ICS 67.120.30

DMS 116:2018
Second edition

DRAFT MALAWI STANDARD
(SADC HARMONIZED)

Salted fish and dried salted fish – Specification

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FOREWORD

This draft standard is a Southern African Development Community (SADC) Harmonized Text covering the requirements and methods of tests for salted fish and dried salted fish.

The harmonization of standards and technical regulations in the SADC region is an obligation under the SADC protocol on Trade which was established under the SADC Treaty to provide for elimination of tariffs and non-tarriff barriers to trade.

This standard is identical to SADC HT 85, *Salted fish and dried salted fish – Specification.*

Acknowledgement is made for the use of the above standard.

TECHNICAL COMMITTEE

This draft standard was prepared by the Technical Committee MBS/TC 39, *Fish and fishery products,* and the following companies, organizations and institutions were represented:

Malawi Bureau of Standards.

MALDECO Fisheries

Malawi College of Fisheries;

Ministry of Agriculture, Irrigation and Water Development – Department of Fisheries;

Lake Harvest; and

Lilongwe University for Agriculture and Natural Resources.

NOTICE

This standard shall be reviewed every five years, or earlier when it is necessary, in order to keep abreast of progress. Comments are welcome and shall be considered when the standard is being reviewed.

DRAFT MALAWI STANDARD

Salted fish and dried salted fish - Specification

1 SCOPE

This draft standard applies to salted fish and dried salted fish which has been fully saturated with salt (heavily salted) or to salted fish which has been preserved by partial saturation to a salt content not less than 12 % by weight of the salted fish for human consumption.

2 NORMATIVE REFERENCES

The following standard contains provisions, which through reference in this text, constitute provisions of this draft standard. All standards are subject to revision and, since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this draft standard are encouraged to take steps to ensure the use of the most recent edition of the standard indicated below. Information on current valid national and international standards can be obtained from the Malawi Bureau of Standards.

MS 19: *Labelling of prepacked foods – General standard;*

MS 21: *Food and food processing units – Code of hygienic conditions;*

MS 188: Edible salt – Specification;

MS 214: *Potable water – Specification;*

MS 237: *Food additives – General Standard;*

MS 302: *General standard for contaminants and toxins in foods and feed;*

MS 790: *Code of practice for fish and fishery products;*

MS 1241: *Guidelines for the sensory evaluation of fish and shellfish in laboratories;*

CODEXSTAN 233: Sampling plans for prepackaged foods (AQL-6.5);

ISO 4833: *Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of microorganisms – Colony-count technique at 30 degrees;*

ISO 6579: *Microbiology of food and animal feeding stuffs – Horizontal method for the detection of Salmonella spp.;*

ISO 6888: *Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species);*

ISO 7251: *Microbiology of food and animal feeding stuffs – Horizontal method for the detection and enumeration of presumptive Escherichia coli – Most probable number technique;*

ISO 7937: *Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of Clostridium perfringens – Colony-count technique;*

ISO 11290: *Microbiology of the food chain – Horizontal method for the detection and enumeration of Listeria monocytogenes and of Listeria spp.;*

ISO/TS 21872-1: *Microbiology of food and animal feeding stuffs – Horizontal method for the detection of potentially enteropathogenic Vibrio spp. – Part 1: Detection of Vibrio parahaemolyticus and Vibrio cholera;*

ISO/TS 21872-2: *Microbiology of food and animal feeding stuffs – Horizontal method for the detection of potentially enteropathogenic Vibrio spp. – Part 2: Detection of species other than Vibrio parahaemolyticus and Vibrio cholera;* and

AOAC: *Association of Analytical Chemist*

3 DEFINITIONS

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

3.1
dried salted fish
salted fish which have been dried

3.2
food grade material
packaging material, made of substances which are safe and suitable for their intended use and which will not impart any toxic substance or undesirable odour or flavour to the product

3.3
foreign matter
any material which is not of fish origin e.g. sand, stones, metallic chips, plant parts etc.

