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# DRAFT EAST AFRICAN STANDARD

Processing and handling of salted fish and fish products — Code of practice

# EAST AFRICAN COMMUNITY

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# Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

In order to achieve this objective, the Community established an East African Standards Committee mandated to develop and issue East African Standards.

The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

FDEAS 834 was prepared by the Technical Committee EASC/TC 003, Fish and Fishery Products.

# Processing and handling of salted fish and fish products — Code of practice

# 1 Scope

This Draft East African standard prescribes guidelines for processing and handling of salted fish and fish products intended for human consumption.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EAS 35, Edible salt - Specification

EAS 39, Hygiene in the food and drink manufacturing industry — Code of practice

EAS 12, Drinking (potable water) - Specification

# 3 Terms and definitions

For the purposes of this standard, the following terms and definitions shall apply.

#### 3.1

barrel

cylindrical container made of plastic or other suitable food contact material with a lid for water tight closure

#### 3.2

#### black membrane

parietal peritoneum, the pigmented lining of the abdominal cavity

# 3.3

brine solution of salt and water

#### 3.4

brine injection

process for injecting brine directly into the fish flesh

#### 3.5

#### brining

process of placing fish in brine for a period of sufficient length for the fish tissue to absorb a specific quantity of salt

# 3.6

## dry-salting

process of mixing fish with suitable food-grade salt and stacking the fish in such a manner that the resulting brine drains away

# 3.7

dun

discoloration and development of the mould *Sporendonema epizoum*, which affects the fish surface and makes it look peppered. The fish flesh is unaffected.

#### 3.8

#### fatty fish

fish in which the main reserves of fat are in the muscle tissue and the fat content is more than 2 %

## 3.9

#### gibbing

process of removing the gills, long gut and stomach from fatty fish, by inserting a knife or using hands at the gills; the milt or roe and some of the pyloric caeca are left in the fish

#### 3.10

#### lean fish (white fish)

fish in which the main reserves of fat are in the liver and less than 2 % fat in the body tissue

## 3.11

# maturing

process from salting until the fish is salt-matured

## 3.12

#### nobbing

removing the head and gut from fatty fish, in one operation by partially severing the head and pulling the head away together with the attached gut; the roe or milt is left in

## 3.13

# pickle

brine that may contain vinegar and spices

# 3.14

# clean water

water from any source where harmful microbiological contamination, substances and/or toxic plankton are not present in such quantities as may affect the health, quality of fish, shellfish and their products

# 3.15

## pickling

process whereby primary fatty fish is mixed with suitable salt (which may contain vinegar and spices) and stored in water tight containers under the resultant pickle that forms by solution of salt in the water extracted from the fish tissue. Pickle may be added to the container. Pickled products will always remain in a brine solution.

# 3.16

## pink

discoloration caused by red halophilic bacteria that damages the fish flesh

# 3.17

# salt

crystalline product consisting predominantly of sodium chloride. It is obtained from the sea, from underground rock salt deposits or from vacuum processed and refined brine.

# 3.18

#### salt-matured fish

salted fish that has an appearance, consistency and flavour characteristic of the final product

# 3.19

# salted fish/salted fillet

fish fillets that have been treated by brining, brine injection, dry-salting, pickling or wet-salting, or a combination of these

# 3.20

# saturated

water phase of the fish muscle in equilibrium with salt (26.4 g salt in 100g water phase)

#### 3.21

#### split fish

fish that have been cut open from throat or nape to the tail, with gills, guts, roe or milt removed. Head and whole or part of backbone may be left in or removed.

## 3.22

## stacking (restacking)

laying fish in piles with salt spread evenly on the surface.

#### 3.23

#### wet-salting

process whereby primary lean fish is mixed with suitable food grade salt and stored in water tight containers under the resultant brine extracted from the fish tissue

# 4 Handling of salted fish and fish products

## 4.1 Raw materials

- **4.1.1** The fish used to prepare salted fish and fish products should be of good quality.
- **4.1.2** The salt used shall conform to EAS 35.
- **4.1.3** Water used in the preparation of salted fish and fish products shall be potable complying to EAS 12.

