

## QUALITY ISSUES IN DRIED FISHERY PRODUCTS

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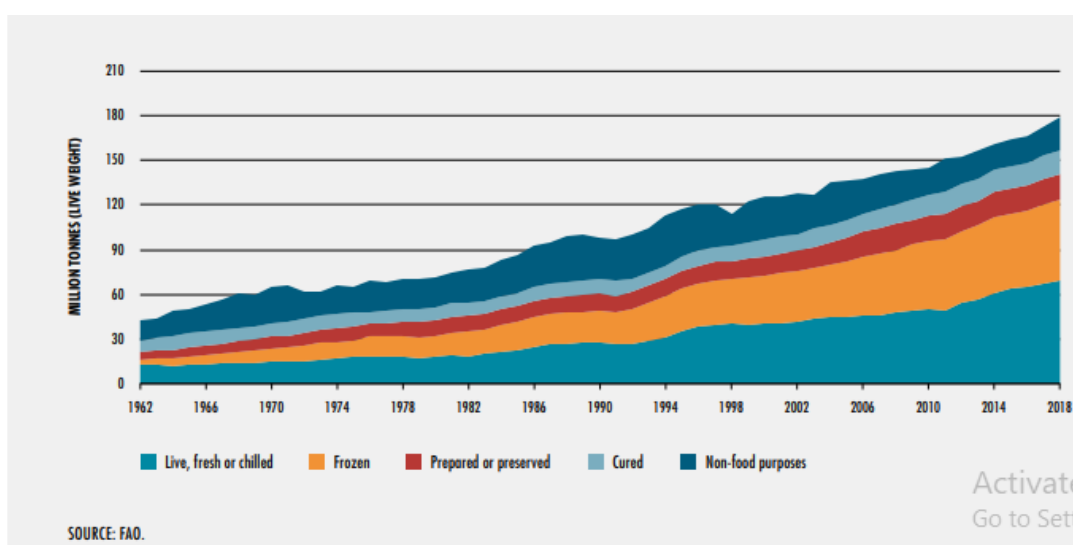
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### Introduction

Drying is the oldest known, widely used and least expensive food preservation method. During drying, water from a subject gets removed which reduces microbial activity, and thus prevents spoilage. The reduced water content not only influence the microbial activity but also retards the chemical as well as the enzymatic processes happening in the food system. Dried products are stable products that can be stored at ambient temperatures. Hence the distribution costs are also minimum while transportation and storage.

As per the FAO records (Fig.1), 10% of the global fish production is utilized for cured products, which comprises the dried, salted, fermented and smoked categories while 44% of the total production is utilized for direct human consumption in the form of fresh, chilled and frozen.



Cured means dried, salted, in brine, fermented, smoked,

Fig:1. Utilization of world fisheries and aquaculture production, 1962-2018. Source: FAO

### Principle of drying process:

During drying process, the water content of the food item gets removed or reduced which proportionately retard or totally stop all microbial and autolytic activities, thus prevents spoilage of food resulting in preservation.

The process of drying involves 2 steps – Diffusion and Evaporation. There are various factors which influences the rate of drying such as nature of the fish (water content/having larger surface area/fat content), Air temperature (25-35°C/40-50°C), Relative humidity, and Air velocity (75-130m/min). As per the method of drying, drying can be various types, viz. Natural/ sun drying, artificial/mechanical dryers. The dried fishery products can be salted/ unsalted/ smoke-dried. Salting can be of different types such as dry salting, wet salting, kench salting, mona curing *etc.* Fig.2. illustrate 'drying curve' with different stages. Smoking is detailed in another chapter - 'quality issues of smoked fishery products. The characteristics of dried/salted dried/smoke dried fish, making them shelf stable is water activity ( $a_w$ ). Water activity is the measure of the amount of water in a food that is available for the growth of microorganisms, including pathogenic bacteria. A water activity of 0.85 or below will prevent the growth and toxin production of all pathogenic bacteria, including *Staphylococcus aureus* and *Clostridium botulinum*, and is critical for the safety of a shelf-stable dried product.

