SRI LANKA STANDARD 591 : 2014

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SPECIFICATION FOR

CANNED FISH

(First Revision)

SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standard
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SLS 591 : 2014

(Attached AMD No.1 (AMD 579))

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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.

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SPECIFICATION FOR CANNED FISH
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FOREWORD

This Sri Lanka Standard was approved by the Sectoral Committee on Agricultural 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 2014-05-28.

Canned fish is a widely consumed food in the country and most of the products are presently imported from various countries. Canned fish of good quality can never be produced from raw materials which are initially of low quality irrespective of the subsequent methods of handling or processing. It is therefore, important to exercise utmost care in obtaining raw materials of good hygienic quality which will satisfy the physical, chemical and bacteriological standards prescribed for the finished products.

This standard was first published in 1982. This revision incorporates a number of important modifications namely, list of ingredients which has been further expanded to give provisions for different types available in the market, the limit of drained mass of the contents has been relaxed and also the sampling scheme has been updated to help in exercising proper quality control of canned fish.

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

For the purpose of deciding whether a particular requirement of this specification is complied with, the final value, observed or calculated, expressing the results of a test, shall be rounded off in accordance with SLS 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 standard.

In revising this standard, valuable assistance derived from the publications of the Codex Alimentarius Commission is gratefully acknowledged.

1 SCOPE

1.1 This standard prescribes the requirements, methods of sampling and testing for canned fish packed in its own juice or brine or potable water or edible oil or other suitable packing medium (including catering purposes).

1.2 This standard does not apply to speciality products where fish content constitutes less than 50 per cent by mass of the net contents of the can and canned curry fish products.

2 REFERENCES

SLS 79 Food grade salt
SLS 102 Rules of rounding off numerical values
SLS 124 Test sieves
SLS 143 General principles of food hygiene
SLS 428 Random sampling methods
SLS 467 Labelling of prepackaged foods
SLS 516 Microbiological test methods
Part 10 : Commercial sterility of low acid and acid canned foods
SLS 614 Potable water
SLS 816 Method for checking net contents of prepackaged goods
SLS 873 Code of practice for manufacture/canning of low-acid and acidified low acid foods
SLS 902 Code of practice for canning of fish
SLS 904 Vocabulary for sensory analysis of food
SLS 1484 Sensory analysis of food
Part 1 : Method of investigating sensitivity of taste
Part 2 : Method of initiation and training of assessors in the detection and recognition of odours
Part 3 : General guidelines for the selection, training and monitoring of selected assessors and expert sensory assessors
Part 4 : General guidelines for the design of test rooms
CAC/GL 31- 1999 Codex Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories
Official Methods of Analysis of the Association of official Analytical Chemists (AOAC), 18th Edition, 2nd Revision 2007

3 DEFINITIONS

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

3.1 canned fish : The product obtained from edible whole fish or cuts of edible fish, packed in a suitable packing medium in hermetically sealed containers and shall have received a processing treatment sufficient to ensure commercial sterility.

3.2 container : Rigid container made of tinplate or glass or semi-rigid container including retort pouches made of food grade material or laminates and is capable of being hermetically sealed.

3.3 count : The number of units of fish or cuts of fish present in the container.

3.4 cross filling : The packing of units of fish in positions, divergent in direction from that of the general direction of the units in the container.

3.5 drained mass : The mass of the contents of the container after filtering through a test sieve of aperture size 2.0-mm.

3.6 hermetically sealed containers : Containers that are designed to protect the contents against the entry of microorganisms and air (during and after heat processing) and prevents leakage of the contents.

3.7 net mass : The gross mass of the unopened container less the mass of the empty container.

3.8 packing medium : A medium in which solid fish pieces are packed in a container.

3.9 washed drained mass : The mass of the contents of the container after washing and filtering through a test sieve of aperture size 2.8-mm.

4 INGREDIENTS

All ingredients used shall comply with the requirements of the Food Act No. 26 of 1980 and the regulations framed thereunder. In addition, ingredients used shall not contain any substance in amounts that may present a hazard to human health.

4.1 Basic ingredients

4.1.1 *Fish*

4.1.1.1 Fish used in the preparation of the product shall be wholesome, clean, sound, of good quality and shall not show any signs of decomposition or contamination. Fish shall be either fresh or frozen and suitable for human consumption.

4.1.1.2 Fish shall be acceptably descaled unless the product is described as “scales on”. Hard scales that can hurt the palate shall be removed.

4.1.1.3 The heads, tails and fins of all fish shall be removed unless the fish is packed as whole units or the manner of presentation is appropriately described on the label.

4.1.1.4 The viscera (except for roes), kidney and extremity of the anal canal, shall be removed.

4.1.1.5 Large bones and backbones that can hurt the palate shall be removed unless, it is the backbone of larger species presented as cross-cut sections or fish bones are softened during heat processing or in low acid preservation to such an extent that there is no risk of injury to the consumer.

4.1.2 *Potable water,* conforming to **SLS 614**

4.2 Optional ingredients

In addition to the ingredients given in **4.1**, one or more of the following may be used:

4.2.1 *Packing oils*

Edible cooking/vegetable oils that shall not affect the product quality and refined fish oil may be used. The oils shall be edible, clear, refined, deodourized and free from rancidity, off-odour and off-flavour and, where applicable, shall comply with the relevant Sri Lanka standards.

4.2.2 *Brine*
Salt added or used in the preparation of brine shall comply with **SLS 79.**

4.2.3 *Tomato paste/sauce*

4.2.4 *Other sauces*

4.2.5 *Spices and/or Seasonings*

4.2.6 *Vinegar*

4.2.7 *Vegetables*

4.2.8 *Natural flavours*

Spice oils
Spice extracts
Smoke flavours (Natural smoke solutions and extracts)
} Limited by GMP

5 REQUIREMENTS

5.1 Hygiene

The product shall be prepared, processed, packaged, stored, transported and distributed under hygienic conditions as prescribed in **SLS 143**, **SLS 873** and **SLS 902**.

5.2 Can defects

The can shall not show any sign of swelling, denting, seam defects, corrosion or other deformations when observed externally. Insignificant corrosion and deformation due to bad handling shall not be considered as visual defects.