3.4
fresh whole fish
fish harvested while alive from culture, immediately cleaned and/or chilled to preserve freshness

3.5
lot
fish from the same origin and harvest

3.6
salting
is a process of treating fish with salt of food grade quality to lower water activity in fish flesh and to enhance flavour by any appropriate salting technology (e.g. dry salting, brining, injection salting)

3.7
salted fish
fish that has undergone salt treatment

3.8
sound
free from physiological deterioration or adulteration/contamination, that appreciably affects their appearance, edibility and the keeping quality of the dried fish.

4 PROCESS DESCRIPTION

4.1 Salting

4.1.1 Dry Salting (kench curing) is the process of mixing fish with suitable food grade salt and stacking the fish in such a manner that the excess of the resulting brine drains away.

4.1.2 Wet Salting (pickling) is the process whereby fish is mixed with suitable food grade salt and stored in watertight containers under the resultant brine (pickle) which forms by solution of salt in the water extracted from the fish tissue. Brine may be added to the container. The fish is subsequently removed from the container and stacked so that the brine drains away.

4.1.3 Brine Injection is the process for directly injecting brine into the fish flesh and is permitted as a part of the heavy salting process.

4.2 Drying

4.2.1 Natural drying - the fish is dried by exposure to the open air; and

4.2.2 Artificial drying - the fish is dried in mechanically circulated air, the temperature and humidity of which may be controlled.

5 ESSENTIAL COMPOSITION AND QUALITY FACTORS

5.1 Fish

Salted fish shall be prepared from sound and wholesome fish, fit for human consumption in accordance with fresh fish standards.

5.2 Salt

Salt used to produce salted fish shall be clean, free from foreign matter and foreign crystals, show no visible signs of contamination with dirt, oil, bilge or other extraneous materials and comply with the requirements laid down in MS 188.

5.3 Presentation

5.3.1 Split fish - split and with the major length of the anterior of the backbone removed (about two thirds).

5.3.2 Split fish with entire backbone - split with the whole of the backbone not removed.

5.3.3 Fillet - is cut from the fresh fish, strips of flesh is cut parallel to the central bone of the fish and from which fins, main bones and sometimes belly flap is removed.

5.3.4 Other presentation: any other presentation of the product shall be permitted provided that it

5.3.4.1 is sufficiently distinctive from the other forms of presentation laid down in this draft standard;

5.3.4.2 meets all other requirements of this draft standard; and

5.3.4.3 is adequately described on the label to avoid confusing or misleading the consumer.

5.3.5 Individual containers shall contain only one form of presentation from only one species of fish.

5.4 When tested in accordance to appropriate methods as indicated, the microbial counts shall be within the limits as described in the Table 1 below.

Table 1: Microbiological limits for salted and dried salted fish

S/No	Micro-organisms	Max. limits	Method of test
i)	*Salmonella* per 25 g	Absent	ISO 6579
ii)	*E. coli* per gram	Absent	ISO 7251
iii)	*Listeria monocytogenes*	Absent	ISO 11290 Part 1
iv)	*Staphylococcus aureus* cfu per gram	10^2	ISO 6888
v)	*Clostridium perfringens* per gram	Absent	ISO 7937
vi)	*Vibrio Spp* per gram	Absent	ISO 21872
vii)	Total viable count per gram	10^5	ISO 4833

5.5 Final product

Products shall meet the requirements of this standard when lots examined in accordance with section **9** and comply with the provisions set out in section **8**. Products shall be examined by the methods given in section **7**.

6 FOOD ADDITIVES

In addition to preservatives listed in Table 2, additives used in the products covered by this draft standard shall comply with MS 237.