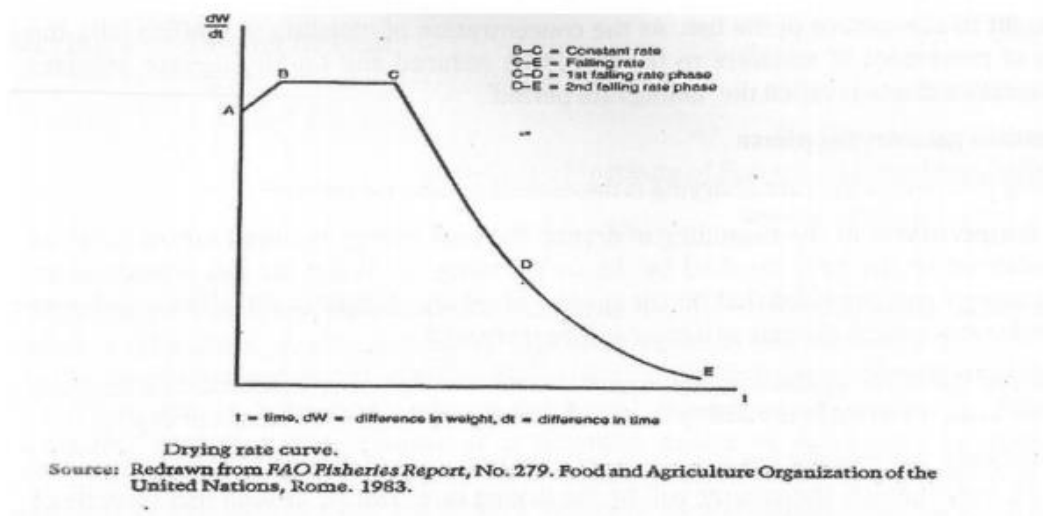


Fig:2. Drying curve with different stages. *Source: FAO*

## DRYING PROCESS

The drying process involves various steps *viz.*, receiving of raw material/fresh fish, washing, weighing, preparation of fish (optional)– gutting/ beheading/ splitting/ filleting/ washing and weighing, salting (optional), drying, packaging and labelling, and storage (Fig.3).

