SRI LANKA STANDARD 913: 2020

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SPECIFICATION FOR RICE FLOUR

(First Revision)

SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standard
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(First Revision)

SLS 913: 2020

Gr. 10

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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 RICE FLOUR
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FOREWORD

This Standard was approved by the Sectoral Committee on Food Products and authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2020-05-27.

This Standard was first published in 1993. In this first revision, types of rice flour have been included and covered string hopper rice flour. Limits for heavy metals, iron dust, pesticide residues and mycotoxins have been introduced.

This Standard is subject to the provisions of the Food Act No. 26 of 1980 and the regulations framed thereunder.

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 to be retained in the rounded off value shall be the same as that of the specified value in this Standard.

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

CODEX STAN 198-1995 Codex standard for rice
Pearson's chemical analysis of foods 8th Edition 1981

1 SCOPE

This Standard prescribes the requirements, methods of sampling and tests for rice flour.

2 REFERENCES

SLS 102 Rules for rounding off numerical values
SLS 124 Test sieves
SLS 143 Code of practice for general principles of food hygiene
SLS 303 Method for the determination of cadmium
SLS 311 Method for the determination of lead
SLS 312 Method for the determination of arsenic
SLS 428 Random sampling methods
SLS 467 Labelling of prepackaged foods
SLS 516 Methods of test for microbiology of food and animal feeding stuffs
Part 2 Horizontal for the enumeration of yeasts and moulds.
Section 2: Colony count technique in products with water activity less than or equal to 0.95

SLS 586 Methods of test for sugar confectionery
SLS 633 Milled rice
SLS 910 Maximum residue limits for pesticides in foods
SLS 962 Method of test for aflatoxin in food Part 1: Determination of aflatoxin B_1, and the total content of aflatoxins B_1, B_2, G_1 and G_2 in cereals, nuts and derived products – High-performance liquid chromatographic method
Official Methods of Analysis of the Association of Official Analytical Chemists (**AOAC**), 20th Edition, 2016

3 DEFINITIONS

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

3.1 extraneous and foreign matter: All materials other than broken rice. Extraneous matter includes paddy, and husk. Foreign matter includes other plant material, soil, sand and metal particles.

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

3.3 red rice: Grains having a red pericarp

3.4 rice flour: The product obtained from red rice/ white rice after the processes of cleaning, with or without soaking, drying, grinding and sieving

3.4 roasted rice flour : The product obtained from roasting of rice flour

3.5 white rice: Grains having a pale white or white pericarp

4 TYPES

Rice flour shall be of the following types:

a) White rice flour; and
b) Red rice flour.

NOTE

The product may be either roasted or unroasted.

5 REQUIREMENTS

5.1 Raw material

Raw milled rice conforming to **SLS 633** shall be used.

5.2 Hygiene

Rice flour shall be processed, packaged, stored and distributed under hygienic conditions as prescribed in **SLS 143.**

5.3 Product

5.3.1 *Appearance*

The product shall be in the form of fine particles and shall be of the following colours :

a) White rice flour - off white to white colour; and
b) Red rice flour - pink colour characteristic of red rice.

5.3.2 *Odour*

It shall be free from objectionable odours.

5.3.3 *Absence of insect infestation, animal excreta and rodent contamination*

The product shall be free from living and dead insects, insect fragments animal excreta and rodent contamination.

5.3.4 *Extraneous and foreign matter*

The product shall be free from extraneous and foreign matter.

5.3.5 *Particle size*

5.3.5.1 The particle size of the product shall be such that the material retaining on a sieve with the aperture size of 300 µm is not more than 2.5 per cent, when tested in accordance with the method prescribed in Appendix **B**.

5.3.5.2 If rice flour is declared as string hopper rice flour, the particle size of the product shall be such that the all material shall sieve with the aperture size of 180 µm, when tested in accordance with the method prescribed in Appendix **B**.