## 4.2 Design and construction

## 4.2.1 Facilities

The facility should include a product flow-through pattern that is designed to prevent potential sources of contamination, minimize process delays (which could result in further reduction in essential quality) and prevent cross-contamination of finished product from raw materials. Fish are highly perishable foods and should be handled carefully. Therefore, the facility should be designed to facilitate rapid processing and subsequent storage.

## 4.2.2 Equipment and utensils

The equipment and utensils used in the preparation and processing of salted fish and fish products shall be made of food grade materials. All surfaces of equipment in handling areas should be non-toxic, smooth, impervious and sound condition to minimize physical contamination. Surfaces should have a minimum of sharp corners and projections. Chutes and conveyors should be designed to prevent physical damage caused by long drops or crushing and storage equipment should be fit for purpose and not lead to crushing of the product.

# 5 General provisions

**5.1** Depending on the species and size of fish for salting, fish should be completely bled as soon as possible.

**5.2** Fresh fish intended for processing salted fish should be checked for visible parasites.

5.3 Frozen fish should not be salted before it has been thoroughly thawed and inspected for suitability.

**5.4** Freezing, heating or adequate combination of salt content and storage time can be used as treatment procedures for killing living parasites.

**5.5** When fish species that accumulate histamine are being salted, exposure to temperatures that would support toxin formation by bacteria should be avoided at each step in the process ( $0 \circ C - 4 \circ C$  temperature is recommended).

**5.6** To minimize time delays, the processing lines should, where applicable, be designed to be continuous and sequential to permit uniform flow without stoppages or slowdowns and removal of waste.

# 6 Specific provisions

#### 6.1 Raw, fresh or frozen fish reception

6.1.1 Any process at fish receiving area should be done in a manner that the quality of fish is not impaired.

**6.1.2** Species identification should be done to ensure a safe source of incoming fish.

**6.1.3** Fish requiring gutting on arrival at the processing facility shall be gutted efficiently, without undue delay and with care to avoid contamination.

**6.1.4** Fish shall be rejected if it is known to contain harmful, decomposed or extraneous substances that will not be reduced or eliminated to an acceptable level by normal procedure of sorting or preparation.

6.1.5 Sensory evaluation should be done to assess freshness or spoilage of fish.

## 6.2 Preparing fish for salting

**6.2.1** The fish should be prepared depending on specie, size and market requirements. If split is required the cut should be made parallel to the backbone straight down from the throat or nape to the tail and in such a way as to prevent uneven and ragged edges or a loss in recovery. If the backbone is to be removed, the fish should be split so deeply that the remains of the backbone (the tail-bone) lie free. It is important to cut the bone rather than to break it from the flesh.

6.2.2 Splitting of fish should be carried out skilfully so that blood in the nape and blood clots are removed.

**6.2.3** Immediately after splitting, fish should be washed in plenty of running potable water or clean water to remove all blood from the fish.

6.2.4 All impurities, blood and livers should be removed.

**6.2.5** Visible parasites should be removed.

**6.2.6** If the black membrane has to be removed, then it should be done after the splitting step.

#### 6.3 Filleting, skinning and trimming

**6.3.1** To minimize time delays, the design of the filleting line and candling line, where applicable, should be continuous and sequential to permit uniform flow without stoppages or slowdowns and removal of waste.

6.3.2 An adequate supply of clean water or potable water should be available for washing of:

- a) fish prior to filleting or cutting, especially fish that have been scaled;
- b) fillets after filleting, skinning or trimming to remove any signs of blood, scales or viscera;
- c) filleting equipment and utensils to minimize build-up of slime and blood and offals; and
- d) fillets to be marketed and designated as boneless.

**6.3.3** Fish handlers should employ appropriate inspection techniques and use the necessary tools to remove bones.

**6.3.4** The candling of skinless fillets by skilled personnel, in a suitable location that optimizes the illuminating effect, is an effective technique in controlling parasites (in fresh fish) and should be employed when implicated fish species are being used.

**6.3.5** The candling table should be frequently cleaned during operation in order to minimize the microbial activity of contact surfaces and the drying of fish residue caused by heat generated from the lamp.