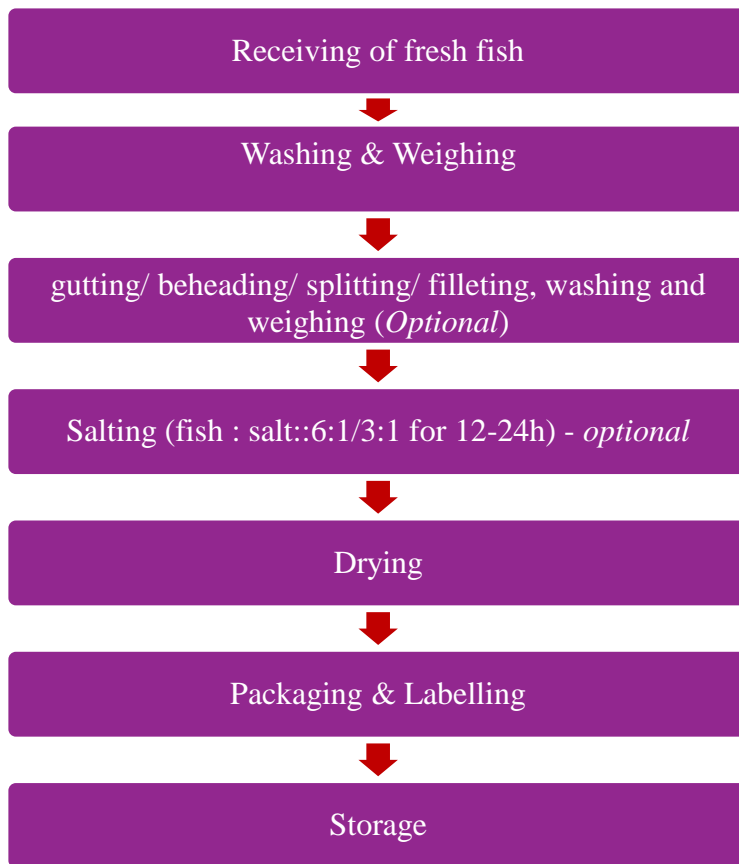


Fig. 3. Process flow chart of drying of fish

At any stages of processing (*i.e.*, drying), a hazard can be present as well as introduced. For example, in the case of receiving step, the potential hazards are presence of viable parasites, pathogens, biotoxin, scomberotoxin, physical and chemical contaminants. In fishes, that are prone to scomberotoxin (histamine formation), time-temperature control is the effective method to ensure food safety. Temperature of the raw material should be  $<4^{\circ}\text{C}$  as temperature abuse may result in histamine formation. However, receiving of fresh fish is not a critical control point for drying process, as the subsequent steps are there to prevent the potential hazards. Raw fish should be washed in chilled potable water and properly iced or moved to the chilled storage facility without undue delay if not immediately taken for drying. Depending on the design/type of final product the fish has to be gutted, beheaded, split, or filleted. If the final product is a salted dried fish, after the pre-processing step, it needs to be salted for 12-24h. Fish to salt ratio is again on the basis of thickness/nature of the fish- whether it is lean or fatty. The salt used should be of good quality, as it can cause cross-contamination - introduction of viable parasites, pathogens, biotoxin, scomberotoxin, physical and chemical contaminants into the raw material.

Drying is the most critical step in the case of dried/salted-dried fish products and it is first critical control point (CCP<sub>1</sub>) as the inadequate drying can result in the proliferation of pathogenic bacteria like *Staphylococcus aureus* and *Clostridium botulinum*, and toxin production. A water activity of 0.85 or below will prevent the growth and toxin production of all pathogenic bacteria, including *S. aureus* and *C. botulinum*, and is critical for the safety of a shelf-stable dried product. Some dried products are not dried to get a water activity ( $a_w$ ) of 0.85, but to a little bit higher level,  $a_w$ -0.95. So as to control growth and toxin formation by *C. botulinum* type E and non- proteolytic types E and F, these partially dried products should be kept under refrigeration duration storage. Toxins of *Clostridium botulinum* are not allowed in smoked fish, smoke-flavored fish and smoke-dried fish products. The formation of *C. botulinum* toxin can be controlled through scientific approaches involving packaging type, storage temperature, and the use of salt. The preventive measure for inadequate drying procedure is proper design and control of drying process, to achieve desirable level of  $a_w$  according to the nature of the final product *i.e.*, fully dried/ partially dried. The design and operation of the drying equipment should be in such a way to ensure that, every unit of a product receives at least the established minimum process;

The packaging of the final product should be effective to prevent rehydration of the product during transit and storage. For the partially dried products, appropriate packaging – vacuum packaging/modified atmosphere packaging (MAP), reduced oxygen packaging *etc.*- should be used to control the growth of pathogenic organisms. If the products are partially dried, vacuum packed/ MAP, it should be kept under refrigeration during storage and distribution and the final product should be clearly labelled as “keep refrigerated”. If the partially dried product is packed under reduced oxygen condition, the product should be kept frozen during storage and distribution, and labelling with “keep frozen” instructions are important to ensure food safety. Therefore, finished product storage and labelling is another critical control point (CCP<sub>2</sub>) in the drying process of dried/salted- dried fish.

The minimum and maximum values for the critical factors - drying time, input/output air temperature, humidity, and velocity, as well as flesh thickness- should be derived scientifically for both fully dried and partially dried/ salted- dried fish products to achieve the desired  $a_w$ . The spoilage organisms like mold in shelf- stable products should be eliminated/inhibited by further processes such as heat treatment, use of additives, further drying or other treatments *etc.*, The  $a_w$  of the finished products should be monitored by using a water activity meter along with the process parameters such as drying time and input/output air

temperature. A recording thermometer can be used for continuous monitoring of the drying temperature. Any person who has an understanding of the nature of the controls or with sufficient training to perform the analysis should carry out the monitoring activity.