5.3.6 *Microscopical examination*

The product shall show the characteristic shape of rice flour as illustrated in Figure **1,** when examined in accordance with the method prescribed in Appendix **C.**

5.3.7 *Other requirements*

The product shall comply with the requirements given in Table **1** when tested in accordance with the methods prescribed in Column **4** of the Table **1**.

TABLE 1 - Requirements for rice flour

Sl. NO. (1)	Characteristic (2)	Requirements for white/ Red rice flour (roasted or unroasted) (3)	Method of test (4)
i)	Moisture, per cent by mass, max.	12.0	Appendix **D**
ii)	Starch per cent by mass (on dry basis), min.	80.0	Appendix **E**
iii)	$_P$H, at 25± 2 ^oC	5.0 to 7.0	Appendix **F**
iv)	Total ash (on dry basis), per cent by mass, max.	1.0	Appendix **G**
v)	Acid insoluble ash (on dry basis), per cent by mass, max.	0.05	Appendix **H**

5.3.8 *Microbiological limits*

The product shall conform to the limits given in Table **2** when tested in accordance with the methods prescribed in Column **4** of the table.

Table 2 – Microbiological limits

Sl. No. (1)	Test organism (2)	Limit (3)	Method of Test (4)
i)	Moulds, cfu per gram, max.	10^4	**SLS 516: Part 2: Section 2**

6. CONTAMINANTS

6.1 Iron dust

Iron dust shall be less than 3.0 mg/ kg when tested in accordance with test method given in appendix **J**.

6.2 Potentially toxic elements

The product shall not exceed the limits for potentially toxic element given in Table **3**, when tested according to the methods given in Column **4** of the table.

TABLE 3 - Limits for potentially toxic element

SI No. (1)	potentially toxic element (2)	Limit (3)	Method of test (4)
i)	Arsenic as As, mg/ kg, max.	0.1	**AOAC 986.15 /SLS 312**
ii)	Lead as Pb, mg/ kg, max	0.2	**AOAC 994.02/SLS 311**
iii)	Cadmium as Cd, mg/ kg, max.	0.1	**AOAC 999.11/SLS 303**

6.3 Mycotoxin

The product shall not exceed the limits for mycotoxins given in Table 4, when tested according to the methods given in Column **4** of the table.

TABLE 4 - Limits for mycotoxins

SI No. (1)	Mycotoxin (2)	Limit (3)	Method of test (4)
i)	Total aflatoxins, µg/ kg, max	4	**SLS 962 : Part 1**
ii)	Aflatoxins B_1, µg/ kg, max.	2	**SLS 962 : Part 1**

6.4 Pesticide residues

Rice flour shall be processed with special care under Good Agricultural Practices and Good Manufacturing Practice (**SLS 143),** so that residues of those pesticides which may be required in the cultivation and production do not remain or if practically unavoidable, are reduced to the maximum extent possible. The product shall comply with the maximum pesticide residue limits given in **SLS 910.**

NOTE

It is not necessary to carry out this determination as a routine for all the samples. This should be tested in case of dispute and when required by the purchaser or vendor or when there is any suspicion of pesticide contamination.

7 PACKAGING

The packaging material which comes into contact directly with the product shall be food grade and sufficiently inert to preclude substances from being transferred to food in quantities large enough to endanger human health or to bring about an unacceptable change in the composition of the product or deterioration in its organoleptic properties.

8 MARKING AND/ OR LABELLING

8.1 The following shall be marked and/ or labeled legibly and indelibly on each package.

(a) Common name of the product as “white rice flour”, “red rice flour”, “roasted white rice

flour", "roasted red rice flour", "string hopper red rice flour", "String hopper white rice flour";
(b) Brand name or registered trade mark;
(c) Name and address of the manufacturer and/ or the distributor;
(d) Net mass, in "g" or "kg'";
(e) Batch number or code number; or a decipherable code marking;
(f) Date of expiry;
(g) Date of manufacture;
(h) Date of repackaging; if applicable, and
(j) Instructions for storage; if any.

