6 Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contamination.

A.2.7 The samples shall be stored in a cool and dry place.

A.3 SCALE OF SAMPLING

A.3.1 The samples shall be inspected and tested from each lot for ascertaining conformity of the lot to the requirements of this Standard.

A.3.2 The number of containers to be selected as the sample from a lot shall be in accordance with Table 2.

Table 2 – Scale of sampling

Number of containers in the lot (1)	Number of containers to be selected (2)
Up to 50	3
51 to 150	5
151 and above	8

A.3.3 All containers shall be selected at random. In order to ensure randomness of selection, random number tables as given in **SLS 428** shall be used.

A.4 PREPARATION OF SAMPLES

A.4.1 Equal quantities of material shall be drawn from different parts of each container selected as in **A.3.2** using an appropriate sampling instrument. The material so obtained from all containers shall be mixed to form a composite sample of not less than 400 g and transferred to a sample container.

A.5 NUMBER OF TESTS

A.5.1 Each container selected as in **A.3.2** shall be examined for packaging and marking requirements specified in Clause **6** and **7**.

A.5.2 Composite sample prepared as in **A.4.1** shall be tested for the requirements of this Standard.

A.6 CRITERIA FOR CONFORMITY

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

A.6.1 Each container examined as in **A.5.1** shall satisfies the packaging and marking requirements.

A.6.2 The test results on the composite sample tested as in **A.5.2** shall satisfies the relevant requirements.

APPENDIX B
(normative)
IDENTIFICATION OF CALCIUM SALTS AND CHLORIDES

B.1 REAGENTS

B.1.1 Ammonium oxalate solution

B.1.2 Acetic acid, 6 mol/ L

B.1.3 Hydrochloric acid

B.1.4 Nitric acid, 2 mol/ L

B.1.5 Silver nitrate solution, 0.25 mol/ L

B.1.6 Ammonia, 10 mol/ L

B.2 CALCIUM SALTS

Add a few drops of a solution of Ammonium oxalate to the filtrate obtained as in **5.1.3**. Formulation of a white precipitate which is only sparingly soluble in 6 mol/ L solution of acetic acid but is soluble in hydrochloric acid, indicates the presence of Calcium salts.

B.3 CHLORIDES

Acidify 2 mL of the filtrate obtained as in **5.1.3** with 2 mol/ L solution of Nitric acid and add 0.4 mL of 0.25 mol/ L solution of Silver nitrate. Shake and allow to stand. Formation of a curdy white precipitate which yields the following reaction indicates the presence of Chlorides.

Centrifuge and wash the precipitate with three quantities, each of 1 mL of water. Carry out this operation rapidly in subdued light, disregarding the fact that the supernatant solution may not become perfectly clear. Suspend the precipitate in 2 mL of water and add 1.5 mL of 10 mol/ L solution of Ammonia. The precipitate dissolves easily with the possible exception of a few large particles that dissolve slowly.

APPENDIX C
(normative)
DETERMINATION OF AVAILABLE CHLORINE

C.1 REAGENTS

C.1.1 Standard Potassium iodate solution, 0.1 mol/ L

Weigh accurately 21.4 g of dry Potassium iodate (KIO₃) and transfer to a 1 000- mL volumetric flask. Dissolve in water, mix thoroughly and make up to the mark. This solution will be exactly 0.1 mol/ L.

C.1.2 Potassium iodide

C.1.3 Hydrochloric acid, 0.1 mol/ L

C.1.4 Glacial Acetic acid

C.1.5 Starch indicator

Mix 1 g of starch with 10 mL of cold water and pour, with constant stirring, in to 200 mL boiling water. Allow to settle and use the clear supernatant liquid.

C.1.6 Standard Sodium thiosulphate solution, 0.1 mol/ L

C.1.6.1 *Standardization of Sodium thiosulphate Solution*

To standardize the Sodium thiosulphate solution, carefully pipette out a 50 mL aliquot of the Potassium iodate solution (**C.1.1**) into a 250 mL stoppered conical flask and dilute to 100 mL with water. Add 1 g of Potassium iodide (**C.1.2**). When it is dissolved, add 15 mL of 0.1 mol/ L Hydrochloric acid (**C.1.3**) and titrate immediately with the Sodium thiosulphate solution (**C.1.6**). When the solution becomes pale yellow colour, add 1 mL of starch indicator solution (**C.1.5**) and complete the titration to the disappearance of the blue colour. Standardize at least monthly. Calculate the concentration of the Sodium thiosulphate solution as follows:

C.1.6.2 *Calculation*

$$\text{Concentration of Sodium thiosulphate solution}(M), \text{ mol/ L} = \frac{6 \times 50 \times 0.1}{V}$$

where,

V is the volume, in milliliters, of Sodium thiosulphate solution required for titration.

C.2 PROCEDURE

Weigh, to the nearest 0.001 g, about 2.5 g of the sample and grind in a mortar with water till a smooth paste is formed. Add 15 to 25 mL of water and decant off the fine part into a 250 mL volumetric flask. Again grind the material left behind and repeat the process of decanting off till no gritty material is left. Wash the pestle and mortar into the same flask. Make up the solution to 250 mL. Take 25.0 mL of this solution, add 2 g of Potassium iodide (C.1.2) and 100 mL of water followed by 2 mL of glacial acetic acid (C.1.4). Titrate it against the standard Sodium thiosulphate solution (C.1.6) till the pale yellow colour is left. At this stage add starch indicator (C.1.5) and continue the addition of standard Sodium thiosulphate solution (C.1.6) till the blue colour discharges.