If any final product involved in a critical limit deviation, chill and hold the product for an evaluation of the adequacy of the drying process. Re-dry the product if the redrying process does not provide an opportunity for the growth of pathogenic bacteria. Otherwise divert the product to a use in which the critical limit is not applicable because pathogenic bacteria growth in the finished product will be controlled by means other than drying or for non- food use. If these things are not at all possible destroy the product. At the same time corrective actions needs to be taken to control drying time/temperature/ air velocity/ humidity/ belt speed in equipment for feeding etc., regain control over the process for adequate drying.

### **Effect of drying on quality of fish**

Shrinkage:

During drying there are many structural changes are happening and shrinkage is such a major physical change. During drying, when water get removed from the fish, a proportionate shrinkage in volume of fish also takes place.

Case hardening:

When the drying temperature is high, relative humidity is low the dissolved salts, proteins and organic matters get deposited on the surface of the fish. This impervious layer prevents the diffusion process, which results in cooking of the final product. Thus, the final product became brittle. This condition is known as case hardening.

Denaturation of protein:

During drying, the concentration of dissolved material in water increases. Reduced evaporation due to case hardening will result in increase of temperature of the fish muscle which leads to denaturation of protein and toughening of texture.

Rehydration:

Due to denaturation of protein and poor water holding capacity, penetration of water will be retarded in dried fish resulting in poor rehydration.

Maillard reaction:

The Maillard reaction/ non-enzymatic browning is a chemical reaction between amino acids and reducing sugars, resulting in brown coloration and distinctive flavor in dried fish.

Rancidity:

Rancidity is caused by the oxidation of fat, which is more pronounced fatty fishes such as mackerel, sardine, tuna, anchovy etc. The unsaturated fat in the fish reacts with the oxygen in the atmosphere forming peroxides, which are further broken down into simple and odoriferous compounds like aldehydes, ketones and hydroxy acids. This imparts the characteristic odors, and yellowish to brown color in the dried fish, referred to as rust.

### **Spoilage during drying and storage**

**Dun** – Dun is a kind of spoilage occurs in dried/salted- dried fishes during storage due to the growth of halophilic mold – *Valencemia semi* imparting black/brown/grey-colored spots on the fleshy part of the fish. Being halophilic in nature, *V. semi* can growth at optimal condition of 10-15% salt concentration, 75% relative humidity and 30-35°C. The preventive measures are use of good quality salt, storage at low temperature and humidity, under well ventilated and dry storage conditions.

**Pink or Red** – Common type of spoilage associated with salted dried fish and fishery products, with a salt concentration above 10%. The halophilic bacterial growth (*Halobacterium salinaria*, *H cutirubum*, *Sarcina morrhuae*, *S. littoralis* & *Micrococcus rosens*) imparts a red slime on the surface of the fish within unpleasant odor. The spoilage is known as pink/red due to the colour of colonies of bacteria appearing on the surface of the fish. These bacteria are aerobic and thermophilic in nature within optimum growth temperature of 42°C. The preventive measures are use of good quality salt, keeping the fish out of contact with air, storage at low temperature (<10°C).

**Insect infestation** – Insect infestation is major problem for unsalted fish during drying. The fishes are often infested with blowflies- *Chrysomya spp.* *Lucilia spp.* *Sarcophaga spp.*, and their larvae feed on it resulting in huge loss in terms of quantity, quality, and economic aspects. Insect attack may also take place during storage also. Eg: Beetle infestation (dermestid beetles) – their larvae feed on the fish at a moisture content of 15% and more, leaving only fish bones. Preventive measures are Good Hygiene Practices (GHP), and salting.

