SRI LANKA STANDARD 643 : 2007

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SPECIFICATION FOR
DRIED FISH
(FIRST REVISION)

SRI LANKA STANDARDS INSTITUTION

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SLS 643 : 2007

Gr. 13

SRI LANKA STANDARDS INSTITUTION
17, Victoria Place
Elvitigala Mawatha
Colombo 8
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 DRIED FISH
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FOREWORD

This Sri Lanka Standard was approved by the Sectoral Committee on Agriculture and Food products and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2007-07-27.

This specification was first published in 1984. This revision has been undertaken to update the specification. Chemical and microbiological limits have been revised and new quality requirements have been introduced.

Dried fish has always been an important item of food in the diet of the people of this country particularly as a source of protein. The quantity of dried fish consumed is appreciable and the local production has been insufficient to meet the demand.

Reasonable quality standards are necessary to prevent health hazards due to consumption of dried fish. If proper quality control methods are adopted at different stages of production, dried fish with guaranteed quality could be produced. The suggested procedure for preparation outlined in Annex I of this specification will ensure that dried fish of acceptable quality will be produced.

This specification is subject to the restrictions imposed under the Sri Lanka Food Act No. 26 of 1980 and regulations framed thereunder, wherever applicable.

All standard values given in this specification are in SI units.

For the purpose of deciding whether a particular requirement of this specification 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 **CS 102**. The number of significant figures to be retained in the rounded off value shall be the same as that of the specified value in this specification.

In the preparation of this specification valuable assistance derived from the publications of the Codex Alimentarius Commission, Department of Health of the Republic of Philippines and the Indian Standards Institution is gratefully acknowledged.

1 SCOPE

This specification prescribes requirements, methods of sampling and test for all commercial dried split/filleted fish and dried whole fish.

2 REFERENCES

SLS 79 Edible common salt (ordinary washed and iodized)
SLS 83 SI units and recommendations for use of their multiples and of certain other units
CS 102 Presentation of numerical values
SLS 143 Code of practice for general principles of food hygiene
SLS 312 Methods for the determination of arsenic
SLS 428 Random sampling methods
SLS 467 Code of practice for labelling of prepackaged foods
SLS 516 Microbiological test methods
Part 1 : General guidance for enumeration of micro-organisms-colony count technique at 30 ^{0}C
Part 2 : Enumeration of yeasts and moulds
Part 3 : Detection and enumeration of coliforms, faecal coliforms and *Escherichia .coli*
Part 6 : General guidance for enumeration of *Staphylococcus aureus*
SLS 614 Potable water
SLS 1017 Code of hygienic practice for salted fish
SLS 1106 Canned fish curry
Official methods of Analysis, Association of Official Analytical Chemists (AOAC) 18 th edition, 2005

3 DEFINITIONS

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

3.1 chilling : Process of cooling fish to a temperature approaching that of melting ice between 0^0 C to 4^0 C.

3.2 dried fish fillet : Dried fish made from flesh cut parallel to the back bone of the fish wherein the fins, main bones and sometimes belly flaps are removed.

3.3 dry salting or kench curing : Process of mixing fish with dry salt (sodium chloride) in such a manner that the resulting brine drains away.

3.4 fish : Any marine, brackish water or fresh water fish, crustacean, mollusc and other aquatic life that is edible by human beings. It also includes fish roe.

3.5 fresh fish : Freshly caught fish which have received no preserving treatment or which have been preserved only by chilling.

3.6 salt : Salt (sodium chloride) of an appropriate quality and otherwise suitable for the purpose.

3.7 split dried fish : Dried fish prepared by cutting the fish along the dorsal or ventral side from the base of the tail to the tip of the head with the internal organs and gills removed prior to salting and drying.

3.8 water activity (a_w) : Ratio of the water-vapour pressure in the food stuff to the vapour pressure of pure water at the same temperature.

3.9 wet salting or brining: Process of placing fish in a solution of salt (sodium chloride) in water for a period of sufficient length for the fish tissue to absorb a significant quantity of salt.

3.10 whole dried fish : Fish dried in its original form, which has not been cut and eviscerated and with scales intact.

3.11 whole fish : Whole fish as captured, ungutted.

4 PRODUCT DEFINITION

4.1 Dried split/filleted fish shall be obtained or prepared from any of the species listed but not limited in Appendices **N** & **P** which have been split/filleted, gutted, washed and dried with or without the addition of salt. The heads, bones and tails may be removed.

4.2 Whole dried fish shall be obtained or prepared from any of the species listed but not limited in Appendices **N** & **P** which has a length below 12 cm from the tip of the snout to the base of the caudal fin and with or without salt added and dried in their original forms.