Table 2: Preservatives for salted and dried salted fish

1	2	3	4
S/No	**Name of preservative**	**INS Number**	**Maximum level in the final product**
1	Sorbic acid	200	200 mg/Kg, singly or in combination expressed as sorbic acid
2	Sodium sorbate	201	
3	Potassium sorbate	202	

7 CONTAMINANT

Salted and dry salted fish shall conform to those maximum levels for heavy metals and other contaminants as stipulated in MS 302.

8 HYGIENE

8.1 The products covered by the provisions of this draft standard shall be prepared and handled in accordance with the appropriate sections of the MS 21 and 790.

8.2 The final product shall be free from any foreign material that poses a threat to human health.

9 PACKAGING AND LABELLING

9.1 Packaging

Fish shall be packaged in food grade containers.

9.2 Labelling

In addition to the requirements in ms 19, the following specific labelling requirements shall apply and shall be legibly and indelibly marked:

9.2.1 The name of the food

9.2.1.1 The name of the food to be declared on the label shall be "salted fish", "wet salted fish" or "salted fillet" "dried salted fish" or "klippfish". In addition, there shall appear on the label in conjunction with the name of the product, the name of the species of fish from which the product is derived.

9.2.1.2 For forms of presentation other than those described in **4.3.1** "split fish", the form of presentation shall be declared in conjunction with the name of the product in accordance with sub-section **4.3.2** as appropriate. If the product is produced in accordance with sub-section **4.3.3,** the label shall contain in close proximity to the name of the food, such additional words or phrases that will avoid misleading or confusing the consumer.

9.2.1.3 The term "klippfish" can only be used for dried salted fish which has been prepared from fish which has reached 95 % salt saturation prior to drying.

9.2.1.4 The term "wet salted fish" can only be used for fish fully saturated with salt.

9.2.2 Labelling of non-retail containers

Information specified above shall be given either on the container or in accompanying documents, except that the name of the food, lot identification, and the name and address of the manufacturer or packer shall always appear on the container. However, lot identification, and the name and address may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

10 METHODS OF SAMPLING AND TESTS

10.1.1 Sampling of lots for examination of the product shall be in accordance with the Codex Stan 233. A sample unit shall be the primary container or where the product is in bulk, the individual fish is the sample unit.

10.1.2 Sampling for net weight shall be carried out in accordance with the Codex Stan 233.

10.2 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 Annex A and in accordance with MS 1241.

10.3 Determination of net weight

The net weight (excluding packaging material and excess salt) of each sample unit in the sample lot shall be determined.

10.4 Preparation of fish sample

10.4.1 Before preparing of a sub-sample adhering salt crystals should be removed by brushing from the surface of the sample without using water.

10.4.2 The preparation of fish samples for the determination of salt content, and water content in order to calculate the % salt saturation of the fish should be carried out according to AOAC 937.07. The analysis should be on the edible portion of the fish.

10.4.3 Determination should be performed at least in duplicate.

10.5 Determination of salt content

Salt content shall be determined using the method in Annex C.

10.6 Determination of water content

10.6.1 Determination of % salt saturation as required by the standard, should be in accordance to AOAC 950.46.B (Air drying (a))

10.6.2 Determination of water content in the whole fish, when needed in the commercial trade of klippfish and wet salted fish, the method of sampling the fish should be carried out according to the method described in Annex B.

11 DEFINITION OF DEFECTS

11.1 Foreign matter. The presence in the sample unit of any matter which has not been derived from fish, does not pose a threat to human health, and is readily recognized without magnification or is present at a level determined by any method including magnification that indicates non-compliance with good manufacturing and sanitation practices.

11.2 Odour. A fish affected by persistent and distinct objectionable odours indicative of decomposition (such as sour, putrid, etc.) or contamination by foreign substances (such as fuel oil, cleaning compounds, etc.).

11.3 Pink. Any visible evidence of red halophilic bacteria.

11.4 Appearance. 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.

11.5 Halophilic mould (dun). A fish showing an aggregate area of pronounced halophilic mould clusters on more than one third of the total surface area of the face side.