**6.3.6** Where a prescribed critical limit for staging time and temperature regime has been established for the control of histamine or a defect, the fish fillets should be well iced or appropriately chilled in clean containers, protected from dehydration and stored in appropriate areas within the processing facility.

#### 6.4 Nobbing

After nobbing the following should be taken into consideration:

- a) fish should be checked for remaining intestines;
- b) fish should be thoroughly washed to remove blood, remaining intestines and scales if appropriate; and
- c) the nobbed fish should be drained and well iced or appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility.

#### 6.5 Gibbing

After gibbing the following should be taken into consideration:

- a) fish should be checked for correct gibbing;
- b) fish with incorrect gibbing should be sorted out and used for other purposes;
- c) fish should be thoroughly washed to remove blood, remaining undesirable intestines, heart, etc. and scales if appropriate; and
- d) the gibbed fish should be drained and well iced or appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility.

#### 6.6 Salt handling and salt requirements

**6.6.1** The quality of salt used in salting of fish should possess an appropriate composition for the product.

**6.6.2** Salt used in salting fish should be inspected to ensure that it is clean, not used before, free from foreign matter and foreign crystals, and shows no visible sign of contamination with dirt, oil, bilge or other extraneous materials.

**6.6.3** The size of the salt granules used should be carefully considered. The use of very fine salt granules could result in the formation of clusters, which is not favourable for ensuring the uniform distribution of salt on the fish. The use of very coarse salt granules could result in damage to the fish flesh during salting and may reduce the rate of maturation.

**6.6.3** Small crystals of salt should be used for dry-salting of fatty fish, and large crystals for lean fish. Salt used as an ingredient needs to be of food grade.

**6.6.4** Salt for salting of fish and fish products should be transported and hygienically stored dry in its original package.

**6.6.5** In order to minimize the presence and growth of bacteria and moulds in salted fish, such as pink and dun, the reuse of salt should be avoided.

## 6.7 Salting and maturing

**6.7.1** Salted fish should be salt-matured, sound and wholesome. The salting process, including the temperature, should be sufficiently controlled to prevent the development of harmful micro-organisms or the fish should be eviscerated prior to brining.

**6.7.2** Salting of fish either by brining, brine injection, wet-salting, dry-salting or pickling should be carried out with full understanding of their effects on the quality of the final product and should be done under strict hygienic conditions and temperature control. Two particular conditions that can adversely affect the quality of salted fish are the occurrence of bacteria and moulds. Both defects can be combated by maintaining a temperature lower than 8 °C. Salt produced from marine sources may contain halophilic bacteria, which continue to live in the salt and salted fish. In order to minimize such microbial contamination of salted fish, previously used and/or contaminated salt should not be used and removed from the plant.

**6.7.3** Another adverse condition that can affect the quality of salted fish is brown (yellow) discoloration often stemming from rancidity caused by metal catalysts in the salt. The quality of the salt is important, low temperature (below 25 °C) should be maintained during the process; and light and oxygen should be avoided.

## 6.8 Brining

**6.8.1** Only fresh stabilized brine should be used for the salting operations; water quality is important, potable water should be used for preparation of brine.

**6.8 2** The ratio of brine to fish and the concentration of the brine should be adjusted to the desired product; control of time and temperature below 4 °C is important if the brine concentration is lower than saturated.

**6.8.3** Concentration of brine should be checked at regular intervals, incorrect concentration should be adjusted prior to use.

**6.8.4** To ensure proper salt penetration, fish should be of similar size.

## 6.9 Brine injection

**6.9.1** Equipment used for brine injection should be cleaned and disinfected at regular intervals.

**6.9.2** Needles of apparatuses should be inspected daily for broken tips, for blocking and deflections of needles.

**6.9.3** Brine injection devices should be operated by trained personnel only.

6.9.4 Conduct metal detection.

**6.9.5** The reflux of injected brine into the reservoir should be avoided.

#### 6.10 Wet-salting

**6.10.1** Fish for wet-salting should be salted and carefully arranged in the curing container such that voids channels between the fish are minimized.

**6.10.2** When salting the fish, the salt concentration of the brine should be checked periodically with a salinometer according to specifications.