4.2.1. Grading of fish that have a length below 12 cm shall comply with Table **1**.

TABLE 1-Grading of fish (length below 12 cm)

Characteristic	Grade	
	A	B
Breakage	Less than 5%	Less than 15%

5 TYPES

Dried fish shall be of the following types:

a) Whole dried fish
b) Split dried fish
c) Dried fish fillet
d) Other types

NOTE: *Any other type of the product shall be permitted provided that it is sufficiently distinctive from the above three types(a, b and c) and shall meet all other requirements of this specification.*

6 REQUIREMENTS

6.1 Hygiene

The product shall be prepared, packaged, stored and distributed under hygienic conditions as prescribed in **SLS 143** and **SLS 1017**.

6.2 Appearance

The product shall have the characteristic colour of the properly cured fish of the particular variety and shall be free from yellowing, pinking, browning and presence of brown , black or white spots. The product shall be free from any evidence of insect infestation and mould growth.

6.3 Odour

The product shall be free from any objectionable odours indicative of decomposition (such as sour, putrid, rancid, etc.) or contamination by foreign substances (such as fuel oil, organic solvents, cleaning compounds, etc.).

6.4 Texture

The flesh of the product shall be firm and fibrous and shall not break when pressed with fingers. The flesh shall not crumble and shall not be mealy or pasty.

6.5 Flavour /Taste

The product after cooking in accordance with Appendix **F** shall have the characteristic flavour of good quality dried fish of the particular variety and also shall be free from rancid/ soap taste, bitter taste, itchy sensation or other disagreeable tastes.

6.6 Defects

The product shall be considered defective when it exhibits any of the properties defined in Appendix **B**.

6.7 Additives

No additives shall be used other than edible common salt, conforming to **SLS 79** added during processing.

6.8 The product shall pass the physical examination, test for sulphide (Beer's test) and sensory evaluation prescribed in Appendices **C, D** and **F.**

NOTE: *Test for sulphide (Beer's test) as described in Appendix **D** shall be carried out prior to the other tests.*

6.9 Other requirements

6.9.1 The product shall also comply with the requirements prescribed in Table **2** when tested according to the methods prescribed in column **4** of the Table.

TABLE 2 –Requirements for dried fish

Sl. No. **(1)**	**Characteristic** **(2)**	**Requirement** **(3)**	**Method of test** **(4)**
i)	Water activity (a_w),Max.	0.75	**Appendix G**
ii)	Salt content (as NaCl), per cent by mass, on dry basis, Max.	12 *	**Appendix H**
iii)	Histamine content, mg/kg edible portion, Max.**	100.0	**Appendix J**
iv)	Acid insoluble ash, per cent by mass, on dry basis, Max.	1.5	**Appendix K**

NOTE: * *Salt content may vary provided that the prescribed water activity is not exceeded.*

** *Histamine content shall be determined in species given in Appendix **P** only*

6.9.2 The product shall conform to the microbiological limits given in Table **3** when tested in accordance with the methods prescribed in column 7 of the Table.

TABLE 3 - Microbiological limits

SI. No. (1)	Test organism (2)	n (3)	c (4)	Limit per gram		Method of Test (7)
				m (5)	M (6)	
i)	Halophilic count	5	2	$1x10^4$	$1x10^5$	**Appendix E**
ii)	Aerobic Plate Count	5	2	$1x\ 10^5$	$5x10^5$	**Appendix L**
iii)	Yeast and Mould Count	5	2	$1x10^3$	$1x10^4$	
iv)	Total Coliforms	5	2	$1x10^2$	$5x10^2$	
v)	*Escherichia .coli*	5	2	2x10	$1x10^2$	
vi)	*Staphylococcus aureus*	5	2	-	$1x10^3$	

where:

n = number of sample units to be tested;

c = maximum allowable number of sample units yielding values between m and M;

m = limit below which a count is acceptable for any sample unit; and

M = limit above which a count is unacceptable for any sample unit.

6.9.3 The product shall also comply with the limits given in Table **4** when tested according to the methods given in Column **4** of the Table.

Table 4- Limits for heavy metals

SI. No. (1)	Heavy metal (2)	Limit (3)	Method of Test (4)
i)	Mercury (as Hg), mg/kg, Max.	0.5	Appendix M
ii)	Lead (as Pb), mg/kg, Max.	2.0	
iii)	Arsenic (as As), mg/kg, Max.	1.0	
iv)	Cadmium (as Cd), mg/kg, Max.	1.0	

7 PRESENTATION, PACKAGING AND MARKING

7.1 Presentation

7.1.1 Dried split/filleted fish : The products shall be presented as split/filleted dried fish, with or without backbone.

