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**SPECIFICATION FOR
TEXTURED SOYA PROTEIN**
(First Revision)

SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standard
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SLS 898: 2017

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SPECIFICATION FOR TEXTURED SOYA PROTEIN
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FOREWORD

This Standard was approved by the Sectoral Committee on Food Products and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2017-08-30.

Soya protein plays a significant role as a source of supplementary protein. Soya proteins can be transformed to a fibrous texture by two main processes, extrusion and spinning. Textured Soya Protein (TSP) when rehydrated can be used as a meat analog or as an extender to fresh or processed meat products.

This Standard was first published in 1990. Taking into consideration the new developments made in the industry and to align with the international practices, a revision of this Standard was considered necessary. In this revision, requirements have been updated and limits for aflatoxin and heavy metals have been introduced. In addition to that, requirements for sachets have been considered.

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 results 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 revising this Standard, the assistance derived from the publications of the Codex Alimentarius Commission, Bureau of Indian Standards and the United States Department of Agriculture is gratefully acknowledged.

1 SCOPE

This Standard prescribes the requirements and methods of sampling and test for textured soya protein.

2 REFERENCES

Official methods of Analysis, Association of Official Analytical Chemists (AOAC) 20th edition, 2016

SLS	80	Food grade salt (Powdered form)
SLS	102	Rules for rounding off numerical values
SLS	143	Code of practice for general principles of food hygiene
SLS	191	White sugar
SLS	313	Methods for analysis of animal and vegetable fats and oils

		Part 2/ Section 6 - Determination of chemical characteristics/ Determination of acid value and acidity
		Part 3/ Section 7 - Determination of foreign substances and parameters affecting quality and stability/ Determination of peroxide value- Iodometric (visual) end point determination
SLS	428	Random sampling methods
SLS	467	Code of practice for labeling of prepackaged foods
SLS	516	Methods of test for Microbiology of food and animal feeding stuffs
		Part 1/ Section 1 - Horizontal method for the enumeration of microorganisms/ Colony count at 30 °C by the pour plate technique
		Part 2/ Section 1 - Horizontal method for the enumeration of yeasts and moulds/ Colony count technique in products with water activity greater than 0.95
		Part 3/ Section 1 - Horizontal method for the detection and enumeration of coliforms/ Most probable number technique
		Part 5: Horizontal method for the detection of <i>Salmonella</i> spp.
		Part 12: Horizontal method for the detection and enumeration of presumptive <i>Escherichia coli</i> (most probable number technique)
SLS	1011	Soya Flour
SLS	1362	Methods of test for agricultural food products
		Part 1: Determination of crude fibre content – general method
SLS	1549	Methods of tests for cereals, pulses and derived products
		Part 2: Determination of the Nitrogen content and calculation of the crude protein content – Kjeldahl method
		Part 3: Cereals, cereal based products and animal feeding stuffs – Determination of crude fat and total fat content by the Randall extraction method
		Part 4: Determination of ash yield by incineration

3 DEFINITIONS

For the purpose of this Standard the following definition shall apply:

textured soya protein: A high protein product having a fibrous texture, obtained from defatted soya flour and other soya sources, processed under controlled conditions of moisture, temperature and pressure

4 INGREDIENTS

4.1 All ingredients used shall comply with the requirements of the Food Act No. 26 of 1980 and the regulations framed thereunder. The limits set for the use of ingredients by the regulations in the said Food Act shall be adhered.

4.2 All ingredients used in the preparation of the product shall be clean, wholesome and free from evidence of insect and rodent infestation and other extraneous matter. In addition, ingredients used shall not contain any substance in such amounts that may be hazardous to human health.

4.3 Basic ingredient

Defatted soya flour, conforming to **SLS 1011**

4.4 Optional ingredients

4.4.1 *Vitamins and minerals*

4.4.2 *Soya isolates*

4.4.3 *Soya concentrates*

4.4.4 *Herbs and spices*

4.4.5 *Food grade salt*, conforming to **SLS 80**

4.5 In addition to the above mentioned, separate sachet(s) may contain following ingredients.

4.5.1 *Modified starch* (Limited by GMP)