8.2 All markings shall be applied on the bags before filling in such a manner that the dye or ink does not penetrate into the material inside.

8.3 The markings shall be completely dry before the bags are filled.

8.4 Marking and/ or labeling as given in **SLS 467** shall be followed.

9 METHODS OF TEST

Tests shall be carried out as prescribed in **SLS 303, SLS 311, SLS 312, Section 2/ Part 2 of SLS 516, Clause 6** of **SLS 586 : 1982, Part 1 of SLS 962** and Official Methods of Analysis of the Association of Official Analytical Chemists (**AOAC**), 20th Edition, 2016 and Appendices **B to J** of this Standard**.**

10 CRITERIA FOR CONFORMITY

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

10.1 Each package inspected as in **A.6.1** satisfies the relevant requirements.

10.2 The composite sample tested as in **A.6.2** satisfies the relevant requirements.

10.3 The results on microbiological tests satisfy relevant limits.

APPENDIX A
SAMPLING

A.1 LOT

In any consignment all packages of rice flour of the same type and size belonging to one batch of manufacture or supply shall constitute a lot.

A.2 GENERAL REQUIREMENTS OF SAMPLING

When drawing samples, the following precautions shall be taken:

A.2.1 Samples for microbiological analysis shall be drawn first.

A.2.2 The sampling instruments shall be clean and dry when used. When drawing samples for microbiological examination, the sampling instrument shall be sterilized.

A.2.3 The samples shall be kept in clean and dry glass or suitable containers. The samples for microbiological examination shall be kept in sterilized containers.

A.2.4 The sample containers shall be sealed air-tight and marked with necessary details of sampling.

A.2.5 The samples containers shall be sealed so that there will be no deterioration of the quality of the material.

A.3 SCALE OF SAMPLING

A.3.1 Samples shall be tested from each lot for ascertaining its conformity to the requirements of this standard.

A.3.2 The number of packages to be selected from a lot shall be in accordance with Table **5.**

TABLE 5 - Scale of sampling

Number of packages in the lot (1)	**Number of packages to be selected** (2)
Up to 500	5
501 to 1 200	5
1 201 to 3 200	6
3 201 to 10 000	7
10 001 and above	8

A.3.3 The packages shall be selected at random. In order to ensure randomness of selection tables of random numbers as given in **SLS 428** shall be used.

A.4 PREPARATION OF THE SAMPLE FOR MICROBIOLOGICAL TESTING

A sub sample of five (05) packages shall be selected from the packages selected as in **A.2.2** Approximately equally sufficient quantities of material shall be drawn from each package using an appropriate sampling instrument and transferred to five different sample containers.

A.5 PREPARATION OF THE COMPOSITE SAMPLE

Approximately equal quantities shall be drawn from each package selected as in **A.3.2** using an appropriate sampling instrument, mixed and reduced by the coning and quartering method to get a composite sample of sufficient size and transferred to a moisture proof sample container.

A.6 NUMBER OF TESTS

A.6.1 Each package selected as in **A.3.2** shall be inspected for marking and/or labelling requirements, appearance, odour and extraneous and foreign matter.

A.6.2 The composite sample prepared as in **A.5** shall be tested for the requirements given in **5.3.5, 5.3.6, 5.3.7, 6.1, 6.2** and **6.3**.

A.6.3 The five samples prepared as in **A.4** shall be tested individually for **5.3.8.**

APPENDIX B
DETERMINATION OF PARTICLE SIZE

B.1 APPARATUS

B.1.1 *Sieve,* 300 µm conforming to **SLS 124**

B.1.2 *Sieve,* 180 µm conforming to **SLS 124**

B.1.2 *Balance,* having a sensitivity of 0.01 g.

B.2 PROCEDURE

Weigh, to the nearest 0.1 g, about 100 g of sample into the sieve. Sieve for a minimum period of 5 min with occasional tapping on the sieve until all the passable particles are passed through the sieve. Transfer the material retained on the sieve quantitatively into a tared dish and weigh.