7.1.2 Dried whole fish : The products shall be presented as whole dried fish, with all parts intact.

7.1.3 Individual retail or bulk container shall contain only one species of fish, which are relatively uniform in size.

7.1.4 Average net weight of the sample unit shall not be less than the declared net weight provided no individual container is less than 95% of the declared net weight.

7.2 Packaging

7.2.1 *Bulk packaging*

The product shall be packed in carton or corrugated boxes lined with suitable food grade plastic films.

7.2.2 *Retail packaging*

The product shall be packed in transparent pre-formed bags made of suitable films or laminates of food grade and packed in carton or corrugated boxes.

7.3 Marking

7.3.1 Following shall be marked legibly and indelibly on each bulk package/Non retail container:

a) Name of the product;
b) Lot identification code; and
c) Name and address of the manufacturer , packer , distributor or importer.

7.3.2 Following shall be marked legibly and indelibly on each retail package/container:

a) Name of the product;
b) Type of the product;
c) Brand name / Trade mark, if any;
d) Net mass in "g" or "kg";
e) Name and address of the manufacturer and packer or distributor in Sri Lanka;
f) Batch number or code number or decipherable code marking;
g) Instructions for storage;
h) Date of manufacture;
i) Date of expiry, and
j) Country of origin, in case of imported products.

7.3.3 Marking and labelling shall also be in accordance with **SLS 467.**

NOTE : *Attention is drawn to the certification facilities offered by the Sri Lanka Standards Institution. See the inside back cover of this specification.*

8 SAMPLING

Representative samples of the product shall be drawn as prescribed in Appendix **A**.

9 METHODS OF TEST

9.1 Tests shall be carried out as prescribed in Appendices **B** to **M** of this specification.

9.2 Reagents

All reagents used shall be of recognized analytical quality and wherever water is mentioned distilled or de-ionized water shall be used.

9.3 Sensory and physical examination

Samples taken for sensory and physical examination shall be assessed by persons trained in such examination and in accordance with procedures elaborated in Appendices **C** and **F** .

10 CRITERIA FOR CONFORMITY

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

10.1 Each package inspected as in **A.5.1** satisfies the packaging and marking requirements.

10.2 Each sample tested as in **A.5.2** satisfies the microbiological requirements.

10.3 The composite sample tested as in **A.5.3** satisfies the requirements given in **6.5**, **6.8**, and **6.9.1**.

10.4 The material in each package examined as in **A.5.4,** satisfies the requirements given in **6.2**, **6.3**, **6.4** and **6.6.**

10.5 Each sample tested as in **A.5.5** satisfies the requirements given in **6.9.3**.

APPENDIX A
SAMPLING

A.1 LOT

All packages containing dried fish of same variety, grade and type belonging to one batch of manufacture, or supply shall constitute a lot.

A.2 GENERAL REQUIREMENTS OF SAMPLING

In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed.

A.2.1 Sampling shall be carried out in such a manner as to protect the sample, the material being sampled, the sampling instrument, and the containers in which the samples are placed from adventitious contamination.

A.2.2 All sampling apparatus shall be clean and dry when used.

A.2.3 The sample containers after filling shall be sealed air tight with a stopper or any suitable closure and marked with necessary details of sampling.

A.3 SCALE OF SAMPLING

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

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

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

TABLE 5 – Scale of sampling

No. of packages in the lot (1)	No. of packages to be selected (2)
Up to 50	10
51 to 150	11
151 to 500	13
501 and above	16

A.4 PREPARATION OF SAMPLES

A.4.1 Preparation of samples for chemical and microbiological tests

A sub sample of five packages shall be drawn aseptically from the packages selected as in **A.3.2** to prepare samples for microbiological tests. Equal quantities shall be drawn from top, middle and bottom portions of each package and mixed separately to form individual samples for testing. The size of the test sample obtained from each package shall not be less than 500 g.

A.4.2 A sub sample of three packages shall be drawn from the packages selected as in **A.3.2** to prepare samples for testing of requirements given in **6.9.3.** Sufficient quantities shall be drawn from top, middle and bottom portions of each package and separately to form three individual samples. The size of the test sample shall not be less than 400 g.

A.4.3 The remaining packages of the sample as in **A.3.2** shall be used to carry out tests for remaining requirements.

A.4.3.1 Sufficient quantities from each package shall be separately drawn and mixed together to prepare a composite sample for remaining tests.

A.5 NUMBER OF TESTS

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

A.5.2 Each sample prepared as in **A.4.1** shall be tested for microbiological requirements. (see note below).

A.5.3 The composite sample prepared as in **A.4.3.1** shall be tested for the requirements given in **6.5**, **6.8** and **6.9.1** (see note below).