11.6 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.

11.7 Intense bruising. Any fish showing more than 1/2 of the face of the fish with intense bruising.

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

12 LOT ACCEPTANCE

A lot shall be considered as meeting the requirements of this standard when:

12.1 The total number of defectives as classified according to section **8** does not exceed the acceptance number (c) of the appropriate sampling plan in the Codex Stan 233;

12.2 The average net weight of all sample units is not less than the declared weight, provided no individual container is less than 95 % of the declared weight; and

12.3 The total number of sample units not meeting the form of presentation as defined in section **2.3** does not exceed the acceptance number (c) of the appropriate sampling plan in the Codex Stan 233.

ANNEX A
(Normative**)**

SENSORY AND PHYSICAL EXAMINATION

A1 Examine every fish in the sample in its entirety.

A2. Examine the product for the form of presentation.

A3. Examine the fish for foreign matter, pink conditions, halophilic mould, liver stains, intense bruising, severe burning and texture.

A4. Assess odour in accordance with the MS 1241.

ANNEX B
(Normative)

DETERMINATION OF WATER CONTENT IN WHOLE FISH BY CROSS SECTION METHOD

B1 PRINCIPLE

The fish is cut in sections as described in method. The sections are cut in smaller bits to a collected sample. The water content of the collected sample is determined by drying. Examinations and experience have shown that the water content of this collected sample is closed to the “true” water content of the fish.

B2 EQUIPMENT

B2.1 Soft brush.

B2.2 Basins (steel, glass, porcelain).

B2.3 Scissors.

B2.4 Band saw.

B2.5 Knife.

B2.6 Weight, 1 g precision.

B2.6 Oven. 103 - 105 °C.

B2.7 Desiccator.

B3 PREPARATION OF SAMPLE

Salt particles on the surface of the fish are brushed away. The weight of the fish is determined to 1 g accuracy. The length of the fish is measured as the distance between the cleft in the tail and a line drawn between the tips of the earbones.

B4 PROCEDURE

B4.1 The sampling of the fish is described in the enclosed figure.

B4.1.1 Wet salted fish is sliced in sections by knife.

B4.1.2 Salted and dried salted fish is sliced in sections by band saw.

B4.2 A section of 20 mm measured from a line drawn between the earbones, dotted line on figure, is cut.

B4.3 The next cut is a 40 mm section.

B4.4 A 2 mm section is cut from the front part of the 40 mm section and collected (see B7).

B4.5 The next cut is a new cut of a 40 mm section.

B4.6 A 2 mm section is cut from the front part of the 40 mm section and collected.

B4.7 The entire fish is cut in 40 mm sections from which are cut 2 mm sections (see enclosed figure).

B4.8 All sections of 2 mm, marked II, IV, VI, VIII in the figure, even numbers, are collected to a collected sample.

B4.8.1 The 2mm sections in the collected sample are cut with scissors in smaller pieces directly in tared basins just after the fish is cut.

B4.8.2 The basins containing the sample are weighted.

B4.8.3 The basins containing the samples are put in the oven at 103 – 105 °C for drying to constant weight (18 hours over night).

B4.8.4 The basins are taken from the oven to a desiccator and cooled.

B4.8.5 The basins are weighted.

B5 Calculation of results

The water content in the fish is calculated by using the equation:

Water content, g/100g = $100 (W_1-W_2) / (W_1 – W_s)$

Where;

W_1 = Weight of fish and basins before drying, g.

W_2 = Weight of fish and basins after drying, g.

W_s = Weight of tared basins, g

The result is reported to the nearest gram, together with the length and the weight of the analysed fish.

B6 Control analysis of whole fish

The determination of water content in whole fish by cross section method appears to give the closest result compared to water content determined by the drying of the whole fish.

B7 Comments

B7.1 Each sampled fish should be packed and sealed in a plastic bag before analysis. The samples should be stored under chilled or refrigerated conditions from the time of sampling to the time of analysis.