5.3 Negative air pressure inside the containers

The can shall give a negative air pressure when punctured. If round cans are used, the vacuum shall be not less than 100 mm of Hg (13.33 kPa), when measured at 27 °C ± 2 °C with a vacuum gauge of the piercing type or an electric vacuum recorder.

5.4 Compliance with type description and sensory requirements

5.4.1 Only fish of one species shall be packaged under the same batch code and sub code where applicable. A guideline of fish species which may be canned under different product types are given in Clause **6** (see **8.2.6**). Units of fish in any one container shall be practicably uniform in size, appearance and form. When it is necessary to adjust the fill of the container, a smaller unit of fish may be added. The manner of packing or the cut packed shall be in accordance with the final product description on the label. In packs other than plain packs, the fish may be pre-cooked and exuded liquids shall be drained before the addition of the packing medium. The product shall be free from units of mushy and brittle texture indicating poor quality.

5.4.2 Where fish is packed as fillets, the fillets shall be practicably uniform in size. An additional small piece may be included for weight adjustment.

5.4.3 The presentation of the final product and its appearance shall comply with the description of the product on the label. The appearance, colour, texture, odour and flavour shall be indicative and characteristic of fresh raw material used. The flesh colour shall be free from discolouration indicating excessive lipid oxidation or other chemical or biochemical reaction. The product shall be acceptably free from skin damage and excessive blemishes in the flesh. Flesh texture shall not be excessively soft, mushy, tough or rubbery.

The product shall be assessed for sensory requirements by a screened and trained sensory panel in such examination and in accordance with Appendix **B**.

5.5 Freedom from defects

Canned fish shall be free from defects indicating poor processing practices such as, but not limited to, viscera, head parts or tails unless the presentation matches the description on the label of the final product. Canned fish shall be free from unsightly deposits of exuded fish protein curd, loose scales, scuta, fibre, sand, grit, viscera or spilled feed and other extraneous matter. Any residual scales shall be soft.

5.6 Objectionable matter

The product shall be free from foreign materials, filth and grittiness. The product shall also be free from sulphide staining and presence of “Struvite crystals” (any struvite crystal greater than 5 mm in length).

5.7 Disintegrated units

The contents of the can on opening shall not display any appreciable disintegration. Fish units from which portions have separated out would be treated as disintegrated fish units. The percentage of disintegration calculated on the basis of the drained mass when tested in accordance with Appendix **F,** shall not exceed 5 per cent by mass based on the average of 5 cans.

5.8 Packing medium requirements

The product may be packed in its own juice, potable water, brine, vegetable broth, a sauce, fish oil, vegetable oil, or with vegetable oil added, or other suitable medium. The packing medium shall be free from unsightly deposits of exuded proteins and fish matter indicating decomposed fish or presence of viscera or of excessive fish blood in the raw material. Vegetables may be used in the preparation of the sauce. Where the product is in a broth, or a thick or rich sauce, the character of the packing medium after equilibrium has been reached, shall be in accordance with the claim made on the label.

Where edible oil is declared as the sole packing medium, the presence of other liquids shall not be in excess of 40 per cent, when determined in accordance with Appendix **C**.

5.9 Packing appearance and colour

The product in its container shall comprise of fish of appearance and colour characteristic of the species processed and packed in the manner indicated. The final product shall have a texture characteristic of the species, the type of product and the process used.
The interior surface of the can shall not show any signs of deterioration.

5.10 Fish packed in sauce

The product shall be fully or partially covered with sauce upon opening of the can and the product shall comply with the final product description on the label. The presence of natural fish oils in the sauce is acceptable but there shall not be excessive separation of water from the sauce. Fish units shall be of uniform size and there shall not be excessive disintegration of flesh and bellies indicative of low quality raw material or bad manufacturing practices.

5.11 Fish packed in brine/salt added

5.11.1 The percentage of sodium chloride in the final product shall be not more than 2.5 per cent by mass, when tested according to the method given in Appendix **D**.

5.11.2 The acidity, as citric acid anhydrous shall be not more than 0.5 per cent by mass, when tested according to the method given in Appendix **E**.

5.12 Decomposition

The product shall not contain more than 10 mg/100 g of histamine, when tested in accordance with the **AOAC** method **977.13.**

5.13 Drained mass

5.13.1 The drained mass of the contents of each can (except products packed in sauces) shall be not less than 65 per cent by mass of the water capacity of the can, when tested in accordance with the method given in Appendix **F.**

5.13.2 When product is packed in sauces the drained mass shall be not less than 60 per cent by mass of the water capacity of the can, when tested in accordance with the method given in Appendix **F.**

5.14 Commercial sterility

The product shall satisfy the test for commercial sterility, when tested in accordance with the method given in **Part 10** of **SLS 516**.

5.15 Heavy metals

The product shall not exceed the limits given in Table **1**, when tested in accordance with the methods given in Column 4 of the Table.

TABLE 1 – Limits for heavy metals

SI No. (1)	Heavy metal (2)	Limit Maximum (mg/kg) (3)	Methods of test (AOAC* method) (4)
i)	Arsenic (as As)	1.0	986.15
ii)	Lead (as Pb)	1.0	999.11
iii)	Cadmium (as Cd)	1.0	999.11
iv)	Mercury (as Hg)	0.5	977.15
v)	Tin (as Sn)		
	For products in tinplate containers	250.0	985.16
	For products in other containers	50.0	

**Official Methods of Analysis of the Association of official Analytical Chemists.*

6 TYPE SPECIFIC REQUIREMENTS

In addition to the requirements given in Clause **5,** the following requirements shall also apply:

6.1 Canned Sardines and Sardine – type products

6.1.1 Canned Sardines or Sardine type products shall be prepared from fish of the following species:

Sardina pilchardus
Sardinops melanostictus,S. neopilchardus, S. ocellatus, S. sagax, S. caeryleus
Sardinella aurita, S. brasiliensis, S. maderensis, S. longiceps, S. gibbosa, S. albella, S. fimbriata
Clupea harengus
Clupea bentincki
Sprattus sprattus
Hyperlophus vittatus
Nematalosa vlaminghi
Etrumeus teres
Ethmidium maculatum
Engraulis anchoita, E. mordax, E. ringens
Opisthonema oglinum
Amblygaster sirm
Hilsa kelee

6.1.2 Head and gills shall be completely removed, scales and /or tail may be removed. The fish may be eviscerated. If eviscerated, it shall be practically free from visceral parts other than roe, milt or kidney. If ungutted, it shall be practically free from undigested feed or used feed.