NOTE : *If the sample fails either physical examination given in Appendix **C**, Beer's test in Appendix **D** or the halophilic count in Table **2**, then the sample shall be rejected without further testing. This could be further confirmed by the sensory test for cooked products given in Appendix **F**.*

A.5.4 The dried fish in each package remained as in **A.4.3** shall be examined for the requirements given in **6.2**, **6.3**, **6.4** and **6.6.**

A.5.5 Each sample prepared as in **A.4.2** shall be tested for the requirements given in **6.9.3.**

APPENDIX B
TYPES OF DEFECTS AND TOLERANCES

The sample unit shall be considered defective when it exhibits any of the properties defined below.

B.1 *Foreign Matter*

The presence in the sample unit of any matter which has not been derived from the species of fish given in Appendices **N** and **P**, does not pose a threat to human health and can be recognized either without magnification or is present at a level determined by any method including magnification that indicates non–compliance with good manufacturing and sanitation practices.

B.2 *Appearance*

B.2.1 Loose scales.

B.2.2 Presence of liver and blood stains, and traces of internal organs (for dried split/filleted fish).

B.2.3 Bursting of bellies (for dried, whole fish).

B.2.4 Excessive cracks and crumbling texture.

B.2.5 Detaching of fish parts.

B.2.6 Excessive salt crystals appearing on more than 50% of the fish surface.

APPENDIX C
PHYSICAL EXAMINATION OF DRIED FISH

C.1 The sample unit shall be considered defective when 30% or more of the fish in the sample unit are affected by any of the following defects.

C.1.1 ***Halophilic mould (dun)***

A fish showing an aggregate area of pronounced halophilic mould clusters on more than 1/3 of the total surface area of the face side.

C.1.2 ***Liver Stains***

A pronounced yellow or yellowish orange discoloration caused by the presence of liver and affecting more than 1/4 of the total surface area of the face of the fish.

C.1.3 Any fish showing more than 1/2 of the face with intense bruising.

C.1.4 ***Severe burning***

A fish with more than 1/2 of the back (skin side) tacky or sticky due to overheating during drying.

C.2 Textural breakdown of the flesh which is characterized by extensive cracks on more than 2/3 of the surface area or which has been mutilated, torn or broken through to the extent that the split fish is divided into two or more pieces but still held together by skin.

APPENDIX D
TEST FOR SULPHIDE (BEER'S TEST)

D.1 REAGENTS

D.1.1 *Sulphuric acid,* concentrated, 5 ml diluted to 50 ml with distilled water.

D.1.2 *Lead acetate,* saturated solution

D.2 PROCEDURE

D.2.1 Place 50 g of the test material at the bottom of a 250-ml conical flask fitted with a tight fitting cork carrying a strip of white filter paper 50 mm x 6 mm, the end of the filter paper being inserted in a slit in the bottom of the cork.

D.2.2 Pour 50 ml of diluted sulphuric acid **(D.1.1)** into the flask without touching the inner sides of the flask. Revolve the flask gently to wet the test material thoroughly.

D.2.3 Moisten the filter paper strip with the lead acetate solution **(D.1.2)** and fit the cork tightly so that the filter paper strip does not touch the sides, of the flask or come in contact with the acid.

D.2.4 Stand in a warm room and note colour change of the filter paper.

D.3 CONCLUSION

D.3.1 Dark colour or black colour in the filter paper shall indicate heavy decomposition of the material.

D.3.2 Brown colour in the filter paper in 1 h to 3 h shall indicate considerable decomposition of the material.

D.3.3 Slight tan colour in the filter paper after 16 h shall indicate that the material is suitable.

APPENDIX E
HALOPHILIC COUNT TEST

E.1 MEDIA

E.1.1 Halophilic Agar (HA)

Casamino acids	10.0 g
Yeast extract	10.0 g
Proteose peptone	5.0 g
Trisodium citrate	3.0 g
Potassium chloride	2.0 g
Magnesium sulphate .7 H_2O	25.0 g
Sodium chloride	250.0 g
Agar	20.0 g
Distilled water	1.0 l

Dissolve ingredients in distilled water and sterilize at 121^0 C for 15 minutes. Final pH shall be 7.2

E.1.2 Halophilic Broth (HB)

Prepare as for Halophilic Agar except omit agar. Medium is used as a diluent and as an enrichment medium for the isolation of extremely halophilic bacteria. Sterilize medium by autoclaving at 121^0 C for 15 minutes.

E.2 PROCEDURE

E.2.1 For isolation, transfer surface slime from fish to an HA agar plate using a cotton swab

E.2.2 For the quantitative enumeration , blend 50 g of sample with 450 ml HB **(E.1.2).** Place 0.1 ml aliquots of each dilution (to 10^{-6}), on HA **(E.1.1)** agar plates with the spread plate technique.