B7.2 The analysis must be performed as soon as possible after the fish has been sampled.

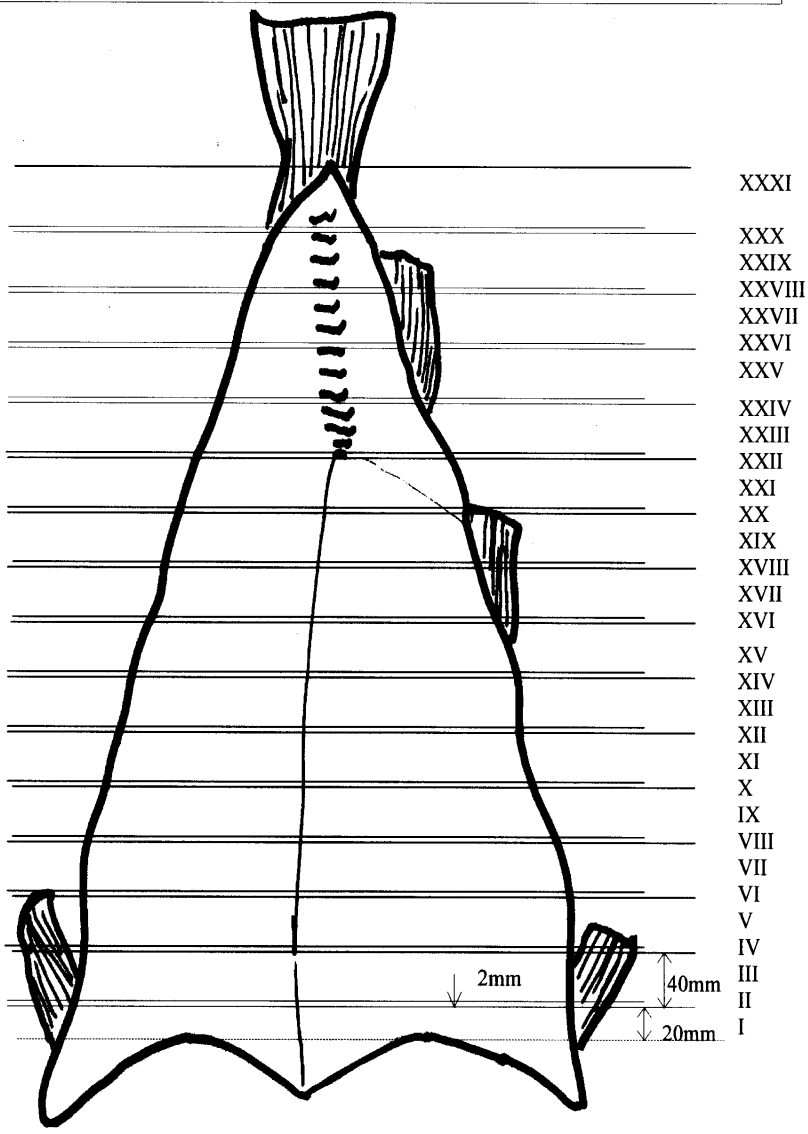
B7.3 It might be difficult to cut sections of 2 mm when the fish has a water content above 50 % but the section must be close to 2 mm.

B7.4 To minimise the loss of water from the 2mm sections it is important to weigh the collected sample immediately after the fish is cut in sections.

B7.5 Determination should be performed at least in duplicate.

FIGURE

Sampling procedure.



All section labelled by even numbers , II, IV,VI,VIII etc. are collected to constitute one sample.

ANNEX C
(Normative)

DETERMINATION OF SALT CONCENTRATION

C1 PRINCIPLE

The salt is extracted by water from the preweighed sample. After the precipitation of the proteins, the chloride concentration is determined by titration of an aliquot of the solution with a standardized silver nitrate solution (Mohr method) and calculated as sodium chloride.