6.2 Canned Mackerel and Jack Mackerel products

6.2.1 Canned Mackerel and Jack Mackerel products shall be prepared from fish of the following species:

Species of *Scomber*	Mackerel
Species of *Rastrelliger*	Mackerel
Species of *Trachurus*	Jack Mackerel
Species of *Decapterus*	Jack Mackerel

6.2.2 The product shall be prepared from Mackerel or Jack mackerel fish from which the heads, tails and viscera have been removed.

6.3 Canned Tuna and Bonito

6.3.1 Canned Tuna and Bonito shall be prepared from fish of the following species:

Tuna

-Species of the genus *Thunnus*

Thunnus alalunga (Albacore or long-finned tuna)
Thunnus albacares (Yellowfin tuna)
Thunnus obesus (Bigeye tuna)
Thunnus thynnus (Bluefin tuna)
Other species of the genus *Thunnus.*
Euthynnus (Katsuwonus) pelamis (Skipjack or stripe-bellied tuna)

Bonito

-Species of the genus *Sarda*

Sarda sarda (Atlantic bonito)
Sarda chiliensis (Pacific bonito)
Sarda orientalis (Oriental bonito)
Other species of the genus *Sarda.*

-Species of the genus *Euthynnus*, with the exception of the species *Euthynnus (Katsuwonus) pelamis*

Euthynnus alleteratus (Atlantic little tuna)
Euthynnus affinis (Eastern little tuna)
Euthynnus lineatus (Black skipjack)
Other species of the genus *Euthynnus.*

-Species of the genus *Auxis*

Auxis thazard (Frigate tuna)
Auxis rochei

6.3.2 The product shall be presented as :

6.3.2.1 Solid (skin-on or skinless) : Fish cut into transverse segments which are placed in the can with the planes of their transverse cut ends parallel to the ends of the can. The proportion of free flakes or chunks shall not exceed 18 per cent of the drained mass of the container, when determined in accordance with the method described in Appendix **G**.

6.3.2.2 Chunk : Pieces of fish most of which have dimensions of not less than 1.2 cm in each direction and in which the original muscle structure is retained. The proportion of pieces of flesh of which the dimensions are less than 1.2 cm shall not exceed 30 per cent of the drained mass of the container, when determined in accordance with the method described in Appendix **G**.

6.3.2.3 Flake or flakes **:** A mixture of particles and pieces of fish most of which have dimensions less than 1.2 cm in each direction but in which the muscular structure of the flesh is retained. The proportion of pieces of flesh of which the dimensions are less than 1.2 cm shall exceed 30 per cent of the drained mass of the container, when determined in accordance with the method described in Appendix **G**.

6.3.2.4 Grated or shredded : A mixture of particles of fish that have been reduced to a uniform size, in which particles are discrete and do not comprise a paste.

6.3.2.5 Other presentations **:** Any other presentation shall be permitted provided that it is sufficiently distinctive from the forms of presentation described in **6.3.2.1** to **6.3.2.4**, meets all other requirements of this standard and is adequately described on the label to avoid confusing or misleading the consumer.

6.3.3 *Colour of white or light meat tuna*

The colour in each pack shall conform to its description on the label and shall be reasonably uniform. There shall be no dark meat and the final product shall be free from discoloured muscle due to bruising, blood or lipid oxidation. The flesh of different species of tuna shall not be packed together. Discolouration due to lipid oxidation, sugar caramelization or persistent flushed pink, orange or green colours in the flesh shall not exceed 5 per cent of the drained contents.

6.3.4 *Dark meat tuna or dark tuna*

Canned tuna that does not meet the colour requirements of light meat tuna or that is packed by using dark meats, shall be described as dark meat tuna or dark tuna.

NOTE : *Colour of tuna is usually determined subjectively by trained and experienced inspectors.*

6.4 Canned Salmon

6.4.1 Canned Salmon shall be prepared from fish of the following species:

Salmo salar (Atlantic salmon, salmon)
Oncorhynchus nerka (Sockeye salmon, red sockeye salmon, red salmon)
Oncorhynchus kisutch (Coho salmon, silver salmon, medium red coho salmon)
Oncorhynchus tschawytscha (Chinook salmon, spring salmon, king salmon)
Oncorhynchus gorbuscha (Pink salmon, humpback salmon)
Oncorhynchus keta (Chum salmon, keta salmon, dog salmon)
Oncorhynchus masou (Cherry salmon, Japanese or Masou salmon)

6.4.2 Canned Salmon shall consist of sections which are cut transversely from the fish and which are filled vertically into the can. The sections shall be packed so that the cut surfaces are approximately parallel with the ends of the container.

6.4.3 Any other presentation may be permitted provided that it is sufficiently distinctive from the form of presentation in **6.4.2** and is adequately described on the label to avoid confusing or misleading the consumer.

7 PACKAGING

7.1 The product shall be packed in hermetically sealed suitable food grade containers free from rust. If the cans are lacquered, the lacquer used shall be non-toxic and shall be of such quality that it does not impart any discolouration, foreign taste and smell to the contents of the cans and does not peel off during processing and storage of the product. The lacquer shall not be soluble in the packing medium.

7.2 Packages in which containers are packed shall be clean, neat and undamaged. Outer packages such as boxes or cases shall be suitable for the purpose of use, be of correct size to avoid damaging of containers by squeezing or loose movement of the containers inside the outer container. Containers shall not be packed in outer containers in positions prone to cause damaging such as packing containers on their sides.

7.3 Outer packages shall be strong enough to protect the finished final product during normal handling and transport.

7.4 Materials such as adhesives or glues used for attaching or applying labels, outer wrappers or outer cartons or closing of packages shall not be hygroscopic, or liable to deteriorate during storage after being applied or condusive to corrosion of the can or lid.