E.2.3 For samples with low number of halophilic bacteria , place 10g into 90 ml HB broth and incubate at 35^0 C for upto 12 days. Streak from broth onto HA plates.

E.2.4 Incubate plates at 33^0 C to 35^0 C in a humid incubator for 5 to 12 days.

APPENDIX F
SENSORY EVALUATION

F.1 COOKING TO EVALUATE FLAVOUR

Rinse the product with water to remove the excess salt, and cook it in plain boiling water. During this process, addition of spices shall be avoided. Cooking time is generally taken as 10 minutes. Cool the product to approximately room temperature to evaluate the flavour.

F.2 Assess flavour in accordance with the Codex Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31 – 1999).

APPENDIX G
DETERMINATION OF WATER ACTIVITY

G.1 PREPARATION OF THE SAMPLE

Remove carefully the test sample from containers and grind it quickly not allowing any loss of moisture in the process. The bony material shall be separated and left out before the grinding process. Mix well to get a homogeneous sample. Keep in an air tight container, use this material for testing.

G.2 Proceed as described in ISO 21807:2004 Microbiology of food and animal feeding stuffs- Determination of water activity, using a suitable water activity meter, **or** by the method described in **G.3**

G.3 APPARATUS

G.3.1 *Analytical balance*, with a readability of 0.1 mg

G.3.2 *Desiccators*

G.3.3 *Temperature controllable cabinet*

G.3.4 *Petri dishes,* diameter 40 mm

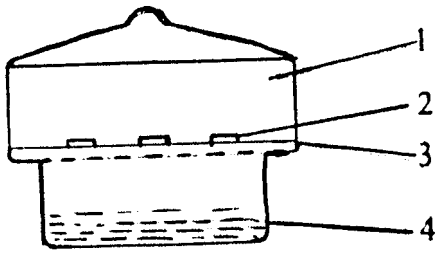
G.3.5 *Other laboratory equipment*

G.4 REAGENTS

G.4.1 *Sulphuric acid*, concentrated

G. 5 PROCEDURE

G.5.1 Prepare equipment as shown in figure **1.**



1. desiccator 2. samples 3.clapboard with hole 4. sulphuric acid solutions

Figure 1

G.5.2 Select the suitable temperature from Table **6,** where water activity of sulphuric acid solutions at selected concentrations and relevant temperatures given.

TABLE 6- Water activity of sulphuric acid solutions at selected concentrations and relevant temperatures

H_2SO_4 solution % (v/v)	Water activity (a_w)		
	30^0C	45^0C	60^0C
5.0	0.9808	0.9812	0.9818
20.0	0.8814	0.8839	0.8882
30.0	0.7549	0.7629	0.7711
40.0	0.5711	0.5866	0.5989
50.0	0.3574	0.3765	0.3936
60.0	0.1677	0.1834	0.1988
70.0	0.0470	0.0548	0.0611
80.0	0.0059	0.0077	0.0103

G.5.3 Previously dried desiccators are prepared as shown in Fig.**1** with suitable range of sulphuric acid solution percentages (v/v) (i.e 28.0, 28.3, 28.5, 28.7, …etc.).

NOTE : *Desiccators shall be tightly closed to avoid the influence of outside humidity on measurements*

G.5.4 The prepared desiccators **(G.3.2)** are placed in a selected temperature **(G.5.2)** controlled cabinet and allow to equilibrate for 24 h.

G.5.5 Weigh 5.0 ± 0.001 g of prepared sample **(G.1)** and place in previously dried petri dishes **(G.3.4)** inside desiccators (the distance from petri dish to sulphuric acid solution shall be 100 mm) in temperature controlled cabinets **(G.3.3)**.

G.5.6 The samples are weighed at 24 h intervals. (the total time require for removal, weighing and replacing the sample in the desiccator shall be approximately 30 s to minimize the degree of atmospheric moisture sorption during weighing).

