SRI LANKA STANDARD 633: 2021

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SPECIFICATION FOR MILLED RICE

(Second Revision)

SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standard
SPECIFICATION FOR MILLED RICE
(Second Revision)

SLS 633: 2021
(Incorporating Corrigendum No.1)

Gr.7

SRI LANKA STANDARDS INSTITUTION
17, Victoria Place,
Alvitigala Mawatha,
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Sri Lanka.

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

Sri Lanka Standard
SPECIFICATION FOR MILLED RICE
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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 2021-09-01.

This Standard was first published in 1984. Since then there had been a marked improvement in the rice processing techniques to produce better quality rice. Therefore, in this revision requirements for both raw milled rice and parboiled milled rice have been changed. Requirements for potentially toxic elements, microbiological limits, limits for pesticide residues and mycotoxin were also introduced. Further, modifications have been done in the definitions, types, packaging and marking, and sampling, clauses. A test method to determine the degree of milling and added colouring substances have also been introduced.

In general, the term rice may refer to the grain of *Oryza sativa* L. in various stages of process:

a) with husk (paddy);
b) with the husk removed (brown rice);
c) with both husk and part or whole of the bran removed (milled rice).

This standard is subjected to the restrictions imposed under Sri Lanka Food Act No. 26 of 1980. And the regulations framed there under and any other regulatory and statutory requirements wherever applicable.

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**.

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 result of a test or analysis, shall be rounded off in accordance with CS 102. The number of significant places retained in the rounded off value should be the same as that of the specified value in the Standard.

In the preparation of this Standard, the valuable assistance obtained from the following publications is gratefully acknowledged.

i) Codex Alimentarius Commission.
ii) CNS 1059 : 1965 Chinese National Standard for milled rice.
iii) MS 3.19 : 1974 Malaysian Standard Specification for grading of milled rice.
iv) Commission Regulation (EC) no 1881 / 2006.
v) Publications of the Rice Processing Research and Development Centre.

1 SCOPE

This Standard prescribes the requirements, methods of sampling and methods of test for raw and parboiled milled rice.

2 REFERENCES

ISO	15141	Determination of Ochratoxin A in cereals and cereal products – Part 2: High performance liquid chromatographic method with immunoaffinity column cleanup and fluorescence detection
SLS	102	Presentation of numerical values.
SLS	448	Analysis of food grains Part 2 : Refraction
SLS	516	Part 2/ Section 2: Horizontal method for the enumeration of yeasts and moulds- Colony count technique in products with water activity less than or equal to 0.95
SLS	516	Part 5: Horizontal method for the detection of *Salmonella* spp
SLS	516	Part 12: Horizontal method for the detection and enumeration of presumptive *Escherichia coli (most probable number technique)*
SLS	528	Sampling of food grains
SLS ISO	712	Method of test for determination of moisture content in cereals and derived products
SLS	910	Maximum residue limits for pesticides in food.
SLS	962	Method of test for aflatoxin in foods Part 1 : Method of test for aflatoxin in food

Association of Official Analytical Chemist (AOAC) 20th Edition, 2016

3 DEFINITIONS

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

3.1 adulteration: Alteration of composition of the milled rice by any means whatsoever with the resulting mixture not of the nature prescribed, its quality or flavour adversely affected or its bulk or mass changed

3.2 broken grain: Broken kernels of rice which are less than three-fourths of the length of whole kernels

3.3 brown rice: Hulled but unpolished rice that retains most of the bran layers, endosperm, and germ

3.4 commercially objectionable foreign odour: Odors which are entirely foreign to rice and which, because of their presence render rice unfit for its normal commercial usage

3.5 damaged grain: Kernels which are distinctly identified as having been visibly affected by insects, heat, water, diseases or any other causative agent. Damages caused by the milling

process is excludes. Such grains could have a substantial discolouration and include stained, spotted and yellow grains. This includes the kernels of muddy paddy (damaged and discolored)