8 MARKING AND/OR LABELLING

The marking and/or labelling of the containers shall be done either by printing or lithographing on the containers themselves or attaching labels printed on paper.

The following shall be marked or labelled legibly and indelibly on each container:

8.1 General

8.1.1 Common name of the product as “Canned fish”. In addition, the common or usual name applied to the species of fish shall be given.

8.1.2 Any descriptive terms used including those denoting style of presentation, shall accurately reflect the contents of the container.

8.1.3 No fish, shall be labelled under a name or designation that is misleading or no descriptive terms or statements that are misleading or confusing the consumer shall be used.

8.1.4 The name of the final product shall be qualified by a term descriptive of the representation. A final product presented as solid pack or chunks or as flaked, grated, shredded, minced or similarly prepared, shall be described by the appropriate word(s) on the main panel of the label in letters of the same size and prominence as the name of the final product that shall include the name of the fish.

8.1.5 Pictorial presentations shall not be misleading or confusing to the consumer. Any fish, depicted on the container, label, outer wrapper or outer carton shall accurately reflect the type of fish, cut of fish, colour of fish of the final product in the container.

8.1.6 The name of the packing medium shall form part of the name of the product.
When packing medium contains more than 40 per cent exuded liquid it shall be labelled as ;"X (name of the final product) with oil added".
Where the final product is packed in oil, the name of the type of oil, of the term "Vegetable oil" appears in the name of the product, the specific type of vegetable oil shall be declared in the list of ingredients.

8.2 Type description of canned fish

8.2.1 *Trachurus spp.* and *Decapterus spp*. shall be described only as "Jack Mackerel".

8.2.2 *Scomber spp.* and *Rastrelliger spp*. shall be described only as "Mackerel".

8.2.3 Canned Sardines or Sardine type products.

a) " Sardines" exclusively reserved for *Sardina pilchardus* (Walbaum).

b) "X sardines" where "X" is the name of description of a country, the species, or the common name of the species in accordance with this standard and in a manner not confusing or misleading the consumer.

c) The description "Pilchards/Sardine" is exclusively reserved for the species *Sardinops ocellatus, S. melanostictus, S. neopilshardus, S. sagax, S. caeruleus and Sardina pilchardus.*

d) *Sardinella spp* shall be described as "Sardinella". The descriptive terms "Pilchards" shall not be used for packs consisting of *Sardinella spp.*

e) *Etrumeus spp.* shall be described as "X Herring" where "X" is the name or description of a country, a geographic area, the species, or the common name of the species in a manner not misleading or confusing the consumer.

f) *Engraulis spp.* shall be described as Anchovies.

8.2.4 Canned Tuna and Bonito (see 6.3).

a) The name of the final product as declared on the label shall be "Tuna" or "Bonito" and may be preceded or followed by the common or usual name of the species in a manner not confusing or misleading the consumer.

b) The name of the final product labelled as "Tuna" shall be qualified or accompanied by a term descriptive of the representation in accordance with 8.1.4 and of

the colour of the final product provided that the term “white” shall be used only for *Thunnus alalunga (*see 6.3.3). A tuna product that corresponds to a colour designation as given in 6.3.4 shall be labelled as “dark”. Blends of tuna of different colour designation shall be specifically described in the label of the final product.

c) The name “Albacore” when used for the labelling of Tuna shall be reserved for the Tuna species *Thunnus alalunga* and shall be coupled with “Tuna” in letters of the same size and prominence.

d) Final products consisting of the flesh of *Sarda* spp. shall be labelled as “Bonito” and shall not be described as “Tuna” or any reference made to Tuna.

8.2.5 Canned Salmon with the provison that the qualifying names in brackets may only be used in conjunction with the corresponding species names as listed in **6.4**.

a) Tips, tails, minced and similar forms of canned Salmon shall be labelled to disclose their true nature, all words qualifying the word “Salmon” being in type of the same size and prominence as “Salmon”.

b) The species *Oncorhynchus gorbuscha* – (Pink Salmon, Humpback Salmon) is the only species that may be labelled as “Pink Salmon” .

c) The colour of the fish flesh depicted in the pictorial presentation shall be a true reflection of the fish flesh colour of the contents.

8.2.6 Any other suitable species, other than those specified in Clause **6** may be canned and shall be correctly identified by their common name and scientific name on the label.

8.3 Brand name or trade mark, if any ;
8.4 Net mass in ‘g’ or ‘kg’;
8.5 Drained mass in ‘g’ or ‘kg’ ;
8.6 Name and address of the manufacturer ;
8.7 Name and address of the packer or distributor in Sri Lanka ;
8.8 Batch or code number or a decipherable code marking;
8.9 Date of manufacture;
8.10 Date of expiry;
8.11 The date of manufacture, date of expiry and batch/code number shall be embossed or printed on the container/can.
8.12 List of ingredients;
A complete list of ingredients including the scientific name of the fish species shall be declared on the label in descending order of proportion.
8.13 Country of origin, in case of imported products;
8.14 Misaligned labels, excess glue or lack of glue, or loose or pleated labels or outer wrappers shall not be used. Labels or outer wrappers shall not be superimposed over other labels or over outer wrappers that have been affixed onto containers or onto lithographic printed containers.

NOTE: *When determining the conformity under Clause 8.4 and 8.5 guidance shall be obtained from "SLS 816 : Method for checking net contents of prepackaged goods".*

8.15 The marking and labelling 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 Part **10** of **SLS 516** ,Appendices **B** to **G** of this standard, Official Methods of Analysis of the Association of official Analytical Chemists (AOAC), 18th Edition, 2nd Revision 2007 and CAC/GL 31- 1999 Codex Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories.

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 From the sample of cans examined visually as in **A.4.1.**

a) No defective cans are found in the sample of 200 cans; or

b) One or two defective cans are found in the sample of 200 cans and 1 per cent or less defective cans are found in the lot on sorting.

NOTES:
1 *If more than one defective cans are found, the lot shall be subjected to initial sorting of any defective cans and then 100 per cent sorting and samples from each lot to be drawn for commercial sterility.*
2 If sorting reveals more than 1 per cent defective cans, the lot shall be rejected.