4.5.1.1 Dextrin roasted starch INS 1400

4.5.1.2 Acid treated starch INS 1401

4.5.1.3 Alkaline treated starch INS 1402

4.5.1.4 Bleached starch INS 1403

4.5.1.5 Oxidized starch INS 1404

4.5.1.6 Enzyme treated starch INS 1405

4.5.1.7 Monostarch phosphate INS 1410

4.5.1.8 Distarch phosphate INS 1412

4.5.1.9 Phosphated distarch phosphate INS 1413

4.5.1.10 Acetylated distarch adipate INS 1414

4.5.1.11 Starch acetate INS 1420

4.5.1.12 Acetylated distarch adipate INS 1422

4.5.1.13 Hydroxypropyl starch INS 1440

4.5.1.14 Hydroxypropyl distarch phosphate INS 1442

4.5.1.15 Starch sodium octenyl succinate INS 1450

4.5.1.16 Acetylated oxidized starch INS 1451

4.5.2 *Dehydrated vegetables*

4.5.3 *Cereals and legume flour*

4.5.4 *Vitamins and minerals*

4.5.5 *Edible vegetable oil*

4.5.6 *Dried meat, fish, crustaceans and molluscs*

4.5.7 *Spices and condiments*

4.5.8 *Food grade salt*, conforming to **SLS 80**

4.5.9 *Sugar*, conforming to **SLS 191**

4.5.10 *Food additives*

4.5.10.1 Permitted flavouring substances and flavour enhancers

4.5.10.2 Permitted colouring substances

4.5.10.3 Acidity regulators (Citric acid - INS 330 and Malic acid - INS 296)

4.6 Separate sachets may be included for chillie paste and sauces conforming to the relevant Standards.

5 GENERAL REQUIREMENTS

5.1 Hygiene

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

5.2 Appearance

The product shall be reasonably uniform in shape and size.

5.3 Flavour and odour

The product shall be free from objectionable flavour and odour.

5.4 Free from extraneous matter

The product shall be free from extraneous matter.

5.5 Absence of moulds, insect infestation and animal excreta

The product shall be free from mould growth, living and dead insects, insect fragments and animal excreta, visible to the naked eye (corrected, if necessary, for abnormal vision), or using the required magnifying instrument. If the magnification exceeds $\times 10$, this fact shall be mentioned in the test report.

5.6 Compositional and chemical requirements

The product shall conform to the requirements given in Table 1 when tested according to the methods given in Column 4 of the table.

TABLE 1 - Requirements for textured soya protein

Sl No. (1)	Characteristic (2)	Requirement (3)	Method of test (4)
i)	Moisture, per cent by mass, max.	10.0	Appendix B
ii)	Protein (on dry basis), per cent by mass, min.	48.0	SLS 1549: Part 2
iii)	Fat, per cent by mass, max.	1.0	SLS 1549: Part 3
iv)	Crude fiber (on dry basis), per cent by mass, max.	3.0	SLS 1362: Part 1
v)	Ash (on dry basis), per cent by mass, max.	8.0	SLS 1549: Part 4
vi)	Acid insoluble ash (on dry basis), per cent by mass, max	0.2	Appendix C
vii)	Peroxide value*, meq/ kg, max	10.0	SLS 313: Part 3: Section 7
viii)	Free fatty acids (expressed as oleic acid)*, per cent by mass, max	0.1	SLS 313: Part 2: Section 6

* Applicable for vegetable oil sachet(s), if required only.

5.7 Microbiological limits

Textured soya protein shall conform to the microbiological limits given in Table 2 when tested according to the methods given in Column 4 of the table.

TABLE 2 - Microbiological limits

SI No. (1)	Test organism (2)	Limit (3)	Method of test (4)
i)	Aerobic Plate Count, cfu, per g, max	10 ³	SLS 516: Part 1: Section 1
ii)	Coliforms (MPN), per g, max	10	SLS 516: Part 3: Section 1
iii)	<i>Escherichia coli</i> (MPN), per g	Absent	SLS 516: Part 12
iv)	Yeasts and moulds, cfu, per g, max	10 ³	SLS 516: Part 2: Section 1
v)	<i>Salmonella</i> , per 25 g	Absent	SLS 516: Part 5

6 CONTAMINANTS

6.1 Aflatoxins

The product shall not exceed the level 5.0 µg/ kg for aflatoxin B₁ and the level 10.0 µg/ kg for total aflatoxin, when determined according to the method given in **968.22** of **AOAC**.

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 contamination.

6.2 Heavy metals

The product and contents in sachets shall not exceed the limits given in Table 3, when tested separately according to the methods given in Column 4 of the Table.