C.3 CALCULATION

$$\text{Available Chlorine (as Cl}_2\text{), percent by mass} = \frac{V_1 \times M \times 35.46}{m}$$

where,

V_1 is the volume, in milliliters, of standard Sodium thiosulphate solution required for titration of the sample;

M is the concentration, of the standard Sodium thiosulphate solution; and

m is the mass, in g, of original sample taken for the test.

APPENDIX D

(normative)

DETERMINATION OF LOSS OF AVAILABLE CHLORINE ON HEATING

D.1 APPARATUS

D.1.1 Test tube, dry clean tube of length about 150 mm and an internal diameter of about 25 mm

D.1.2 Air condenser, consisting of a piece of glass tubing of length about 375 mm and an internal diameter of about 5 mm

D.1.3 Water bath, maintained at $100\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$

D.2 REAGENTS

as in C.1

D.3 PROCEDURE

Weigh, to the nearest 0.001 g, approximately 15 g of the sample into the test tube (D.1.1). Attach the air condenser (D.1.2) by means of a rubber stopper in such a way that the tube extends about 12 mm beyond the stopper into the test tube. Incline the test tube at an angle of about 15° above the horizontal and rotate to loosen the material. Heat the apparatus for 2 hours in a water bath (D.1.3) maintained at 100 °C ± 2 °C in a fume hood. Detach the air condenser, close the test tube with a solid rubber stopper and allow the test tube and its contents to cool to room temperature.

Thoroughly mix the contents of the test tube and determine the available Chlorine content, as given in C.2.

D.4 CALCULATION

$$\frac{\text{Loss of available chlorine on the basis of initial}}{\text{Available chlorine, per cent by mass}} = \frac{A - B}{A} \times 100$$

where,

A is the per cent by mass, of initial available Chlorine; and
B is the per cent by mass, of available Chlorine after heating.

APPENDIX E
(normative)
DETERMINATION OF MOISTURE

E.1 PROCEDURE

Weigh, to the nearest 0.1 g, approximately 15 g of the sample in an open, dry weighing glass and place it for 24 hours in a vacuum desiccator (see **Note**) over fused anhydrous Calcium chloride, under an absolute pressure of 30 mm to 40 mm of Mercury. Weigh the sample again.

NOTE

Place the desiccator within a protective enclosure.

E.2 CALCULATION

$$\text{Moisture content, percent by mass} = \frac{m_1 - m_2}{m_1} \times 100$$

where,

m_1 is the mass, in g, of the sample before drying; and
 m_2 is the mass, in g, of the sample after drying.

APPENDIX F
(normative)
DETERMINATION OF PARTICLE SIZE

F.1 PROCEDURE

Weigh, to the nearest 0.1 g, approximately 50 g of the sample and place it on the relevant sieve conforming to **SLS 124**. Shake the sieve till no more material passes through it and weigh the material passing through the sieve.

F.2 CALCULATION

$$\text{Material passing through the sieve, per cent by mass} = \frac{m_1}{m_0} \times 100$$

where,

m_0 is the mass, in g, of the sample used; and
 m_1 is the mass, in g, of the sample passing through the sieve.

APPENDIX G
(normative)
DETERMINATION OF BULK DENSITY

G.1 PRINCIPLE

Measured volume of sample is weighed and expressed as weight per unit volume.

G.2 APPARATUS

G.2.1 Rubber base pad

G.2.2 Funnel

G.2.3 Cylinder, Stoppered measuring cylinder

G.3 PROCEDURE

Weigh, to the nearest 0.1 g, approximately 40 g of the sample, previously passed either through a 1.40 mm sieve or 1.70 mm sieve. Pour the sample gently and smoothly into the stoppered measuring cylinder through a funnel (without tapping/ knocking or squeezing). Close the cylinder with stopper. Gently lift the cylinder up to 100 mm height (from cylinder base to surface) and allow it to drop vertically and freely on rubber base pad. Repeat the lifting and dropping procedure of the cylinder for 100 times. Care shall be taken so that sample from cylinder shall not spill out during dropping of cylinder. After completion of 100 drops, level the inside material of the cylinder with help of narrow head spatula without any tapping/ knocking and read the volume of material.

G.4 CALCULATION

$$\text{Bulk density, grams per milliliter} = \frac{m}{v}$$

where,

m is the mass, in g, of the sample used; and

v is the volume, in mL, of the sample in cylinder after 100 drops.

APPENDIX H
(normative)
DETERMINATION OF ARSENIC, CADMIUM, CHROMIUM, NICKEL, LEAD,
ANTIMONY, SELENIUM AND MANGANESE CONTENT

H.1 Atomic Absorption Spectrometry (AAS) methodology or Inductively Coupled Plasma Mass Spectrometry (ICP-MS) or Inductively Coupled Plasma – Optical Emission Spectrometry (ICP-OES) shall be used for the determination of Arsenic, Cadmium, Chromium, Nickel, Lead, Antimony, Selenium and Manganese content.

H.2 Methods having a detection limit of at least 0.1 times the values of the elements to be measured shall be used to determine their quantity.

APPENDIX J
(normative)
DETERMINATION OF MERCURY CONTENT

Two methods have been prescribed for the determination of Mercury content. The method prescribed in **J.1** shall be the reference method and shall be carried out in case of any dispute.

J.1 METHOD 1 – MERCURY ANALYZER METHOD

Mercury analyzer methodology shall be used for the determination of Mercury content.

J.2 METHOD 2

Atomic Absorption Spectrometry (flameless) methodology or Inductively Coupled Plasma Mass Spectrometry (ICP-MS) or Inductively Coupled Plasma – Optical Emission Spectrometry (ICP-OES) shall be used for the determination of Mercury content.