B.3 CALCULATION

$$\text{Material retained on the sieve, per cent by mass} = \frac{m_1}{m_2} \times 100$$

where,
m_1 is the mass, in g, of the test portion; and
m_2 is the mass,in g, of the material retained on the sieve.

APPENDIX C
MICROSCOPICAL EXAMINATION

C.1 APPARATUS

C.1.1 Microscope, with a magnification of x 400

C.1.2 Microscope slides

C.1.3 Cover Slips

C.1.4 Test tubes

C.1.5 Glass rod

C.2 PROCEDURE

Weigh about 1g of sample, place it in a test tube, add distilled water to wet the flour, crush and add 50 ml of distilled water and mix. Shake the test tube thoroughly and take 1 to 2 drops of the suspension on a slide, by means of a glass rod (see Note 1). Place the cover slip on the glass slide so that no air bubble is present between the cover slip and the slide (See Note 2).

NOTES

1. *The quantity of material taken should be such that while the fluid of view under the microscope shows numerous granules, they are not so crowded as to overlap.*
2. *When placing the cover slip in position, care should be taken not to exert excessive pressure in order to avoid breaking of clusters.*

Examine, at least 5 slides prepared as above, under a microscope (**C.1.1**) and compare the outline of the starch granules with that in the photomicrograph given in Figure **1.**