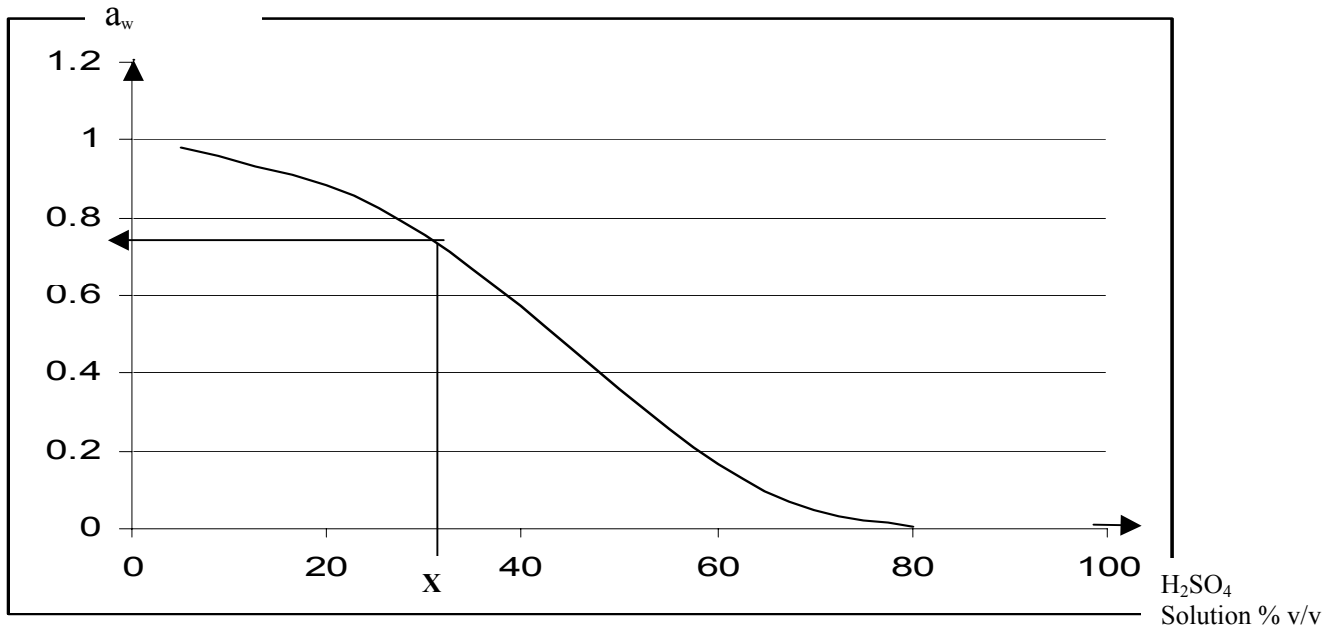
G.5.7 Find the H_2SO_4 solution percentage (v/v), where there is no discernible weight change (± 0.1mg) of the sample.

G.5.8 Find the water activity of the sample ($\mathbf{a_w}$) from the graph H_2SO_4 solution percentage (v/v) vs a_w (**G.6.1**)

G.5.9 Each experiment shall be carried out in triplicate.

G.6 INTERPRETATION OF RESULTS

G.6.1 Plot H_2SO_4 solution percentage (v/v) vs a_w to the relevant temperature **(G.5.2)** (Values are given in Table 6)



X = H_2SO_4 solution percentage (v/v) where there is no discernible weight change of the sample.

Y = water activity (a_w) of the sample

APPENDIX H
DETERMINAITON OF SALT CONTENT

H.1 Spread about 20 g of the prepared sample **(G.1)** on a petri dish or any suitable dish and dry in an air oven maintained at 103 ± 2^0 C for at least 3 hours.

H.1.1 Cool to room temperature in a desiccator and weigh. Repeat heating, cooling and weighing at half hour intervals until there is no further loss in mass. The dried material shall be refered to as the dried sample and shall be used in the tests where so indicated.

H.2 APPARATUS

H.2.1 *Analytical balance*, with a readability of 0.1mg

H.2.2 *Other laboratory equipments*

H.3 REAGENTS

H.3.1 *Standard silver nitrate solution*, 0.1 mol/dm^3

H.3.2 *Potassium thiocyanate standard solution,* 0.1mol/dm^3.

H.3.3 *Indicator solution,* a saturated solution of ferric alum $(NH_4)_2 SO_4.Fe_2 (SO_4)_3. 24H_2O$

H.3.4 *Nitric acid,* dilute, 1 : 4**.**

H.4 PROCEDURE

H.4.1 Weigh to the nearest milligram about one gram of the dried sample (**H.1**), into a 250-ml Erlenmeyer flask (tared). Add 50.0 ml of standard silver nitrate solution **(H.3.1)** and 20 ml of dilute nitric acid **(H.3.4)**. Boil on sand bath or hot plate for about 45 min. until all soluble solids are dissolved. Cool, add 50 ml of distilled water and 5 ml of indicator solution **(H.3.3)**.

H.4.2 Titrate against standard thiocyanate solution **(H.3.2)** until a permanent light brown colour appears.