3.6 degree of milling: The extent or degree of bran removal (based on mass of paddy) as a result of milling. Rice can be under-milled, reasonably well-milled or well-milled as given below:

a) Under- milled - below 4 per cent bran removal
b) Reasonably well- milled - 4 per cent to 7 per cent bran removal
c) Well- milled - above 7 per cent to 10 percent bran removal
d) Over milled - above 10 percent bran removal

3.7 foreign matter: All matter other than rice (whole or broken) or paddy. Foreign matter includes such things as, dead insects or their fragments, seeds of weed, fragments of paddy stalk, husk and dust

3.8 germ: embryo situated at one end of the grain

3.9 head rice: kernels of rice, which are at least three-fourths or more than three-fourths of whole kernels in length

3.10 infested grain: Rice which contain live weevils, insects, mites, eggs, larvae, pupae, nymphs, their webbing or their refuse. Rice can be un-infested, moderately infested or heavily infested as given below

a) Un-infested – does not contain any live insects, their webbing or their refuse
b) Moderately infested - contain up to 20 live insects per kilogram
c) Heavily infested - contain more than 20 live insects per kilogram

3.11 parboiled milled rice: processed from paddy or husked rice that has been soaked in water and subjected to a heat treatment so that the starch is fully gelatinized, followed by a drying process and the outer coats of the kernel (outer bran) layers have been partially or fully removed

3.12 raw milled rice: whole/head grains with or without broken kernels of rice *(Oryza sativa* L.) from which the husk, germ and at least the outer coats of the kernel (outer bran) layers have been partially or fully removed

3.13 red rice: kernels having red pericarp

3.14 rice bran: The outer covering of brown rice, which is removed during the polishing process. It is composed of the pericarp, seed coat, aleurone layer and the germ (bran may also contain parts of the outer endosperm). **See 3.5**

3.15 sand: a loose granular material that results from the disintegration of rocks, consists of particles smaller than gravel

3.16 stones: piece of rock quarried and worked into a specific size and sharp particles consist of small grains of silica (SiO_2)

3.17 varietal admixture: The presence of a variety of the rice grain other than the variety under consideration

3.18 white rice: kernels having white pericarp

4. TYPES

Rice shall be classified into the following types on the basis of the length of the kernels and colour of the pericarp.

4.1 Long red (LR) - red pericarped rice having a grain length above 6.0 mm.

4.2 Long white (LW) - white pericarped rice having a grain length above 6.0 mm.

4.3 Medium red (MR) - red pericarped rice having a grain length between 4.5 mm and 6.0 mm.

4.4 Medium white (MW) - white pericarped rice having a grain length between 4.5 mm and 6mm.

4.5 Short red (SR) - red pericarped rice having a grain length less than 4.5 mm.

4.6 Short white (SW) - or Samba - white pericarped rice having a grain length less than 4.5 mm.

5 GRADES

Raw milled rice and parboiled milled rice shall be classified into the following 5 grades as prescribed in Tables **1** and **2**.

5.1 Premium
5.2 Grade 1
5.3 Grade 2
5.4 Grade 3 ; and
5.5 Broken

6 REQUIREMENTS

6.1 General requirements

6.1.1 Rice shall be free from commercially objectionable odour and insect infestation when examined as prescribed in Appendix **B**.

6.1.2 Both parboiled and raw rice shall be of uniform colour, further parboiled rice shall be of translucence.

6.1.3 Both parboiled and raw rice shall be free from any added colouring substances when tested as prescribed in Appendix F.

6.1.4 Both raw and parboiled rice shall be reasonably well-milled or well-milled as defined in clause **3.6**, when tested as given in Appendix **C** (see note).

6.1.5 Both raw and parboiled rice shall be free from visible infestation.

6.2 Physical requirements

Raw milled rice shall conform to the requirements specified in Table **1** and parboiled milled rice shall conform to the requirements specified in Table **2** when tested by the relevant methods given in Column **8** of each table.