Spoilage during drying and storage

**Rancidity/Rust-** Fishes with rich oil content are prone to oxidation and development of rancid flavour. Rancid flavour in dried fish is acceptable to some extent, but excessive will be objectionable. The preventive measure is air tight packaging, and use of permitted antioxidants.

**Fragmentation** – Fragmentation is often observed in cured/dried fish due to the brittleness and breakage happening during storage & transportation. The brittleness and breakage are caused by various reasons such as denaturation of protein, insect infestation, poor quality raw material for drying. The preventive measures are use of fresh fish as raw material, and appropriate packaging.

### **Regulations/Standards:**

Regulations and standards specific for dried/salted dried fish and fishery products are as following:

- Food Safety and Standards Regulations (FSSR), 2011
- *CODEX STAN 167-1989* – Standard for salted fish and dried salted fish of the Gadidae family of fishes
- *CODEX STAN 236-2003* - Standard for Boiled Dried Salted Anchovies
- Indian Standard (IS 14950:2001)

### **Food Safety and Standards Regulations (FSSR), 2011**

As per Food Safety and Standards (Food products Standards and Food Additives) Regulations, 2011

(1) Dried/ salted and dried fishery products mean the product prepared from fresh or wholesome fish after drying with or without addition of salt.

(2) The fish shall be bled, gutted, beheaded, split or filleted and washed prior to salting and drying.

(3) Salt used to produce salted fish shall be clean, free from foreign matter, show no visible signs of contamination with dirt, oil, bilge or other extraneous materials.

(4) The product shall be free from foreign matter, objectionable odour and flavour.

(5) The product may contain food additives permitted.

(6) The product shall conform to the microbiological and chemical requirement as laid down in the regulation.

(7) The products shall conform to the following requirements

**FSSR requirements**

Sl no:	Characteristics	Requirements
1.	Water activity (aw), at 25°C	Less than 0.78
2.	Salt Content (percent Sodium Chloride)*	Not less than 12 %
3.	Histamine** content, max.	200 mg/Kg
4.	Acid Insoluble Ash on dry basis	Not more than 1%

\*Requirement of salt content is only applicable to dry salted fishery products

### Limit of histamine level

Product category	Applicability	Level of histamine
Dried/ Salted and Dried fishery products	Species with high amount of free <u>histidine</u> (Listed fish species with potential to cause histamine fish poisoning)	n=9, c=2; m=200 mg/kg, M=400 mg/kg

n : Number of units comprising the sample  
c : Maximum allowable number of defective sample units  
m : Acceptable level in a sample  
M : Specified level when exceeded in one or more samples would cause the lot to be rejected

Satisfactory, if the following requirements are fulfilled:

1. the mean value observed is  $\leq m$
2. a maximum of  $c/n$  values observed are between m and M
3. no values observed exceed the limit of M,

Unsatisfactory, if the mean value observed exceeds m or more than  $c/n$  values are between m and M or one or more of the values observed are  $>M$ .



## Additives permitted

Food Category System	Food Category Name	Food Additive	INS No	Recommended Maximum Level	Note
9.2.5	Smoked, dried, fermented, and/or salted fish and fish products, including molluscs, crustaceans, and echinoderms (Dried shark fins, Salted fish/dried salted fish)	Allura red AC	129	100 mg/kg	22
		<b>BENZOATES</b>		200 mg/kg	
		Butylated hydroxyanisole (BHA)	320	200 mg/kg	15, 196
		Butylated hydroxytoluene (BHT)	321	200 mg/kg	15, 196
		<b>CHLOROPHYLLS AND CHLOROPHYLLI NCOPPER COMPLEXES</b>		200 mg/kg	
		Calcium carbonate	170(i)	GMP	266, 267
		Canthaxanthin	161g	15 mg/kg	
		beta- Carotenes, vegetable	160a(ii)	1,000 mg/kg	
		Fast green FCF	143	100 mg/kg	
		Fumaric acid	297	GMP	
		Grape skin extract	163(ii)	1,000 mg/kg	266, 267
		<b>IRON OXIDES</b>		250 mg/kg	22
		Magnesium carbonate	504(i)	GMP	22
		Indigotine (Indigo)	132		22