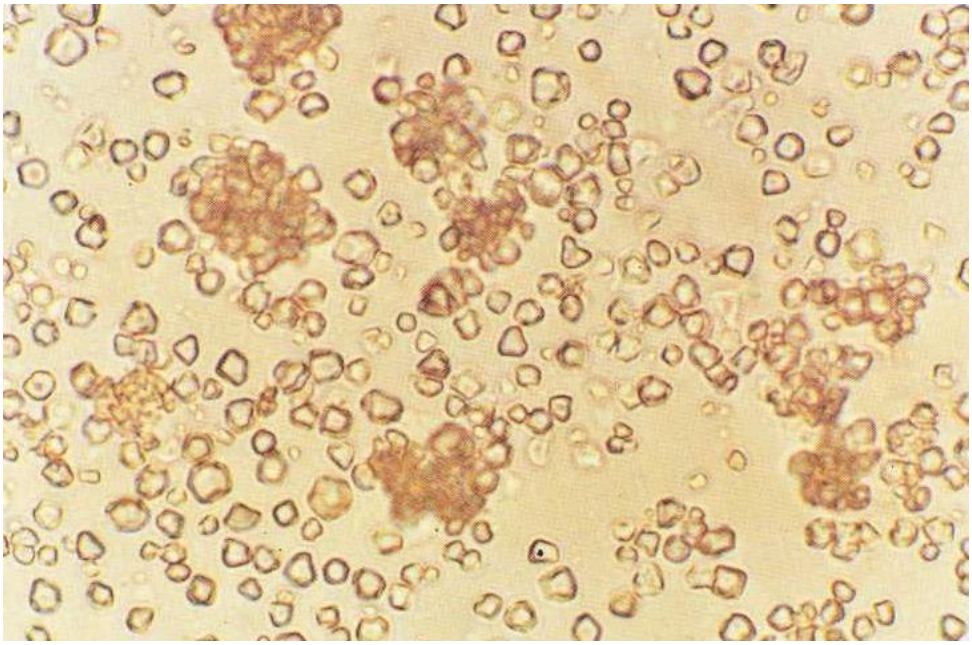

FIGURE 1 : **Photomicrograph of rice starch granules x 400**

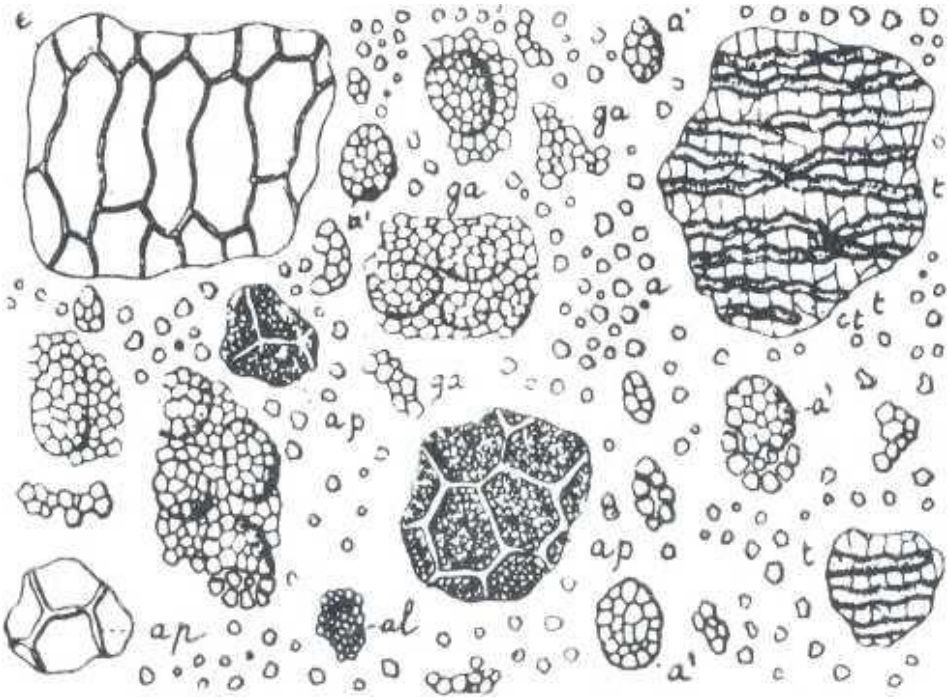

FIGURE 2 : **Rice flour x 100**

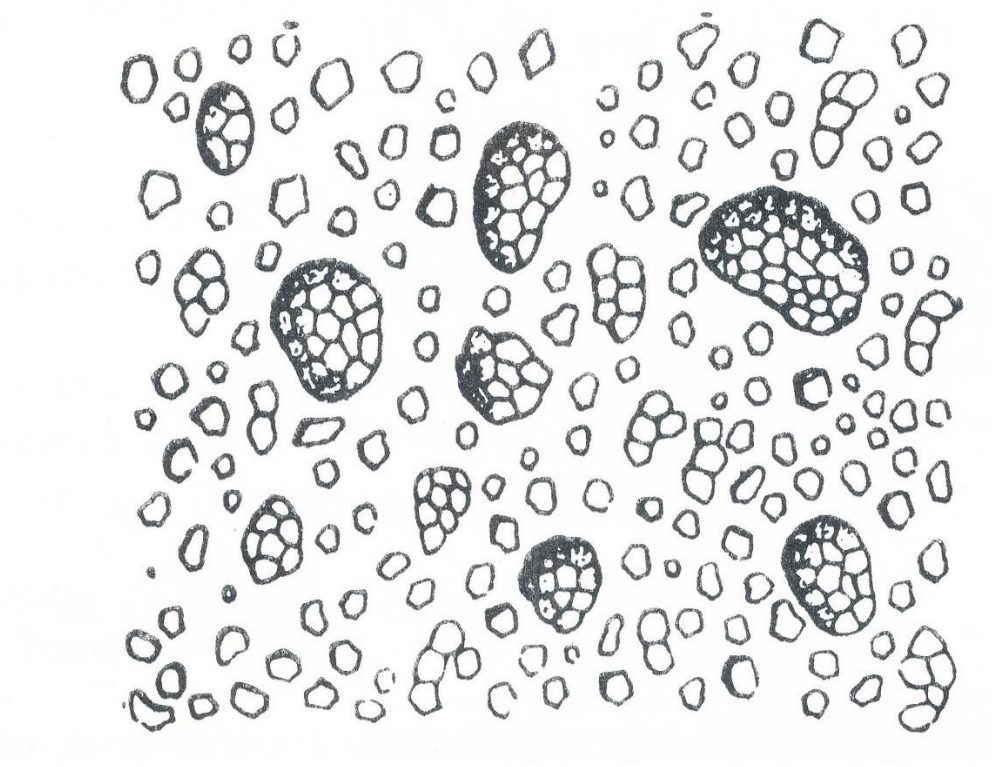

FIGURE 3 : Rice Starch x 400

Rice starch generally consists of both simple and compound grains, the simple grains are tolerably uniform in size and shape; they range from 4 µ, to 6 µ, sometimes reaching µ, and are generally angular. The compound grains are ovoid or rounded in shape, but vary very much in size, according to the number of constituent grains that they contain.

The rice flour which is commercially available, has a very small proportion of the seed-coats of the grain. Therefore, the main characteristics are the size and shape of the grains of starch. These are as follows:

a) Small simple polyhedral grains;
b) Large or small compound grains, oval or rounded in shape, and varying in size according to the number of constituent grains;
c) Fragments of the above of varying shape; and
d) Masses of starch from the cells of the endosperm, or masses of several cells together (Figures **2** and **3**).

APPENDIX D
DETERMINATION OF MOISTURE

D.1 APPARATUS

D.1.1 *Metal dish with lid*, approximately 55 mm in diameter and 15 mm in height, with inverted slip- in cover fitting tightly on inside

D.1.2 *Drying oven*, capable of being controlled at 130 ± 2^0C

D.1.3 *Desiccator*

D.2 PROCEDURE

Weigh, to the nearest 0.001 g, approximately 2 g of the sample in a dish, previously dried in an oven at 130 ±2 ^{0} C, Cooled and weighed (provided with cover).

Place the uncovered dish with the sample and the cover in drying-oven provided with opening for ventilation and maintained at 130 ± 2 °C for one hour. (One hour drying period begins when oven temperature is actually 130 °C). Cover the dish while still in oven, transfer to desiccator and weigh soon after reaching room temperature.