TABLE 1 – Requirements for raw milled rice

SI No	**Characteristic**	**Requirements for Grades**					**Method of test**
		Premium	**Grade 1**	**Grade 2**	**Grade 3**	**Broken**	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Moisture, per cent by mass, max.	14.0	14.0	14 .0	14.0	14.0	SLS ISO 712
ii)	Foreign matter, per cent by mass, max.	nil	nil	0 .2	0.3	0.3	SLS 448 Part 2
iii)	Type admixture, per cent by mass, max.	nil	2.0	6 .0	8.0	12.0	Appendix **D**
iv)	Damaged grain, per cent by mass, max.	nil	1.0	2 .0	4.0	4.0	Appendix **D**
v)	Broken grain, per cent by mass, max.	5	10	20	25	-	Appendix **D**
vi)	Paddy seeds, grains per kilogram	nil	5	15	30	5	Appendix **E**
vii)	Availability of stones/ sands percent by mass, max.	nil	nil	0 .2	0.2	0.2	Appendix **E**

TABLE 2 – Requirements for parboiled milled rice

SI No.	Characteristic	Requirements for grades					Method of test
		Premium	Grade 1	Grade 2	Grade 3	Broken	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Moisture, per cent by mass, max.	14.0	14.0	15.0	15.0	14.0	**SLS ISO 712**
ii)	Foreign matter, per cent by mass, max.	nil	nil	0.3	1.0	0.3	**SLS 448: Part 2**
iii)	Type admixture, per cent by mass, max.	nil	1.0	6.0	8.0	12.0	**Appendix D**
iv)	Damaged grain, per cent by mass, max.	nil	2.0	4.0	5.0	4.0	**Appendix D**
v)	Broken grain, per cent by mass, max.	1	5	15	20	-	**Appendix D**
vi)	Paddy seeds, grains per kilogram	nil	nil	15	30	5	**Appendix E**
vii)	Availability of stones/ sands per cent by mass, max.	nil	nil	nil	0.2	0.2	**Appendix E**

6.3 Potentially toxic elements

Raw and parboiled milled rice shall also be complying with the requirements given in Table **3** when tested according to the methods given in Column **4.**

TABLE 3 –Limits for potentially toxic elements

Sl No (1)	Element (2)	Limit (3)	Method of test (4)
i)	Arsenic, as As, mg/kg max	0.2	**AOAC** 2013.06
ii)	Lead, as Pb, mg/kg max	0.2	**AOAC** 2013.06
iii)	Mercury as Hg, mg/kg max	0.1	**AOAC** 2013.06
iv)	Cadmium as Cd , mg/kg max	0.2	**AOAC** 2013.06

6.4 Microbiological Requirements

All the types and grades of milled rice shall not exceed the microbiological limit given in Table **4** when tested according to the method prescribed in Column **4** of the Table **4**.

TABLE 4 - Microbiological limits

SI No (1)	**Test organism** (2)	**Limit** (3)	**Method of test** (4)
i	Salmonella count per g. max	Not Detected	**SLS 516: Part 5**
ii	E coli count per g. max	Not Detected	**SLS 516: Part 12**
iii	Yeast and mould count, per g, max.	1×10^{4}	**SLS 516: Part 2/ Section 2**

6.5 Pesticide residues

All the types and grades of milled rice shall not contain pesticide residues in excess of the limits as prescribed in **SLS 910**.

6.6 Mycotoxin

All the types and grades of milled rice shall not exceed the limits for mycotoxins given in **Table 5** when tested in accordance with the method given in the Column **4** of the Table **5**.