11.2 Each can tested for commercial sterility as in **A.4.2.1. or A.4.2.2,** as the case may be, satisfies the relevant requirements.

11.3 Each can examined as in **A.4.3.1** satisfies the marking and labelling requirements.

11.4 Each can tested as in **A.4.3.2** satisfies the requirements given in **5.3** to **5.10**, **5.12** and **5.13**.

11.5 The test results on the composite sample tested as in **A.4.3.3** satisfies the requirements given in **5.11.1**, **5.11.2** and **5.15**.

11.6 Sensory characteristics conforms to the requirement given in Appendix **B**.

APPENDIX A
SAMPLING

A.1 Lot

In a single consignment, all the packages/cartons containing product of the same type, size and from the same batch of manufacture, shall constitute a lot. If the consignment consists of packages/cartons containing product of different types, sizes or batch of manufacture, then the packages/cartons of the same type, size and batch of the manufacture shall be grouped together, and each sub group shall constitute a separate lot.

A.2 Defective can

A can failing to satisfy any one or more of the requirements inspected visually.

A.3 Scale of sampling

A.3.1 For ascertaining the conformity of the lot to the requirements prescribed in this standard, tests shall be carried out on each lot separately.

A.3.2 The number of cartons to be selected from a lot shall be in accordance with Column **2** of Table **2**.

TABLE 2 – Scale of sampling

No. of cartons in the lot	**No. of cartons to be selected**	**No. of cans in the sub-sample**
(1)	**(2)**	**(3)**
Up to 50	10	05
51 to 150	15	08
151 to 1 000	20	15
1 001 and above	30	20

NOTE: *When the net mass of the can is 800 g or more, the number of cans to be selected shall be as decided by the competent authority.*

A.3.3 An equal number of cans shall be drawn from each carton selected as in **A.3.2** to form a sample of 200 cans. If the number of cartons in the lot is not sufficient to yield 200 cans, all the cans in the lot shall be drawn.

A.3.4 The cartons and cans shall be selected at random. In order to ensure randomness of selection, random number tables given in **SLS 428** shall be used.

A.4 Number of tests

A.4.1 All the cans in the sample selected as in **A.3.3** shall be examined (before opening) visually for the requirements given in **5.2.**

A.4.2 After visual examination of the sample, testing for commercial sterility (see **5.14**) shall be carried out according to **A.4.2.1** or **A.4.2.2** as the case may be.

A.4.2.1 If no defective cans are found on visual examination (**A.4.1**), eight cans shall be drawn randomly from the sample and tested for commercial sterility.

A.4.2.2 If one or two defective cans are found on visual examination (**A.4.1**), the whole lot shall be sorted for removal of defective cans. If sorting reveals 1 per cent or less defective cans, 20 of sorted sound cans shall be drawn from the lot and tested for commercial sterility.

A.4.3 The lot having been found satisfactory according to **A.4.1** and **A.4.2** shall be subjected to the other requirements of this standard. For this purpose, a sub-sample of sound cans of size as given in Column **3** of Table **2** shall be drawn from the sample selected as in **A.3.3.**

A.4.3.1 Each can in the sub-sample shall be examined for packaging, labelling and/or marking requirements.

A.4.3.2 Tests for requirements specified in **5.3** to **5.10**, **5.12** and **5.13** shall be carried out on each of the cans of the sub-sample.

A.4.3.3 After testing as in **A.4.3.2,** contents of all the cans shall be taken out and mixed together to form a composite sample. The composite sample so formed shall be tested for the requirements given in **5.11.1, 5.11.2** and **5.15.**

APPENDIX B
SENSORY AND PHYSICAL EXAMINATION

B.1 Complete external can examination for the presence of container integrity defects or can ends which may be distorted outwards.

B.2 Open can and complete weight determination according to defined procedures in Appendix **F**.

B.3 Carefully remove the product and examine for discolouration, foreign matter and struvite crystals. The presence of a hard bone is an indicator of under processing and will require an evaluation for sterility.

B.4 Assess the product for sensory quality requirements as given in Annex **I** and / or assess odour, flavour and texture in accordance with the "Codex Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31-1999)".

APPENDIX C
DETERMINATION OF PERCENTAGE EXUDED LIQUID IN AN OIL PACKING MEDIUM

C.1 PROCEDURE

Drain the entire liquid packing medium from the container and collect by means of a funnel directly into a graduated volumetric measuring glass cylinder of a suitable size. Record the total volume (V) in ml. After the oil has been separated, record the volume (V_1) in ml of the exuded watery liquid.

C.2 CALCULATION

$$Exuded\ \ liquid\ ,\ \ percentage\ \ = \ \ \frac{V_1}{V} \times 100$$

where,
V_1 is the volume of the exuded liquid, in ml ; and
V is the total volume of packing medium, in ml.

NOTE : *The average exuded liquid in a number of containers of the same batch code can be obtained by collecting the entire packing medium of all the samples examined into a glass measuring cylinder and proceed as above.*

APPENDIX D
DETERMINATION OF SODIUM CHLORIDE IN BRINE /SALT ADDED

D.1 REAGENTS

D.1.1 *Standard Silver Nitrate solution,* 0.1 N, standardized against 0.1 N sodium chloride solution

D.1.2 *Dilute Nitric Acid* , (1:4), freed from lower oxides of nitrogen by boiling till colourless

D.1.3 *Ferric Alum Indicator solution,* a saturated solution of ferric alum [$FeNH_4(SO_4)_2.12H_2O$]

D.1.4 *Standard Ammonium Thiocyanate solution,* 0.1 N

D.2 PROCEDURE

D.2.1 Preparation of solution

Wash the emptied can (see **F.2.1.2**) thoroughly with water and wash the residue on the sieve at least thrice with cold water. Collect the drained liquid and all the washings together in a 1000 ml graduated flask and make up the volume. Centrifuge the made-up liquid for at least 5 min at 1000 rev/min.

D.2.2 Take a suitable aliquot of the clear supernatant solution prepared as in **D.2.1**, add a known volume of the standard silver nitrate solution in slight excess and then add 20 ml of dilute nitric acid. Boil gently on a hotplate or a sand-bath until all solids except silver chloride dissolve (usually 15 min). Cool, add 50 ml of water and 5 ml of the ferric alum indicator solution and titrate with the standard ammonium thiocyanate solution until permanent light brown colour appears.