Repeat the process of heating, cooling and weighing at 30- minute intervals till the difference in mass between two successive weighings is less than one milligram. Note the lowest mass.

D.3 CALCULATION

$$\text{Moisture, per cent by mass} = \frac{(m_1 - m_2)}{(m_1 - m_0)} \text{ x } 100$$

m_0 is the mass, in g, of the empty dish,
m_1 is the mass, in g, of the dish with the material before drying and;
m_2 is the mass, in g, of the dish with the material after drying.

APPENDIX E
DETERMINATION OF STARCH

E.l REAGENTS

E.1.1 *Di-ethyl ether*

E.l.2 *Ethyl alcohol,* 10 per cent (V/V)

E.l.3 *Hydrochloric aaid,*10 per cent (V/V)

E.l.4 *Sodium carbonate solution,* 20 per cent (m/v)

E.2 PREPARATION OF SAMPLE SOLUTION

Weigh, to the nearest milligram, about 2 g of the sample. Place on a Whatman No. 1 filter paper or equivalent and extract with five 10 ml portions of diethyl ether (**D.1.1**). Evaporate the ether from the residue and wash with 150 ml ethy1 alcohol (**D.1.2**). Carefully wash off the residue from the filter paper with 200 ml of cold water. Reflux the residue with 200 ml of hydrochloric acid **(D.1.3**) in a flask with reflux condenser for 2 ½ hours. Cool and neutralize with sodium carbonate solution (**D.1.4**) and transfer quantitatively to a 500-ml graduated flask and make up to volume.

Then proceed as given in Clause 6 of **SLS 586 : 1982.**

E.3 CALCULATION

$$\text{Starch (on dry basis), per cent by mass} = \frac{9.3\,mV}{m_1(100 - M)}$$

Starch (on dry basis), per cent by mass

where,

m is the milligrams of anhydrous dextrose in one millilitre of the prepared solution of the material;
V is the total volume in ml of the prepared solution;
m_1 is the mass in g of the material used to prepare V ml of the solution; and
M is the percentage of moisture.