TABLE 5 - Mycotoxin limits

SI No (1)	**Mycotoxin** (2)	**Limit** (3)	**Method of test** (4)
i	Aflatoxin B1 µg/ kg, max.	2	**SLS 962 Part 1**
ii	Total Aflatoxin (B_1+B_2+G_1 +G_2) µg/ kg, max.	4	**SLS 962 Part 1**
iii	Ochratoxin A µg/ kg, max.	3	**ISO 15141**

7. PACKAGING AND MARKING

7.1 Packaging

7.1.1 Bulk packages

Rice shall be packed in clean jute bags, woven polypropylene bags, coarse cloth bags or any other suitable food grade packing materials. The open end of each bag shall be securely stitched.

7.1.2 Retail packages

Rice shall be packed in polyethylene, polypropylene, coarse cloth bags or any other suitable food grade packing materials. The open end of each bag shall be securely stitched/ sealed.

7.2 Marking

7.2.1 Each bag shall be marked legibly and indelibly or a label shall be attached to the bag, with the following information:

a) Name of the product as “raw milled rice” or “parboiled milled rice”;
b) Brand name;
c) Trade mark, if any;
d) Net mass in g or in kg;
e) Type;
f) Grade;
g) Name and address of the producer or trader;
h) Month and year of processed/ milled; and
i) Date of expire.

8 METHODS OF TEST

Tests shall be carried out as prescribed in **ISO 15141, Part 2** of **SLS 448, Section 2 / Part 2, Part 5** and **Part 12** of **SLS 516, SLS 910, Part 1** of **SLS 962, SLS ISO 712** and Appendices **B** to **F** of this Standard.

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 scheme of sampling and inspection should be adopted.

A.l LOT

In any consignment all the bags of milled rice of same size, grade, type and name belonging to one batch of manufacture or supply shall constitute a lot.

A.2 SAMPLING

Sampling shall be carried out as prescribed in **SLS 528**.

A.3 NUMBER OF TESTS

A.3.1 Each bag selected shall be examined for packaging and marking requirements.

A.3.2 Each bag examined as in **A.3.1** shall be opened and individually examined for the requirement given in Clause **6.1**. In case of parboiled rice, it shall also be examined for the requirement given in Clause **6.2**.

A.3.3 Three composite samples shall be prepared as in Clause **5.3** of **SLS 528** for the determination of moisture content shall be individually tested for moisture content requirement.

A.3.4 The three final composite samples prepared as in **A.2** shall be tested for the requirements given in Table **1** or Table **2**.

A.3.5 The remaining material after testing as in **A.3.4** shall be tested for the requirement given in **6.4**.

A.4 CRITERIA FOR CONFORMITY

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

A.4.1 Each bag examined as in **A.3.1** satisfies the packaging and marking requirements.

A.4.2 Each bag examined as in **A.3.2** satisfies the relevant requirement.

A.4.3 The composite samples tested as in **A.3.3** satisfy the relevant requirement.

A.4.4 The composite samples tested as in **A.3.4** satisfy the relevant requirements.

A.4.5 The composite samples tested as in **A.3.5** satisfy the relevant requirement

APPENDIX B
VISUAL EXAMINATION

B.1 PROCEDURE

Take about 500g of the sample and examine as a whole as given in SLS **448** for its general conditions including odour and infestations. Report whether the sample is wholesome, clean, dry (and uniformly parboiled if applicable) and in sound marketable condition. Examine the sample for any deleterious material hazardous to human health and/or rendering the sample inedible.

APPENDIX C
DETERMINATION OF DEGREE OF MILLING

C.l REAGENTS

C.1.1 May - Grunwald reagent, one per cent Eosin - one per cent methylene blue mixture in alcohol.

C.1.2 Methyl alcohol

C. 2 PROCEDURE

Weigh to the nearest 0.1 g, approximately 2 g of rice sample. Immerse in May- Grunwald reagent **(C.1.1)** and keep for two minutes. Rinse the sample with methyl alcohol and then with distilled water. Allow to air-dry. Compare the sample with stained reference samples milled to different degrees of bran removal in order to ascertain the degree of milling.

APPENDIX D
DETERMINATION OF TYPE ADMIXTURE, DAMAGED GRAIN AND BROKEN GRAIN

D.l APPARATUS

D.1.1 ***Forceps,*** of about 100 mm in length.