D.3 CALCULATION

$$\textit{Sodium chloride in brine, per cent by mass} = \frac{5.85\ (V_1\ N_1 - V_2\ N_2)}{M}$$

where,
V_1 is the volume, in ml, of the standard silver nitrate solution added;
N_1 is the normality of the standard silver nitrate solution;
V_2 is the volume, in ml, of the standard ammonium thiocyanate solution used;
N_2 is the normality of the standard ammonium thiocyanate used; and
M is the mass, in g, of the brine in the aliquot.

NOTE: *The total mass of brine is obtained by finding the difference between the net mass and the drained mass of the contents of the can.*

APPENDIX E
DETERMINATION OF ACIDITY (AS CITRIC ACID) IN BRINE /SALT ADDED

E.1 REAGENTS

E.1.1 *Standard Sodium Hydroxide solution*, 0.1 N

E.1.2 *Phenolphthalein indicator solution*
Dissolve one gram of phenolphthalein in 100 ml of 95 per cent (*v/v*) alcohol.

E.2 PROCEDURE

E.2.1 Take a suitable aliquot of the brine solution (see **D.2.1**), add about 200 ml of water and titrate against the standard sodium hydroxide solution using phenolphthalein indicator solution. Calculate the percentage acidity of the brine in terms of citric acid from the relationship: 1 ml of 0.1N sodium hydroxide solution is equivalent to 0.0064 g of citric acid (anhydrous).

APPENDIX F
DETERMINATION OF DRAINED MASS AND WASHED DRAINED MASS

F.1 APPARATUS

F.1.1 Sieve of aperture size 2.0 mm, conforming to **SLS 124,** for drained mass

F.1.2 Sieve of aperture size 2.8 mm, conforming to **SLS 124,** for washed drained mass

F.2 PROCEDURE

F.2.1 Drained mass for packs in own juice, brine/salt added, water or oil

F.2.1.1 Weigh the unopened containers that have been kept at a temperature between 20 °C to 30 °C for a minimum of 12 hours prior to examination.

F.2.1.2 After opening, tilt the containers so as to distribute the contents over the meshes of the tared (pre-weighed) circular sieve (**F.1.1**). Incline the sieve at an angle of approximately 17° – 20° and allow the product to drain for two minutes, measured from the time the product is poured into the sieve.

NOTE: *Collect the drained liquid for determination of sodium chloride in brine (see* D.2*)*

F.2.1.3 Remove adhering liquids from the bottom of the sieve by use of a paper towel. Weigh the sieve containing the drained fish.

F.2.2 Washed drained mass for packs with sauces, also with optional ingredients

F.2.2.1 Weigh the unopened containers that have been kept at a temperature between 20 °C to 24 °C for a minimum of 12 hours prior to examination.

F.2.2.2 After opening, tilt the container and wash the covering sauce first and then the full contents with hot tap water (approx. 40°C) using a wash bottle on the tared circular sieve **(F.1.2)**.

F.2.2.3 Wash the contents of the sieve with hot water until free of adhering sauce; where necessary separate optional ingredients (spices, vegetables, fruits, etc.) with pincers. Incline the sieve at an angle of approximately 17° to 20° and allow the contents to drain for two minutes, measured from the time the washing procedure has finished.

F.2.2.4 Remove adhering water from the bottom of the sieve by use of a paper towel. Weigh the sieve containing the washed drained fish.

F.2.3 Determination of water capacity of container

F.2.3.1 Select a container which is undamaged in all respects.

F.2.3.2 Wash, dry and weigh the empty container after cutting out the lid without removing or altering the height of the double seam.

F.2.3.3 Fill the container with distilled water at 20 °C to 5 mm vertical distance below the top level of the container, and weigh the container thus filled.

F.2.3.4 Substract the mass found in **F.2.3.2** from the mass found in **F.2.3.3**. The difference shall be considered to be the weight of water required to fill the container.

F.3 CALCULATION

$$\textit{Drained or washed drained mass, per cent by mass} = \frac{m_2 - m_1}{m_w} \times 100$$

where,
m_1 is the mass of the sieve;
m_2 is the mass of the sieve plus drained or washed drained product, and
m_w is the water capacity of the container.

APPENDIX G
DETERMINATION OF PRESENTATION

G.1 The presentation of sample units shall be determined by the following procedure:

G.1.1 Open the can and drain the contents, following the procedures given in Appendix **F**.

G.1.2 Remove and place the contents onto a tared 1.2 cm mesh screen equipped with a collecting pan.

G.1.3 Separate the fish with a spatula and care shall be taken so that the configuration of the pieces is not affected. Ensure that the smaller pieces of fish are moved to the top of a mesh opening to allow them to fall through the screen onto the collecting pan.

G.1.4 Segregate the material on the pan according to flaked, grated (shredded) or paste and weigh the individual portions to establish the mass of each component.

G.1.5 If declared as a "chunk" pack, weigh the screen with the fish retained and record the mass. Subtract the mass of the sieve from this mass to establish the mass of solid and chunk fish.

G.1.6 If declared as "solid" pack, remove any small pieces (chunks) from the screen and reweigh. Subtract the mass of the sieve from this mass to establish the mass of 'solid" fish.

G.2 CALCULATIONS

G.2.1 $$Flakes,\ per\ cent\ by\ mass = \frac{Mass\ of\ flakes}{Total\ mass\ of\ drained\ fish} \times 100$$

G.2.2 $$Solid\ and\ chunk\ fish,\ per\ cent\ by\ mass = \frac{Mass\ of\ solid\ and\ chunk\ fish}{Total\ mass\ of\ drained\ fish} \times 100$$

G.2.3 $$Solid\ fish,\ per\ cent\ by\ mass = \frac{Mass\ of\ solid\ fish}{Total\ mass\ of\ drained\ fish} \times 100$$

ANNEX I
(informative)

EVALUATION OF SENSORY QUALITY CHARACTERISTICS

I.1 GENERAL

The basic purpose of this evaluation is to ensure a certain degree of consumer acceptability and satisfaction in respect of sensory quality of the product while conforming to other physico-chemical requirements stipulated in this standard. It is necessary that the system of evaluation adopted provides the basis for a sound acceptance/rejection criteria in respect of the sensory qualities.

