

**CODEX STANDARD FOR SALTED FISH AND DRIED SALTED FISH**  
**OF THE GADIDAE FAMILY OF FISHES**  
*CODEX STAN 167-1989, Rev. 1-1995*

## 1. SCOPE

This standard applies to salted fish and dried salted fish of the Gadidae family which has been fully saturated with salt (Heavy 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 which may be offered for consumption without further industrial processing.

## 2. DESCRIPTION

### 2.1 PRODUCT DEFINITION

Salted fish is the product obtained from fish:

- (a) of the species belonging to the family Gadidae; and
- (b) which has been bled, gutted, beheaded, split or filleted, washed, salted.
- (c) dried salted fish is salted fish which have been dried.

### 2.2 PROCESS DEFINITION

The product shall be prepared by one of the salting processes defined in 2.2.1 and one or both of the drying processes defined in 2.2.2 and according to the different types of presentation as defined in 2.3.

#### 2.2.1 *Salting*

- (a) 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.
- (b) 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.
- (c) Brine Injection is the process for directly injecting brine into the fish flesh and is permitted as a part of the heavy salting process.

#### 2.2.2 *Drying*

- (a) Natural Drying - the fish is dried by exposure to the open air; and
- (b) Artificial Drying - the fish is dried in mechanically circulated air, the temperature and humidity of which may be controlled.

## 2.3 PRESENTATION

- 2.3.1 **Split fish** - split and with the major length of the anterior of the backbone removed (about two-thirds).
- 2.3.2 **Split fish with entire backbone** - split with the whole of the backbone not removed.
- 2.3.3 **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.
- 2.3.4 Other presentation: any other presentation of the product shall be permitted provided that it
- (i) is sufficiently distinctive from the other forms of presentation laid down in this Standard;
  - (ii) meets all other requirements of this Standard; and
  - (iii) is adequately described on the label to avoid confusing or misleading the consumer.
- 2.3.5 Individual containers shall contain only one form of presentation from only one species of fish.

## 3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

### 3.1 FISH

Salted fish shall be prepared from sound and wholesome fish, fit for human consumption.

### 3.2 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 supplement 1 to the Code of Practice for Salted Fish (CAC/RCP 26-1979).

### 3.3 FINAL PRODUCT

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

## 4. FOOD ADDITIVES

Only the use of following additives is permitted.

### Additives

#### Preservatives

200	Sorbic acid
201	Sodium sorbate
202	Potassium sorbate

### Maximum level in the Final Product

200 mg/kg, singly or in combination expressed as sorbic acid

**5. HYGIENE AND HANDLING**

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

5.2 When tested by appropriate methods of sampling and examination prescribed by the Codex Alimentarius Commission, the product:

- (i) shall be free from microorganisms or substances originating from microorganisms in amounts which may present a hazard to health in accordance with standards established by the Codex Alimentarius Commission;
- (ii) shall not contain any other substance in amounts which may present a hazard to health in accordance with standards established by the Codex Alimentarius Commission.

5.3 It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 3-1997) and the following relevant Codes:

- (i) the Recommended International Code of Practice for Fresh Fish (CAC/RCP 9-1976);
- (ii) the Recommended International Code of Practice for Frozen Fish (CAC/RCP 16-1978);
- (iii) the Recommended International Code of Practice for Salted Fish (CAC/RCP 26-1979).
- (iv) The sections on the Products of Aquaculture in the Proposed Draft International Code of Practice for Fish and Fishery Products (under elaboration)<sup>1</sup>

## 6. LABELLING

In addition to the provisions of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev. 3-1999), the following specific provisions apply:

### 6.1 THE NAME OF THE FOOD

6.1.1 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" or other designations according to the law, custom or practice in the country in which the product is to be distributed. 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.

6.1.2 For forms of presentation other than those described in 2.3.1 "split fish", the form of presentation shall be declared in conjunction with the name of the product in accordance with sub-section 2.3.2 as appropriate. If the product is produced in accordance with sub-section 2.3.3, 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.

6.1.3 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.