H.5 CALCULATION

$$Salt\ content\ (as\ NaCl),\ per\ cent\ by\ mass = \frac{5.85\ (V_1N_1 - V_2N_2)}{m}$$

where,

V_1 = volume, in millilitres of the standard silver nitrate solution used;
N_1 = concentration, of the standard silver nitrate solution;
V_2 = volume, in millilitres of the standard thiocyanate solution used;
N_2 = concentration, of the standard thiocyanate solution; and
m = mass, in grams of the dried sample taken.

APPENDIX J
DETERMINATION OF HISTAMINE CONTENT

Proceed as described in Appendix D of SLS 1106 :1995

APPENDIX K
DETERMINATION OF ACID INSOLUBLE ASH

K.1 APPARATUS

K.1.1 *Suitable, silica / porcelain dish*

K.1.2 *Muffle furnace*, maintained at 600 $\pm$ 20 ^{0} C

K.1.3 *Desiccator*

K.1.4 *Hot air oven,* maintained at 135 $\pm$ 2 ^{0} C

K.1.5 *Analytical balance,* with a readability of 0.1 mg

K.1.6 *Other laboratory equipments*

K.2 REAGENT

Hydrochloric acid, dilute 1 : 1.

K.3 PROCEDURE

K.3.1 Weigh, to the nearest milligram, about two grams of dried sample **(**see **H.1)** into a silica or porcelain dish previously dried and weighed and, char with Bunsen burner. Ignite the chared sample by keeping it in a muffle furnace at 600 ± 20 ^{0}C **(K.1.2)** until grey ash results.

K.3.2 Cool and add 25 ml of dilute hydrochloric acid, cover with a watch glass and heat on water bath for 10 minutes.

K.3.3 Cool and filter through Whatman filter paper No. 42 or its equivalent.

K.3.4 Wash the residue with hot water until the washings are free from chlorides as tested with silver nitrate solution and return the filter paper and residue to the dish.

K.3.5 Keep it in a hot air oven maintained at 135 ± 2 ^{0}C **(K.1.4)** for 3 hours.

K.3.6 Char and ignite in a muffle furnace at 600 ± 20 ^{0}C **(K.1.2)** for one hour. Cool in a desiccator **(K.1.3)** and weigh. Repeat this process till the difference between two successive weighings is less than one milligram. Note the lowest mass.

K.4 CALCULATION

$$Acid\ insoluble\ ash,\ per\ cent\ by\ mass,\ dry\ basis\ =\ \frac{m_2 - m}{m_1 - m}\ x\ 100$$

where,

m = mass, in grams, of the empty dish ;
m_1 = mass, in grams, of the dish with the dried sample taken for the test; and
m_2 = lowest mass, in grams of the dish with acid insoluble ash.

APPENDIX L
MICROBIOLOGICAL EXAMINATION

Culture media shall contain 0.5% sodium chloride

L.1 AEROBIC PLATE COUNT

Proceed as described in SLS 516 part 1.

L.2 ENUMERATION OF YEASTS AND MOULDS

Proceed as described in SLS 516 part 2.

L.3 ENUMERATION OF COLIFORMS AND *E.coli*

Proceed as described in SLS 516 part 3.

L.4 ENUMERATION OF *Staphylococcus aureus*

Proceed as described in SLS 516 part 6.

APPENDIX M
DETERMINATION OF HEAVY METALS

M.1 DETERMINATION OF MERCURY

Proceed using the atomic absorption spectrophotometric method as described in **AOAC – method 977.15.**

M.2 DETERMINATION OF LEAD

Proceed using the atomic absorption spectrophotometric method as described in **AOAC – method 972.23.**

M.3 DETERMINATION OF ARSENIC

Proceed as the method described in **SLS 312**

M.4 DETERMINATION OF CADMIUM

Proceed using the atomic absorption spectrophotometric method as described in **AOAC – method 999.11.**

APPENDIX N
MARINE , BRACKISH WATER AND FRESH WATER FISH UTILIZED IN THE PRODUCTION OF DRIED FISH

Common Name (English/Sinhala/Tamil)	Scientific Name (Species)
Seer /Thal thora/Vanchuran	*Cybium spp*
Seer/Angila /Anjila	*Cybium spp*
Tuna/Balaya /Surai	*Katsuwonus pelamis*
Trevally/Paraw/Parai	*Caranx spp*
Katta	*Chorinemus spp*
Koduwa (Jew Fish/Ghol Fish)	*Sciaena, Pseudo scianea spp*
Lavaya	*Serranus spp*
Spratts(Anchovis)/Halmessa/Netholi	*Stolephorus/Anchoville spp*
Kooney	*Acetes, (small*)
Prawns /Issa/Raal	*Penaeus, Metapenaeus,Parapenaeopsis spp*
Shark /Mora/Sura	*Caracharhinus spp*
Maduwa (Ray fish)	*Trygon, Myliobatida spp*
Anguluwa (Cat fish)	*Arius spp*
Hurulla /Keerai meen	*Amblygaster sirm*
Sudaya/Suuda	*Sardinella spp*
Half beak/Morollo /Mural	*Hemirhamphus spp.*
Venganawa	*Pellona spp*
Parawa Small	*Caranx spp*
Mackeral/Kumbalawa/Kumbla	*Rastrelliger kanagurta*
Thalapath	*Istiophorus spp.*
Moodilla	*Rachycentron canadus*
Pulunno (Lapisa)	*Lactarius spp*
Bigeye scad /Bolla	*Selar crumenophthalamus*
Thondaya	*Lutjanus malabaricus*