15- On the fat or oil basis

22- For use in smoked fish products only

196- Singly or in combination: butylated hydroxyanisole (BHA, INS 320), butylated hydroxytoluene (BHT, INS 321) and propyl gallate (INS 310)

266- Excluding salted atlantic herring and sprat

267- Excluding products conforming to the standard for salted fish and dried salted fish of the gadidae family of fishes , the standard for dried shark fins, the standard for crackers from marine and freshwater fish, crustaceans and molluscan shellfish , and the standard for boiled dried salted anchovies

carmine)		100 mg/kg	
Magnesium hydroxide	528	GMP	266, 267
Magnesium hydroxide carbonate	504(ii)	GMP	266, 267
Malic acid, DL-	296	GMP	266, 267
Ponceau 4R	124	100 mg/kg	266, 267
Potassium dihydrogen citrate	332(i)	GMP	22
Propyl gallate	310	100 mg/kg	266, 267
<b>RIBOFLAVINS</b>		300 mg/kg	15, 196
<b>SORBATES</b>		<sup>32</sup> [1000 mg/Kg]	42
<b>SULFITES</b>		30 mg/kg	
Sodium dihydrogen citrate	331(i)	GMP	44
Sodium fumarate	365	GMP	266, 267
Sunset yellow FCF	110	100 mg/kg	266, 267
Acetylated distarch phosphate	1414	GMP	22
Agar	406	GMP	300
Carrageenan	407	GMP	300
Citric and fatty acid esters of glycerol	472c	GMP	300
Guar gum	412	GMP	300
Gum arabic (acacia gum)	414	GMP	300
Hydroxypropyl cellulose	463	GMP	300
Hydroxypropyl methyl cellulose	464	GMP	300
Hydroxypropyl starch	1440	GMP	300
Lactic and fatty acid esters of glycerol	472b	GMP	300
Magnesium chloride	511	GMP	300
Mannitol	421	GMP	300

Methyl cellulose	461	GMP	300
Methyl ethyl cellulose	465	GMP	300
Oxidized starch	1404	GMP	300
Pectins	440	GMP	300
Powdered cellulose	460(ii)	GMP	300
Processed eucheuma seaweed	407a	GMP	300
Salts of myristic, palmitic and stearic acids with ammonia, calcium, potassium and sodium	470(i)	GMP	300
Salts of oleic acid with calcium, potassium and sodium	470(ii)	GMP	300
Sodium alginate	401	GMP	300
Carboxymethyl cellulose	466	GMP	300
Tara gum	417	GMP	300
Tragacanth gum	413	GMP	300
Xanthan gum	415	GMP	300
Lecithins	322(i), (ii)	GMP	300
Acetic and fatty acid esters of glycerol	472a	GMP	300

42- As sorbic acid

44- As residual SO<sub>2</sub>

300 - For use in salted squid only

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## Microbiological requirements – hygiene indicator organisms

Sl. No.	Product Category*	Aerobic Plate Count				Coagulase positive Staphylococci				Yeast & mold count				Stage where criterion applies	Action in case of unsatisfactory results
		Sampling Plan		Limits (cfu/g)		Sampling Plan		Limits (cfu/g)		Sampling Plan		Limits (cfu/g)			
		n	c	m	M	n	c	m	M	n	c	m	M		
7.	Dried/Salted and Dried Fishery Products	5	0	1x10 <sup>5</sup>		-	-	-	-	5	2	100	500	End of Manufacturing process	Improvement in hygiene; Selection of raw material; Adequate drying (water activity ≤ 0.78)

Sampling Plan:  
The terms n, c, m and M used in this standard have the following meaning:  
n = Number of units comprising a sample.  
c = Maximum allowable number of units having microbiological counts above m.  
m = Microbiological limit that may be exceeded number of units c.  
M = Microbiological limit that no sample unit may exceed.