This annex is intended to provide detailed guidelines for such a system to meet the above objectives. For the purpose of sensory evaluation, the definitions given in **SLS 904** should be used.

The Assessors should be selected after screening tests. It is important that the selected assessors undergo familiarization training on evaluation of canned fish in accordance with this scheme. During the familiarization training it is necessary that the assessors identify and differentiate each sensory attribute and use the appropriate description provided in these guidelines, when scoring. It is also necessary that the assessors are exposed to a wide range of qualities of canned fish so that they are familiar with full range of the scales for different sensory attributes.

It is recommended that decision for acceptance/rejection be based on the assessment of at least three (03) Assessors.

I.2 OUTLINE OF THE PROCEDURE

I.2.1 Each can is assessed for different sensory attributes (appearance, odour, flavour, texture) using the scoring system provided in **I.5**.

I.2.2 A weighted score for the overall sensory quality is then calculated for each can with maximum score of 20.

I.2.3 The average weighted score for each can is calculated based on the scores given by the Assessors. Each can is attributed as non-defective/defective based on this score.

I.2.4 Decision on rejection or acceptance of the sample is taken based on the number of defective/non-defective units in the sample.

I.3 GENERAL TEST CONDITIONS

I.3.1 Test rooms

The test should be carried out in rooms according to **SLS 1484** Part **4**.

I.3.2 Assessors

The Assessors should be selected, trained and monitored according to the **SLS 1484** Part **3**. The assessors should be familiar with the product and trained prior to the test, to evaluate canned fish according to these guidelines. Methodology for sensory analysis are given in **SLS 1484** Part **1** and Part **2.**

I.4 PROCEDURE

I.4.1 *Materials required*

I.4.1.1 Can opener

I.4.1.2 White plates (diameter of about 24 cm)

I.4.1.3 Stainless steel spoons

I.4.1.4 Disposable envelopes

I.4.1.5 Score sheet

I.4.2 *Preparation of sample*

I.4.2.1 Code number each can in the sample.

I.4.2.2 Arrange the cans with the code numbers leaving sufficient space in between. White plates with respective code numbers shall be placed parallel to each can.

I.4.2.3 Open the cans using a can opener, transfer the contents with the liquid carefully into the coded plates. Care shall be taken when transferring the contents, so that the fish units will not be disintegrated. Carefully spread the fish units without damaging. A spoon should be provided for each plate.

I.4.3 *Evaluation of sample*

I.4.3.1 Each can should be evaluated for the following sensory attributes in the order indicated using the scales, given in **I. 5**.

a) Appearance (overall colour, physical defects)
b) Odour

c) Flavour (combination of taste and odour)
d) Texture

Each assessor should independently assign points for each sensory attribute using a scale of 0 to 5.

I.4.3.2 When assessing for appearance, observations on style of presentation, form of pack, uniformity in size and packing media should be made.

I.4.3.3 When assessing for odour the following points should be taken into consideration.

a) Evaluate the odour within 1 to 5 minutes after opening the can.
b) Both the packing media and fish units should be taken into consideration.
c) From each can select fish units in the ratio of 1:3. Take pieces from these selected fish units and using your fingers gently crush and smell the fish. Report the score based on the overall assessment.
d) If fish units tested are found to have an objectionable odour, test the other units also for the overall assessment.

I.4.3.4 When assessing for flavour, the following points shall be taken into consideration.

a) The flavour is the total perception of both taste and odour when the food is in the mouth.
b) From each can select fish units in the ratio of 1 : 3.
c) Take a representative portion of the fish into your mouth, bite well and assess its flavour. Report the score based on the overall assessment.

I.4.3.5 When assessing for texture, the following points should be taken into consideration.

a) From each can select fish units in the ratio of 1 : 3.
b) Take fish unit on to a separate plate. Hold the ventral side upward and using the spoon separate the fish unit into two fillets. Observe the texture as it appears.
c) Break a piece from one fillet, and using your fingers gently press and feel for its texture. Observe the texture by crushing.
d) Look for any bones present in the unit, press them and feel for the texture.
e) Report the score based on the overall assessment.
f) If fish units tested are found to have an objectionable textures test the other units also for the overall assessment.

I.5 SCALES FOR ASSESSMENT

I-5.1 *Appearance*

The overall colour, characteristic shape of the fish and defects should be considered, Physical defects includes the presence of scales, hard scutes, hard bones, bruises, broken and cracked fish, parts of head, fins, viscera, pieces of detached or loose skin, foreign material.

Description	Score
Characteristic metallic grey or silvery grey colour of fish skin (bruised skin may be present to a reasonable extent). Free from scales, hard scutes, hard bones, broken and cracked fish, parts of head, fins, viscera, pieces of detached or loose skin, foreign material, different fish types and parasites.	5
Practically free* from scales, hard scutes, bones, broken and cracked fish, parts of head, fins, viscera, pieces of detached or loose skin, foreign material, different fish types and parasites.	4
Lack of characteristic metallic grey or silvery grey colour of fish skin. Lack of characteristic shape of the fish. Reasonable amount ** of scales, hard scutes, bones, broken and cracked fish, parts of head, fins, viscera, pieces of detached or loose skin, parasites, foreign material.	3
Considerable amount *** of scales, hard scutes, bones, broken and cracked fish, parts of head, fins, viscera, pieces of detached or loose skin, parasites, foreign material.	2 ↕ 1
Severe discolouration, skin colour faded to dull, excessive amount of scales, hard scutes, bones, bruises, broken and cracked fish, parts of head, fins, viscera, pieces of detached or loose skin, foreign material.	0

NOTE:

* *Present in negligible amounts which may not be noticed by average consumer.It may contain 01 parasite.*

** *May be noticeable but not offensive to the majority of consumers. It may contain 02 parasites.*

*** *Present to an extent which will be offensive to the majority of consumers. It may contain 03 or more parasites.*

I.5.2 *Odour*

The overall packing media and fish units should be considered.