Contd…./

Goldstrip sardinella/ Salaya /Salai	*Dussumeria acuta*
Barracuda/Jeelava/Seela	*Sardinella gibbosa*
Red mullet/Rathugalmalu/Semmen	*Sphyraena spp*
Dried Bombay Duck	*Harpoden nehereus*
Silver Belly	*Leiognathus spp*
Sole Fish	*Cynoglosus spp*
Ribbon Fish	*Thichurus spp*

Fresh water fish

Catla	*Catla catla*
Tilapia	*Tilapia mossambica*
Big head carp	*Aristicthys nobilis*
Common carp	*Cyprinus carpio carpio*
Loolla	*Channa striata*

APPENDIX P
SCOMBROID FISH SPECIES

Common Name (English/Sinhala/Tamil)	Scientific Name (Species)
Anchovy (Sprats)	*Anchoa spp* *Anchoviella spp* *Cetengraulis mysticrtus* *Engraulis spp*
Herring	*Entrumeus teres* *Harengula thrissina* *Ilisha spp* *Opisthopterus tardoore* *Alosa spp* *Clupea spp*
Tuna (Large and small) Alagoduwa Atavalla Balaya Kelavalla	*Allothunnus fallai* *Auxis spp* *Euthynnus spp* *Katsuwonus pelamis* *Thunnus spp*
Pilchard or Sardine (Hurulla,Sudaya, Salaya)	*Sardinella pilchardus* *Sardinops spp* *Sardinella spp* *Harengula spp*
Mackerels (all)	*Scomber scombrus* *Rastrelliger kanagurta* *Grammatorcynus spp* *Scomber spp* *Trachurus spp*

ANNEX I
(informative)
MODE OF PREPARATION

The product shall be prepared from fresh wholesome chilled fish, fit for human consumption. The fresh fish soon after landing shall be washed in clean chilled water conforming to **SLS 614** to remove blood spots and all adhering impurities.
The fresh fish shall be split open along the dorsal line and gutted. The gutted fish shall then be washed and cleaned.
For split fish, longitudinal incisions shall be made after gutting.
Gills shall be removed except in the case of smaller varieties which are dried whole.
The product shall be prepared by one of the salting processes as defined below.

a) Salting

Dry salting (Kench curing)

The product shall be prepared from fresh wholesome fish. The fish shall be washed in clean chilled water and then suitably split and eviscerated and gills removed except in the case of smaller varieties which are dried whole.

The fish shall be mixed with food grade salt conforming to **SLS 79.** The salted fish shall then be cured in suitable tanks, tubs and other containers for a period not less than 12 hours. The cured fish shall be washed with clean water or in self-brine before drying.

Wet salting (brining)

The product shall be prepared from fresh wholesome fish. The fish shall be washed in clean chilled water and then suitably split and eviscerated and gills removed except in the case of smaller varieties which are dried whole.

Fish shall be further washed in clean chilled water to remove blood spots and all adhering impurities. The fish shall then be pretreated by dipping in a solution of salt conforming to **SLS 79** of specific salt concentration for a particular period of time and stored in watertight containers. The fish is subsequently removed from the container and stacked so that the brine drains away.

Brine injection

Brine shall be directly injected into the fish flesh and permitted as a part of heavy salting process.

NOTE : *The water used in processing shall be clean water conforming to **SLS 614**.*

b) Drying

Cured fish shall be dried under hygienic conditions either in the sun or in artificial driers till a safe and quality product is obtained. The fish shall then be packed after cooling to room temperature.

Sun or solar drying shall be the exposure of fish to open air under the heat of the sun.

Artificial drying shall be the process of removing moisture from the fish in an enclosed chamber under controlled temperature, airflow and humidity.

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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.*

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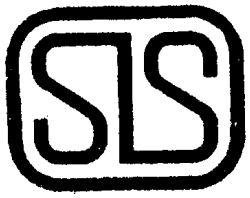

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