APPENDIX F
DETERMINATION OF pH

F.1 APPARATUS

F.1.1 Erlenmeyer flask

F.1.2 pH meter

F.2 REAGENTS

Buffer solutions, of pH 4.0, pH 7.0 and pH 10.0

F.3 PROCEDURE

Weigh 10.0 g sample into a clean, dry erlenmeryer flask and add 100 ml recently boiled and cooled distilled water at a temperature of 27 ± 2°C. Shake until the particles are evenly suspended and the mixture is free of lumps. Digest for 30 minutes, shaking frequently. Let it stand for 10 minutes or more. Decant the supernatent liquid and determine the pH value using a pH meter standardized by buffer solutions.

APPENDIX G
DETERMINATION OF ASH

G.1 APPARATUS

G.1.1 *Muffle furnace*, maintained at 550 ± 10 °C.

G.1.2 *Dish*, platinum or porcelain.

G.2 PROCEDURE

Weight, to the nearest milligram, about 5 g of the well mixed sample into a shallow, relatively broad ashing dish (**G.1.2**) which has been ignited, cooled in a desiccator, and weighed. Ignite the material in the dish with the flame of a suitable burner till all the flour is carbonized. Then ignite in the furnace (**G.1.1**) until a light grey ash results.

Cool in desiccator and weigh. Repeat the process of heating, cooling and weighing at 30-minute intervals till the difference in mass between two successive weighings is less than one

milligram. Note the lowest mass.

NOTE

Preserve the dish containing this ash for the determination of acid insoluble ash.

G.3 CALCULATION

$$\text{Ash (on dry basis), per cent by mass} = \frac{m_2 - m_0}{m_1 - m_0} \times \frac{10000}{(100 - M)}$$

Where,

m_o is the mass, in g of the empty dish;
m_1 is the mass, in g, of the dish with the sample taken for the test;
m_2 is the mass, in g, of the dish with the ash; and
M is the percentage of moisture.

APPENDIX H
DETERMINATION OF ACID INSOLUBLE ASH

H.l APPARATUS

H.1.1 *Muffle furnace,* maintained at 550 ± 10 °C.

H.2 REAGENTS

H.2.1 *Dilute hydrochloric acid,* approximately 5 mol/1.

H.3 PROCEDURE

To the ash contained in the dish (see Appendix **G**), add 25 ml of dilute hydrochloric acid, cover with a watch-glass and heat on a water-bath for 10 minutes. Allow to cool and filter the contents through a ashless filter paper (Whatman No. 41 or its equivalent). Wash the filter paper with water until the washings are free from acid. Return the filter paper and the residue to the dish. Ignite the filter paper and the residue in the dish with the flame till it chars. Ignite in the muffle furnace (**G.1.1**) for one hour Cool the dish in a desiccator and weigh.

Repeat the process of heating for 30 minutes, cooling and weighing till the difference in mass between two successive weighings is less than one milligram. Note the lowest mass.

H.4 CALCULATION

$$\text{Acid insoluble ash (on dry basis), per cent by mass} = \frac{m_3 - m_0}{m_1 - m_0} \times \frac{10000}{(100 - M)}$$

where,

m_0 is the mas, in g, of the empty dish.
m1 is the mass, in g, of the dish with the dried material taken for the determination of total ash;
m3 is the mass, in g, of the dish with the acid insoluble ash; and
M is the percentage of moisture

APPENDIX J
DETERMINATION OF IRON DUST

J.1 REAGENTS

J.1.1 *O-Phenanthroline solution* - dissolve 0.1 g of O-phenanthroline in about 80 ml H_2O at 80 °C, cool and dilute to 100 ml.

J.1.2 *α, α - dipyridyl solution* - dissolve 0.1 g of α,α - Dipyridyl in H_2O and dilute to 100 ml.