## Microbiological requirements – safety indicator

Sl. No.	Product Category*	<i>Escherichia coli</i>				<i>Salmonella</i>				<i>Vibrio cholerae</i> (O1 and O139)				<i>Listeria monocytogenes</i>				<i>Clostridium botulinum</i>			
		Sampling Plan		Limits		Sampling Plan		Limits		Sampling Plan		Limits		Sampling Plan		Limits		Sampling Plan		Limits	
		n	c	m	M	n	c	m	M	n	c	m	M	n	c	m	M	n	c	m	M
7.	Dried/ Salted and dried fishery products	5	0	20		5	0	Absent/25g		-	-	-	-	-	-	-	-	-	-	-	-

Sampling Plan:  
The terms n, c, m and M used in this standard have the following meaning:  
n = Number of units comprising a sample.  
c = Maximum allowable number of units having microbiological counts above m.  
m = Microbiological limit that may be exceeded number of units c.  
M = Microbiological limit that no sample unit may exceed.

## CODEX standard -Codex Committee on Fish and Fisheries Products (CCFFP)

CODEX STAN 167-1989

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### STANDARD FOR SALTED FISH AND DRIED SALTED FISH OF THE GADIDAE FAMILY OF FISHES CODEX STAN 167 - 1989

#### 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:

- of the species belonging to the family *Gadidae*; and
- which has been bled, gutted, beheaded, split or filleted, washed, salted.
- 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.

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## 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 the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003)

### 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

5.1 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 *General Principles of Food Hygiene* (CAC/RCP 1-1969), the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003), and other relevant Codex Codes of Hygienic Practice and Codes of Practice.

5.2 The products should comply with any microbiological criteria established in accordance with the *Principles and Guidelines for the Establishment and Application of Microbiological Criteria Related to Foods* (CAC/GL 21-1997).

## 6. LABELLING

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

### 6.1 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.

### 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.

- Standard for Boiled Dried Salted Anchovies – CODEX STAN 236-2003 - <http://www.fao.org/3/w9253e/w9253e0m.htm>

## Indian Standard (IS 14950:2001)

Sl. No.	Product	Moisture, percent by mass, Max	Sodium chloride (on moisture free basis), percent by mass	Acid insoluble ash (on moisture free basis), percent by mass, Max
1.	Dry-Salted Cat Fish	35	25 (min)	1.5
2.	Dry-Salted Dhoma	35	10-15	2
3.	Dry-Salted Horse Mackerel	35	25-30	1.5
4.	Dry-Salted Threadfin (Dara)	40	25 (min)	1.5
5.	Dry-Salted Leather Jacket	35	25-30	1.5
6.	Dry-Salted Mackerel	30	25-30	1.5
7.	Dry-Salted Jew Fish (Ghol)	40	25 (min)	1.5
8.	Dry-Salted Seer Fish	35	25-30	1.5
9.	Dry-Salted Shark	35	25-30	1.5
10.	Dry-Salted Surai (Tuna)	35	20-25	1.5
<b>Dried products</b>				
11.	Dried Bombay Duck	15	7.5 (max)	1.0
12.	Laminated Bombay Duck	15	6 (max)	1.0
13.	Dried Fish Maws	8	-	1.5
14.	Dried Prawns	20	5 (max)	1.0
15.	Dried Shark Fins	10	-	1.5
16.	Dried White Baits	15	2.5 (max)	1.5

Parameter	Requirement
Total plate count, A/ox/g	1 00 000
<i>E.coli</i> , Max/g	20
<i>Salmonella</i> , per 25 g	Absent
Heavy metals:	
Mercury, mg/kg	0.5
Zinc, mg/kg, Max	50
Copper, mg/kg	10.0
Arsenic, mg/kg	1.0
Lead, mg/kg, Max	1.0
Tin, mg/kg, Max	50.0 (product packed in tin plate) 250.0 (other packaging containers)

Activate Wind