TABLE 3 - Limits for heavy metals

SI No. (1)	Heavy metal (2)	Limit (3)	Method of test (4)
i)	Arsenic, as As, mg/ kg, max	0.1	AOAC 986.15
ii)	Cadmium, as Cd, mg/ kg, max	0.2	AOAC 999.11
iii)	Lead, as Pb, mg/ kg, max	2.0	AOAC 994.02

7 PACKAGING

The product shall be suitably sealed, airtight in a clean, dry package made of moisture proof, food grade material in such a way to protect the product from crumbling, contamination and absorption of moisture.

8 MARKING AND/ OR LABELLING

8.1 The following shall be marked or labeled legibly and indelibly on each bulk package:

- a) The common name of the product as “TEXTURED SOYA PROTEIN”;
- b) Brand name or trade name, if any;
- c) Net mass in ‘kg’;
- d) Any permitted food additive’s name and INS number;
- e) The name and address of the manufacturer and/ or packer and distributor in Sri Lanka;
- f) Batch or code number or a decipherable code marking;
- g) Date of manufacture;
- h) Date of expiry;
- j) In case, where textured soya protein is repackaged, the date of repackaging; and
- k) Country of origin, in case of imported products.

8.2 The following shall be marked or labeled legibly and indelibly on each retail package destined for the final consumer.

- a) The common name of the product as “TEXTURED SOYA PROTEIN”;
- b) Brand name or trade name, if any;
- c) Net mass in ‘g’ or ‘kg’;
- d) Any permitted food additive’s name and INS number;
- e) The name and address of the manufacturer and/ or packer and distributor in Sri Lanka;
- f) Batch or code number or a decipherable code marking;
- g) Date of manufacture;
- h) Date of expiry;
- j) In case, where textured soya protein is repackaged, the date of repackaging;
- k) Country of origin, in case of imported products;
- m) Separate lists of ingredients in “textured soya protein” and “sachets”, in descending order of their proportions; and
- n) Directions for preparation.

8.3 The marking and labeling shall also be in accordance with **SLS 467**.

9 SAMPLING

Representative samples of the product for ascertaining conformity to the requirements of this Standard shall be drawn as prescribed in Appendix A.

10 METHODS OF TEST

Tests shall be carried out as prescribed in Appendix B and C of this Standard, **Section 6 of Part 2** and **Section 7 of Part 3** of **SLS 313**, **Section 1 of Part 1**, **Section 1 of Part 2**, **Section 1 of Part 3**, **Part 5** and **Part 12** of **SLS 516**, **Part 1** of **SLS 1362**, and **Part 2, 3 and 4** of **SLS 1549** and Official Methods of Analysis of the Association of Official Analytical Chemists (AOAC), 20th edition, 2016.

11 CRITERIA FOR CONFORMITY

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

11.1 Each package inspected as in **A.5.1** satisfies packaging and marking and/ or labeling requirements.

11.2 Each package examined as in **A.5.2** satisfies the relevant requirements given in Clauses **5.2, 5.3, 5.4** and **5.5**.

11.3 The composite sample when tested as in **A.5.3** satisfies the relevant requirements given in Clauses **5.6**, and **6.2**.

11.4 The sample when tested as in **A.5.4** satisfies the requirements given in Clause **6.2**.

11.5 The sample when tested as in **A.5.5** satisfies the relevant requirements given in Clause **5.6**.

11.6 Each sample when tested as in **A.5.6** satisfies the microbiological requirements given in Clause **5.7**.

APPENDIX A SAMPLING

A.1 LOT

In any consignment all the packages of the same size, containing textured soya protein, belonging to one batch of manufacture, or supply shall constitute a lot.

A.2 GENERAL REQUIREMENTS OF SAMPLING

When drawing, preparing, sorting and handling samples, following precautions and directions shall be taken:

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

A.2.2 Sampling instruments shall be clean and dry when used. When drawing samples for microbiological analysis the sampling instruments shall be sterilized.

A.2.3 The samples shall be kept in clean and dry suitable sample containers. Samples for microbiological analysis shall be kept in sterilized sample containers.

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

A.3 SCALE OF SAMPLING

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

A.3.2 The number of bulk packages to be selected from a lot shall be in accordance with Table 4.

TABLE 4 - Scale of sampling for bulk packages

Number of bulk packages in the lot (1)	Number of bulk packages to be selected (2)
Up to 3 00	7
301 to 5 00	8
501 to 1 2 00	10
1201 and above	13

A.3.3 The number of retail packages to be selected from a lot shall be in accordance with Table 5.