Description	Score
Fresh, mild, characteristic smell of good quality canned fish. Desirable, appetizing odours.	5
Slightly pronounced or strong smell of canned fish. Generally less appetizing.	4
Lack of canned fish smell or slight* acidic and/or other off odours, or slight scorched or carmelized odours.	3
Slight** but objectionable odours ie. metallic, rancid, putrid, ammoniacal, sulfide, musty or any other foreign odours.	2 ↕ 1
Distinct, objectionable odours, metallic, rancid, putrid, very strong dried fish odours.	0

NOTE:
* *May not be noticed by majority of consumers, even if noticed may not be offensive.*
** *Noticeable and may offend the consumer.*

I.5.3 *Flavour*

Description	Score
Fresh characteristic flavour of good quality canned fish which are desirable.	5
Definite loss of flavour but not off flavours	4
Absolutely no flavour or slight* off flavours, metallic, acidic, woody, grassy flavours, typical burnt flavours.	3
Objectionable metallic, rusty, rancid, bitter or rubber-like flavours or slight putrid and sulfide flavours or distinct foreign flavours.	2 ↕ 1
Inedible	0

NOTE:
* *Not offensive to the majority of consumers.*

I.5.4 *Texture*

Description	Score
Flesh well-bound, intact, firm. Free from mushiness. Bones are soft and yielding.	5
Lack of firmness in the flesh. Bones are not too soft and yielding.	4
Flesh, loosely bound, slightly* soft and mushy, Hard bones (not easily friable using thumb and forefinger).	3
Flesh crumbly,pasty or pulpy**	2 ↕ 1
Excessively mushy, crumbly, pulpy	0

NOTE:
* *Not offensive to the majority of consumers.*
** *To an extent that it is offensive to the consumer.*

I.6 CALCULATION AND INTERPRETATION OF RESULTS

I.6.1 Calculate the weighted sensory scores and total weighted score, using the raw scores assigned by each Assessor, for each can as indicated in Table **3**.

TABLE 3 – Calculation of the weighted score and total weighted score for different sensory attribute

SI No. (1)	Characteristic (2)	Raw score assigned on a scale of 0-5 (3)	Weighted score obtained (4)
i)	Appearance	A	A x 0.8
ii)	Odour	B	B x 1.2
iii)	Flavour	C	C x 1.2
iv)	Texture	D	D x 0.8
Total weighted sensory score			(A x 0.8) + (B x 1.2)+ (C x 1.2) + (D x 0.8)

I.6.2 Using the total weighted scores (S_1, S_2, S_3, etc.), calculate the average weighted sensory score ($\bar{S}$), for each can.

I.6.3 Attribute each can as non-defective or defective based on the average weighted sensory score ($\bar{s}$).

where,

$\bar{s} \geq 12 \longrightarrow$ non-defective

$\bar{s} < 12 \longrightarrow$ defective

Report the total number of non-defective and defective cans in the sample.

I.6.4 Accept or reject the sample of cans based on the acceptance numbers specified in the sampling plan given in Table **4**.

I.7 SCALE OF SAMPLING AND CRITERIA

I.7.1 Number of cans to be selected from a lot should be in accordance with Table **4**.

Table 4 – Acceptance and rejection limits

Number of cartons in the lot (1)	Number of cans to be selected (2)	Cumulative sample size (3)	Acceptance number (4)	Rejection number (5)
Up to 50	1st stage sample 5	5	0	2
	2nd stage sample 5	10	1	2
51 to 150	1st stage sample 8	8	0	3
	2nd stage sample 8	16	3	4
151 to 1000	1st stage sample 15	15	0	4
	2nd stage sample 25	40	4	5
1001 and above	1st stage sample 20	20	1	5
	2nd stage sample 40	60	6	7

I.7.2 A sample of cans as given in 1st stage sample of Column **2** of Table **4** should be selected randomly and are examined by assessors.

I.7.3 If the number of defective cans in 1st stage sample is between corresponding acceptance number and rejection number as given in Column 4 and Column 5, a sample of cans as given in 2nd stage sample of Column **2** of Table **4** should be selected and examined by Assessors.

I.7.4 A lot should be considered as conforming to the sensory characteristics if one of the following conditions are satisfied.

a) The number of defective cans in 1st stage sample when examined as in **I.7.2** is less than or equal to the corresponding acceptance number given in Column **4** of Table **4**; or

b) The number of defective cans in cumulative sample (number of defective cans in 1st stage sample and 2nd stage sample) is less than or equal to the corresponding acceptance number given in Column **4** of Table **4**.

Amendment No: 1 Approved on 2022-09-25 to SLS 591: 2014

AMENDMENT NO: 1 TO SLS 591: 2014
SRI LANKA STANDARD SPECIFICATION FOR CANNED FISH (FIRST REVISION)

EXPLANATORY NOTE

Canned fish samples found to have high total Arsenic values, which is the combination of both organic and inorganic arsenic forms. However, inorganic form is the more toxic form when compared to the organic form. Hence it was essential to include the maximum limit for inorganic arsenic in the standard.

Therefore, a decision was taken by the Sectoral committee on food products to replace the total Arsenic value by the inorganic Arsenic, considering its impact to health and safety of consumers.

Amendment No: 1 Approved on 2022-09-25 to SLS 591: 2014

AMENDMENT NO: 1 TO SLS 591: 2014
SRI LANKA STANDARD SPECIFICATION FOR CANNED FISH (FIRST REVISION)

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Replace Table **1** by following Table.

TABLE 1 Limits for heavy metals

SlNo (1)	**Heavy metal** (2)	**Limit** (3)	**Method of test** (4)
i)	Inorganic Arsenic (as As), mg/ kg	0.1	**BS EN 16802**
ii)	Lead (as Pb), mg/ kg	1.0	**AOAC 999.11/ AOAC 2013.06**
iii)	Cadmium (as Cd), mg/ kg	1.0	**AOAC 999.11/ AOAC 2013.06**
iv)	Mercury (as Hg), mg/ kg	0.5	**AOAC 977.15/ AOAC2013.06**
v)	Tin (as Sn), mg/ kg For products in tinplate containers For products in other containers	 250.0 50.0	**AOAC 985.16/ AOAC 2013.06**

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