C2 EQUIPMENT AND CHEMICALS

C2.1 Brush.

C2.2 Sharp knife or saw.

C2.3 Balance, accurate to 0.01 g.

C2.4 Calibrated volumetric flasks, 250 ml.

C2.5 Erlenmeyer flasks.

C2.6 Electric homogenizer.

C2.7 Magnetic stirrer.

C2.8 Folded paper filter, quick running.

C2.9 Pipettes.

C2.10 Funnel.

C2.11 Burette.

C2.12 Potassium hexacyano ferrate (II), $K_4Fe(CN)_6 \cdot 3H_2O$, 15% w/v (aq).

C2.13 Zinc sulphate, $ZnSO_4 \cdot 6H_2O$, 30% w/v (aq).

C2.14 Sodium hydroxide, NaOH, 0.1 N, 0.41% w/v (aq)

C2.15 Silver nitrate, $AgNO_3$, 0.1 N, 1.6987% w/v (aq), standardized.

C2.16 Potassium chromate, K_2CrO_4 5% w/v (aq).

C2.17 Phenolphthalein, 1% in ethanol.

C2.18 Distilled or deionized water.

C3 PROCEDURE

C3.1 5 g of homogenized subsample is weighted into a 250 ml volumetric flask and vigorously shaken with approximately 100 ml water.

C3.2 5 ml of potassium hexacyano-ferrate solution and 5 ml of zinc sulphate solution are added, the flask is shaken.

C3.3 Water is added to the graduation mark.

C3.4 After shaking again and allowing to stand for precipitation, the flask content is filtered through a folded paper filter.

C3.5 An aliquot of the clear filtrate is transferred into an Erlenmeyer flask and two drops of phenolphthalein are added. Sodium hydroxide is added dropwise until the aliquot takes on a faint red colour. The aliquot then diluted with water to approximately 100 ml.

C3.6 After addition of approximately 1 ml potassium chromate solution, the diluted aliquot is titrated under constant stirring, with silver nitrate solution. Endpoint is indicated by a faint, but distinct, change in colour. This faint reddish-brown colour should persist after brisk shaking. To recognize the colour change, it is advisable to carry out the titration against a white background.

C3.7 Blank titration of reagents used should be done.

C3.8 Endpoint determination can also be made by using instruments like potentiometer or colorimeter.

C4 CALCULATION OF RESULTS

C4.1 The salt content in the sample is calculated by using the equation:

Salt concentration (%) = (V x C x 58.45 x 250 x 100) / (A x W x 1000)

where;

A= volume of aliquot (ml)

C= concentration of silver nitrate solution in N

V = volume of silver nitrate solution in ml used to reach endpoint and corrected for blank value; and

W = sample weight (g)

C4.2 Results should be reported with one figure after the decimal point.

C5 REFERENCE METHOD

As reference method: a method should be used which includes the complete ashing of the sample in a muffle furnace at 550 °C before chloride determination according to the method described above (leaving out steps (**C3.2**) and (**C3.4**)).

C6 COMMENTS

C6.1 By using the given equation all chloride determined is calculated as sodium chloride. However it is impossible to estimate sodium by this methodology, because other chlorides of the alkali and earth alkali elements are present which form the counterparts of chlorides.

C6.2 The presence of natural halogens other than chloride in fish and salt is negligible.

C6.3 A step, in which proteins are precipitated (ii), is essential to avoid misleading results.

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THE MALAWI BUREAU OF STANDARDS

The Malawi Bureau of Standards is the standardizing body in Malawi under the aegis of the Ministry of Industry and Trade. Set up in 1972 by the Malawi Bureau of Standards Act (Cap: 51:02), the Bureau is a parastatal body whose activities aim at formulating and promoting the general adoption of standards relating to structures, commodities, materials, practices, operations and from time to time revise, alter and amend the same to incorporate advanced technology.

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