D.1.2 ***Magnifying glass,*** having a magnification of 10.

D. 2 PROCEDURE

Take the sample, which has been freed from foreign matter **(**Refer **SLS 448 : Part 2)**. Mix well and take three 100g representative samples, weighed to the nearest 0.01 g. Using each of the Samples, visually separate,

a) grains belonging to other types,
b) damaged grains; and
c) broken grains.

Calculate the percentage of each by mass.

APPENDIX E
DETERMINATION OF PADDY SEEDS AND STONES

E.1 PROCEDURE

Weigh to the nearest 1 g, approximately 1 kg of the sample (before removing foreign matter). Hand pick and count the paddy seeds and stones.

APPENDIX F
DETERMINATION OF ADDED COLOURING SUBSTANCES

F.1 APPARATUS

F.1.1 Pipette

F.1.2 Beaker

F.1.3 Flask

B.2 REAGENTS

F.2.1 *White knitting wool* - Extract pure white wool in a soxhlet extractor with petroleum ether for 2-3 hrs to remove fat. Boil in very dilute solution of sodium hydroxide and then in water to free it from alkali

F.2.2 *Paper* -Whatman No. 1 chromatographic paper

F.2.3 *Solvents*

F.2.3.1 1 ml (0.88 sp. gr.) ammonia + 99 ml water

F.2.3.2 2.5 % aqueous sodium chloride

F.2.3.3 2 % sodium chloride in 50 % ethanol

F.2.3.4 Acetic acid solution in water (1:3)

F.2.3.5 Iso-butanol-ethanol-water (1: 2 : 1, v/v)

F.2.3.6 n-butanol-water-glacial acetic acid (20 : 12 : 5, v/v)

F.2.3.7 Iso-butanol-ethanol-water (3: 2: 2, v/v) to 99 ml of this add 1ml of (0.88 sp. gr.) ammonia

F.2.3.8 80 g phenol in 20 g water.

F.3 PROCEDURE

F.3.1 *Extraction of the colour from the food*

Introduce about 20 cm length of woolen thread into a beaker containing about 35 ml of the prepared acidified solution of the sample and boil for a few min till the woolen thread is dyed. Take out the woolen thread and wash it with tap water.

Transfer the washed woolen thread to a small beaker containing dilute ammonia and heat again. If the colour is stripped by the alkali, the presence of an acid synthetic dye is indicated. Remove the woolen thread. Make the liquid slightly acidic and boil with a fresh piece of woolen thread. Continue boiling until the colour is taken by the woolen thread. Extract the dye from the woolen thread again with a small volume of dilute ammonia, filter through a small plug of cotton and concentrate the filtrate over a hot water bath. This double stripping technique usually gives a pure colour extract.

Natural colours may also dye the wool during the first treatment, but the colour is not usually removed by ammonia. Basic dyes can be extracted by making the food alkaline, with ammonia, boiling with wool and then stripping with dilute acetic-acid. At present, all the permitted water soluble synthetic dyes are acidic, hence an indication of the presence of a basic dye suggests that an unpermitted colour is present.

F.3.2 *Identification of the separated food colours by paper chromatography*

Draw a pencil-line parallel to the bottom edge of the paper (Whatman No.1) at about 2 cm distance. Spot the concentrated solution of the unknown dye on the line together with a series of spots (about 2 cm apart) of aqueous solutions of standard permitted dyes of similar colour and dry. Run the chromatogram, by ascending technique, using a selected solvent. Solvent No. (V) is often helpful for general purposes. Identify the colour in the sample by matching its spot with the spot of the standard colour and confirm by co spotting.

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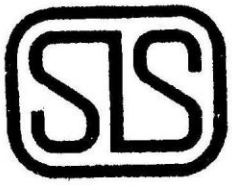

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SRI LANKA STANDARDS INSTITUTION

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