**6.10.3** After salting, the fish can be stacked. This should not be done before the proper salt/water balance has been reached. In stacked, adequate amounts of salt should be added and evenly distributed over the whole surface of the fish.

**6.10.4** Salted fish should be stored or maintained for a sufficient period under controlled temperatures to ensure proper curing and to prevent deterioration of the product. However, the common ratio used for dry salting is 1:3 salt to fish, and for brining is 2 % - 5 % salt depending on customer specification, time and size of the fish.

## 6.11 Dry-salting

**6.11.1** Fish for dry salting should be carefully arranged such that voids or channels between fish are minimized and that drainage is adequate.

**6.11.2** Fish piles should never be placed directly on the floor or in direct contact with the wall.

**6.11.3** Amount of salt, time and temperature should be carefully controlled to obtain the desired product. Sufficient amount of salt is important for the quality of the product.

**6.11.4** Fish should be re-stacked periodically with the top of the pile going to the bottom of the new pile, and with the addition of fresh salt to ensure that sufficient salt will be present to complete the cure.

**6.11.5** If the fish is re-stacked on pallets, the pallet should be clean.

6.11.6 Fish should not be exposed to freezing temperatures during the salting process.

#### 6.12 Pickling

**6.12.1** The amount of salt shall be adjusted to the quality of the fatty fish. Salt, sugar and spices should be weighed /measured and be evenly distributed.

6.12.2 During the pickling operation, all fish should be well immersed in the resulting pickle.

**6.12.3** Fish should be allowed to settle in containers and then salt or pickle added before the container is closed.

6.12.4 Cured fatty fish should be kept in brine or pickle.

**6.12.5** Fatty fish should always be covered with pickle during curing.

**6.12.6** Pickling is primarily used for fatty fish. Under certain conditions, dry-salting of small fatty fish, may be used.

**6.12.7** Maturing time depends on the fish (species, size and quality), temperature and the amount of salt absorbed by the fish tissues.

**6.12.8** The first part of curing period for fish that accumulate histamine should be done at temperatures between 0 °C - 4 °C to prevent development of histamine.

**6.12.9** Fatty fish may be kept in a temperature range of 5  $^{\circ}$ C — 10  $^{\circ}$ C during the maturing period. The length of this period will vary from weeks to several months depending on the specific products. If the containers are to be held at lower temperatures, the maturing period will increase.

**6.12.10** When salting fish that accumulate histamine, regular checks should be done to determine the histamine content of the end product.

#### 6.13 Sorting

**6.13.1** Salted fish should be sorted into species, sizes and trade quality categories for the relevant market.

**6.13.2** Loose salt should be removed from the fish before sorting and new salt should be added before packaging.

#### 6.14 Drying

**6.14.1** The time and temperature used for drying will depend on fish species, size and the handling and stacking of the fish.

**6.14.2** To ensure proper drying, the fish should be of similar size and species.

**6.14.3** Use of higher temperature can cause hard texture of the outer layer of the muscle and should be avoided. This could stop the drying process.

**6.14.4** Packaging material should be clean, sound, durable, and sufficient for its intended use and of food-grade material.

**6.14.5** Barrels in which fatty fish are ready to be marketed should be clean, whole and hygienic.

**6.14.6** The packaging operation should be conducted in hygienic condition to minimize risks of contamination and decomposition.

**6.14.7** Labelling of the product prepared shall follow the labelling requirements within the specific product standard.

#### 6.15 Chilled storage

**6.15.1** Salt-matured fish should be stored in chilled storage.

**6.15.2** The temperature in the chilled storage should be between 0 °C and 4 °C.

**6.15.3** Temperature and storage time should be monitored and recorded at regular intervals.

**6.15.4** The products should be handled carefully and not be over stacked.

# 7 Conditions for distribution and marketing of salted fish and fish products

Salted fish and fish products intended for human consumption shall be distributed in the following conditions:

- a) transport in containers that are vermin-proof, non-corrosive, easy to clean and disinfect;
- b) cover to prevent damage, exposure to direct sunlight and contamination;
- c) no passenger shall sit on fish aboard a transport facility;

- d) no any cargo shall be placed on fish aboard a transport facility; and
- e) only fish and fish products which are safe and wholesome shall be placed on the market.

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