FOOD SAFETY AND STANDARDS AUTHORITY OF INDIA

Inspiring Trust, Assuring Safe & Nutritious Food

GUIDANCE DOCUMENT

FOOD SAFETY MANAGEMENT SYSTEM (FSMS)

FOOD INDUSTRY GUIDE TO IMPLEMENT GMP/GHP

FISH AND FISH PRODUCTS

Food Industry Guide to implement GMP/GHP requirements

FISH AND FISH PRODUCTS

Based on Schedule 4 of Food Safety & Standards (Licensing & Registration of Food Businesses) Regulation, 2011

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Disclaimer

It is to be noted that this guidance document does not intend to replace any legal provision of Food Safety & Standard Act, 2006 & regulations thereunder. Further, wherever the provision of this document conflicts with Schedule 4 of Food Safety &Standard (Licensing and Registration of Food Businesses) Regulation, 2011 or any other regulation under Food Safety & Standard Act, 2006 for that matter, the provision given in the Regulations shall prevail.

PREFACE

Food Safety is best achieved when all the stakeholders join hands and contribute in tandem for this noble cause. **"Food Safety Management System (FSMS) Guidance Document for Fish and Fish Products"** is one such initiative, which we believe will go long way in ensuring the Fish and Fish Products, produced in India are manufactured with scientifically validated processes that ensures safety for the consumers.

This document mainly contains pragmatic approaches which a business can adopt during manufacturing of fish and fish products. However, manufacturers may adopt higher stringent levels, depending on the needs. The use of this guidance is voluntary and food business operators may comply with the requirement of the Regulations according to other established best practices.

It is important that food handlers involved in the Fish industry are trained appropriately to implement the good manufacturing practices and good hygiene practices to ensure food safety.

We acknowledge the contribution of the experts from the technical panel of FSSAI along with CHIFSS (CII-HUL Initiative for Food sciences) team for developing this document.

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Templates of Records/ Documents should be available with the manufacturing facility.

ABBREVIATIONS

COA
Certificate of Analysis

CCP
Critical Control Point

FEFO
First Expiry First Out

FIFO
First In First Out

FMFO
First Manufactured First out

FSMS
Food Safety Management System

GHP
Good Hygiene Practice

GMP
Good Manufacturing Practice

HACCP
Hazard Analysis Critical Control Point

ISO
International Organization for Standardization

MAP
Modified Atmospheric Packaging

QA
Quality Assurance

SCOPE

This FSMS Guidance Document addresses the food safety including related hazards and risks covering handling and processing of fish and fish products along with its storage, distribution and retail.

GUIDANCE TO READ THE DOCUMENT

This document is written with a purpose to guide small and medium fish handling and processing units, both existing and newly established businesses. The document has three main sections.

The first section is an introduction on fish and fish products manufacturing process; with a process flow and a brief on relevance of main processing steps.

The second section is the critical part of this document and it contains the guidance on all the steps throughout the food chain, related to basic food safety. Readers will also find some recommended practices which are currently practiced in large Fish Industries. Though this section is in line with the Regulation requirements (Schedule 4) and have requirements mentioned with 'shall', yet the readers will find some additional guidance mentioned with 'should'. Readers are requested to make sure the difference between 'shall' and 'should' while reading, analysing, and using the document into practice.

Shall: "To be mandatorily implemented; as provided by rules and regulations"

Should: "Strongly advised for food safety operations"

The third section of this document has tried to help industry understand basic knowledge and implementation criteria of Hazard Analysis and Critical Control Point (HACCP). The readers will find two forms of tables: Hazard Analysis and HACCP Plans.

Tables of Hazard Analysis helps the readers (industry) to find out food safety risks related to each processing step, analyse, to identify the Critical Control Points (CCPs), recommended Corrective actions and other related information.

Tables of HACCP Plans has been taken from some established practising Fish Industries. The HACCP Plan tables are just for reference for the readers and should not be considered as CCPs for their own industry, without the detailed risk / Hazard analysis.

This document is written keeping in mind fish processing industry with the entire processing chain i.e. from raw to final product including packaging, transportation and retail.