TABLE 5 - Scale of sampling for retail packages

Number of retail packages in the lot (1)	Number of retail packages to be selected (2)
Up to 1 000	8
1 001 to 3 000	10
3 001 to 10 000	13
10 001 to 30 000	18
30 001 and above	25

A.3.4 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 TEST SAMPLES

A.4.1 Preparation of samples for microbiological analysis

Three packages shall be selected from the packages selected as in **A.3.2** or **A.3.3**. A sufficient quantity of material, not less than 100 g, shall be drawn aseptically from each bulk package so selected. In case of retail packages, a package shall be treated as a sample. Material obtained from each package shall be transferred to separate sample containers.

A.4.2 Preparation of the composite sample

Approximately an equal quantity of material shall be drawn from each package selected as in **A.3.2** or **A.3.3** and mixed to form a composite sample of required size. The composite sample thus obtained shall be transferred to a sample container.

A.4.3 Samples from seasoning and oil sachets

A.4.3.1 Draw a sufficient quantity from the product and the contents of the sachet(s) separately for garnishing and seasoning, from the packages selected as in **A.3.2** or **A.3.3** and form a composite sample for determination of heavy metals.

A.4.3.2 A Sufficient quantity from the contents of the oil sachets, not less than 20 g, shall be drawn from the packages selected as in **A.3.2** or **A.3.3** and form a composite sample for determination of peroxide value and free fatty acids.

A.4.4 These samples shall be prepared at the place of inspection.

A.5 NUMBER OF TESTS

A.5.1 Each package selected as in **A.3.2** or **A.3.3** shall be inspected for packaging and marking and/ or labeling requirements.

A.5.2 Each package selected as in **A.3.2** or **A.3.3** shall be examined for the requirements given in Clauses **5.2**, **5.3**, **5.4** and **5.5**.

A.5.3 The composite samples prepared as in **A.4.2** shall be tested for moisture, protein, fat, crude fibre, ash and acid insoluble ash given in clause **5.6** and heavy metals given in Clause **6.2**.

A.5.4 The composite sample prepared as in **A.4.3.1** shall be tested for heavy metals given in Clause **6.2**.

A.5.5 The sample prepared as in **A.4.3.2** shall be tested for peroxide value and free fatty acids given in Clause **5.6**.

A.5.6 The samples prepared as in **A.4.1** shall be tested for the requirements given in Clause **5.7**.

APPENDIX B DETERMINATION OF MOISTURE

B.1 APPARATUS

B.1.1 *Metal dish with a lid or weighing bottle*

B.1.2 *Oven, maintained at 105 ± 2 °C*

B.1.3 *Desiccator, with a suitable desiccant*

B.2 PROCEDURE

B.2.1 Dry the container (**B.1.1**) in the oven (**B.1.2**) for about 2 hours. Cool in the desiccator and weigh to the nearest milligram.

B.2.2 Weigh, to the nearest milligram, about 5 g of the sample in the container (**B.2.1**). Dry in the oven (**B.1.2**) for about two hours. Cool in the desiccator (**B.1.3**) and weigh. Repeat the process of drying, cooling and weighing at 1 hour intervals until the difference between two successive weighings does not exceed 1 mg.

B.3 CALCULATION

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

where,

m_1 is the mass, in g, of the container with the sample before drying;

m_2 is the mass, in g, of the container with the sample after drying; and

m_0 is the mass, in g, of the empty container.

APPENDIX C DETERMINATION OF ACID INSOLUBLE ASH

C.1 APPARATUS

C.1.1 *Dish*, of silica or platinum

C.1.2 *Muffle furnace*, maintained at 600 ± 20 °C

C.1.3 *Desiccator*, with a suitable desiccant

C.2 PROCEDURE

Add 25 ml of 5 mol/l hydrochloric acid to the dish containing ash obtained by the test done as in **Part 4** of **SLS 1549**, cover with a watch glass and heat on a water bath for 10 minutes. Cool and filter through a Whatman No. 42 filter paper (or its equivalent). Wash with water until the washings are free from acid. Place the filter paper with the residue in the dish and dry in the oven for about 30 minutes. Char the dried filter paper with the residue using a suitable burner or hot plate. Ignite in the furnace for one hour. Cool in a desiccator and weigh. Repeat the process of igniting, cooling and weighing at 1 hour intervals until the difference between two successive weighing does not exceed 1 mg.

C.3 CALCULATION

$$\text{Acid insoluble ash, per cent by mass} = \frac{m_1 - m_0}{m_2 - m_0} \times 100$$

where,

m_1 is the mass, in g, of the dish with the acid insoluble ash;

m_2 is the mass, in g, of the dish with the sample; and

m_0 is the mass, in g, of The empty dish.

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.



SRI LANKA STANDARDS INSTITUTION

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