NOTE
Reagents **J.1.1** *and* **J.1.2** *kept in cool, dark place will remain stable several weeks*

J.1.3 *Iron standard solution* - 0.01 mg Fe/ ml. Dissolve 0.1 g analytical grade Fe wire in 20 ml HCl and 50 ml H_2O, and dilute to 1000 ml. Dilute 100 ml of this solution to 1000 ml or dissolve 3.512 g $Fe(NH_4)_2 (SO_4)_2 . 6H_2O$ in H_2O, add 2 drops of HCl, and dilute to 500 ml. Dilute 10 ml of this solution to 1000 ml.

J.1.4 *Acetate buffer solution* - dissolve 8.3 g anhydrous $NaC_2H_3O_2$ (Previously dried at 100 °C) in H_2O, add 12 ml acetic acid, and dilute to 100 ml. (It may be necessary to redistill acetic acid and recrystallize $NaC_2H_3O_2$ from H_2O, depending on amount of Fe present)

J.2 APPARATUS

Spectrophotometer

J.3 PROCEDURE

J.3.1 Preparation of standard curve

Construct a 10-point standard curve, plus zero, preparing solutions containing 0.0 (Zero), 2.0, 5.0, 10.0, 15,0, 20.0, 25.0, 30.0, 35.0, 40.0 and 45.0 ml) respectively, of final diluted Fe standard solution **(J.1.3),** plus 2.0 ml HCl in 100 ml H_2O

Alternatively, construct a 5-point curve (5.0, 15.0, 25.0, 35.0 and 45.0 ml), plus zero, after correction for reagent blank.

Using 10 ml of each these solutions proceed as in **J.3.2** beginning add 1 ml $H_2NOH.HCl$ plot concentration against scale reading.

J.3.2 Determination by dry ashing

Ash 5.00 g of flour in Pt, SiO, or porcelain dish about 60-mm diameter, 35-ml capacity as in Appendix **C** (Porcelain evaporating dishes of about 25-ml capacity are satisfactory. Do not use flat-bottom dishes of diameter > 60 mm).

Cool and weigh. If per cent ash is desired, continue ashing until practically C-free. To diminishing time, or for samples that do not burn practically Carbon tree e, use one of following ash aids.

Moisten ash with 0.5- 1.0 ml Mg $(NO_3)_2$ solution or with redistilled HNO_3. Dry and carefully ignite in furnace, avoiding spattering, (white ash with no C results in most cases) Do not add these ash aids to self-rising flour (products containing NaCl) in Pt dish because of vigorous action on dish cool, add 5 ml HC1, letting acid rinse upper portion of dish, and evaporate to dryness on steam bath. Dissolve residue by adding 2.0 ml HC1, accurately measured, and heat 5 min on steam bath with watch glass on dish. Rinse watch glass and dilute residue solution to 100 ml with H_2O. If necessary (undissolved particles visible in residue solution), filter diluted residue solution through ashless paper and discard first 15-20 ml filtrate.

Pipette 10 ml aliquot into 25 ml volumetric flask and add 1 ml $H_2NOH.HC1$ solution, let stand 5 min and then add 5 ml buffer solution, **J.1.4** and 1 ml O-Phenanthroline, **J.1.1** or 2 ml dipyridyl solution, **J.1.2** and dilute to volume. Determine absorbance A, in spectrophotometer to photometer at about 510 nm. From reading, determine Fe concentration form equatic line representing standard points or by reference to standard curve for known Fe concentration. If further dilution is required to maintain sample absorbance reading below highest standard point on curve, pipette smaller aliquot into 25.0 ml flask, dilute to 10.0 ml with 2 % HC1 solution and continue as described in **J.3.2** paragraph 3 Determine blank on reagents and make correction. Calculate Fe in flours as mg/ kg.

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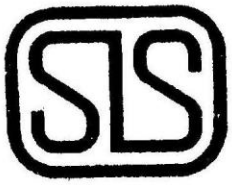

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SRI LANKA STANDARDS INSTITUTION

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