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

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<sup>1</sup> The Proposed Draft Code of Practice, when finalized, will replace all current Codes of Practice for Fish and Fishery Products

## 6.2 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.

## 7. SAMPLING, EXAMINATION AND ANALYSES

### 7.1 SAMPLING

- (i) Sampling of lots for examination of the product shall be in accordance with the FAO/WHO Codex Alimentarius Sampling Plans for Prepackaged Foods (AQL - 6.5) (CAC/RM 42-1969). A sample unit shall be the primary container or where the product is in bulk, the individual fish is the sample unit.
- (ii) Sampling for net weight shall be carried out in accordance with the FAO/WHO Sampling Plans for the Determination of Net Weight (under elaboration).

### 7.2 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 *Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31 - 1999)*.

### 7.3 DETERMINATION OF NET WEIGHT

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

### 7.4 DETERMINATION OF SALT CONTENT

#### 1. 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.

#### 2. Equipment and chemicals

- Brush
- Sharp knife or saw
- Balance, accurate to  $\pm 0.01$  g
- Calibrated volumetric flasks, 250 ml
- Erlenmeyer flasks
- Electric homogenizer
- Magnetic stirrer
- Folded paper filter, quick running
- Pipettes
- Funnel
- Burette
- Potassium hexacyano ferrate (II),  $K_4Fe(CN)_6 \cdot 3H_2O$ , 15% w/v (aq)
- Zinc sulphate,  $ZnSO_4 \cdot 6H_2O$ , 30% w/v (aq)
- Sodium hydroxide, NaOH, 0.1 N, 0.41% w/v (aq)
- Silver nitrate,  $AgNO_3$ , 0.1 N, 1.6987% w/v (aq), standardized

- Potassium chromate,  $K_2CrO_4$  5% w/v (aq)
- Phenolphthalein, 1% in ethanol
- distilled or deionized water

### 3. Preparation of sample

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

The entire sample should be subjected to a systematic cutting and randomization process to assure a subsample representative of the composition of the whole fish or fishery product.

At least 100 g of subsample should be thoroughly homogenized by using an electric homogenizer.

Determination should be performed at least in duplicate.

### 4. Procedure

- (i) Five gram of homogenized subsample is weighted into a 250 ml volumetric flask and vigorously shaken with approximately 100 ml water.
- (ii) Five millilitre of potassium hexacyano ferrate solution and 5 ml of zinc sulphate solution are added, the flask is shaken.
- (iii) Water is added to the graduation mark.
- (iv) After shaking again and allowing to stand for precipitation, the flask content is filtered through a folded paper filter.
- (v) 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.
- (vi) 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.

- (vii) Blank titration of reagents used should be done.
- (viii) Endpoint determination can also be made by using instruments like potentiometer or coulometer.

### 5. Calculation of results

In the equation of the calculation of results the following symbols are used:

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

W= sample weight (g)

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

$$\text{Salt concentration (\%)} = (V \times C \times 58.45 \times 250 \times 100) / (A \times W \times 1000)$$

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

### 6. 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 (ii) and (iv)).

## 7. Comments

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.

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

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

## 8. DEFINITION OF DEFECTIVES

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

### 8.1.1 *Foreign Matter*

The presence in the sample unit of any matter which has not been derived from Gadidae 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.

### 8.1.2 *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.).

### 8.1.3 *Pink*

Any visible evidence of red halophilic bacteria.

### 8.1.4 *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.

8.2 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.

#### 8.2.1 *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.

#### 8.2.2 *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.



### **8.2.3 Intense Bruising**

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

### **8.2.4 Severe Burning**

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

## **9. LOT ACCEPTANCE**

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

- (i) 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 Sampling Plans for Prepackaged Foods (AQL-6.5) (CAC/RM 42-1969);
- (ii) 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
- (iii) 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 Sampling Plans for prepackaged Foods (AQL - 6.5) (CAC/RM 42-1969);
- (iv) the Food Additives, Hygiene and Handling and Labelling requirements of Sections 4, 5.1, 5.2 and 6 are met.

**"ANNEX A"**

**SENSORY AND PHYSICAL EXAMINATION**

1. Examine every fish in the sample in its entirety.
2. Examine the product for the form of presentation.
3. Examine the fish for foreign matter, pink conditions, halophilic mould, liver stains, intense bruising, severe burning and texture.
4. Assess odour in accordance with the *Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31 - 1999)*.