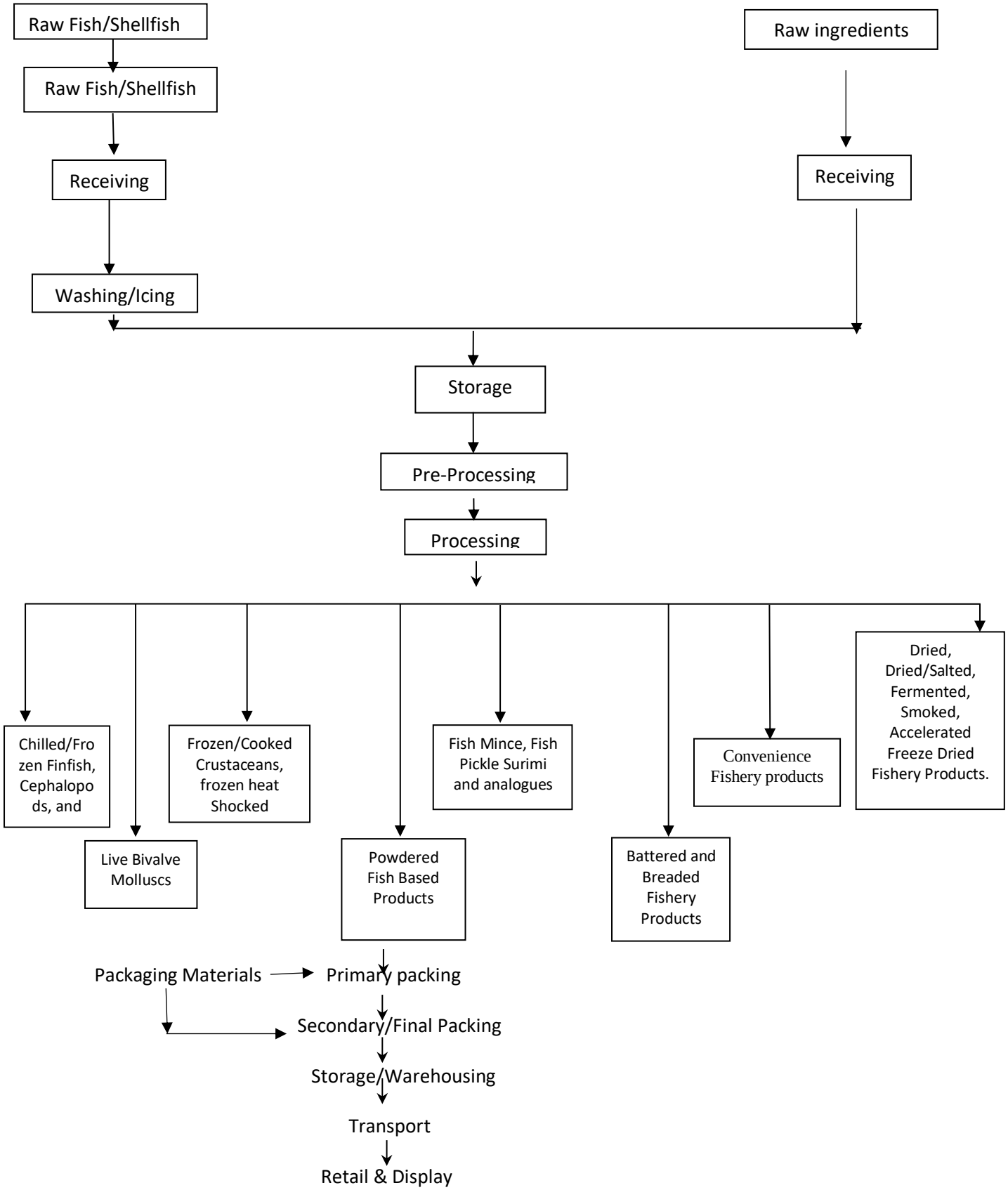
A- Introduction to Process

The fish and fish product comprises a wide range of species including fish, shellfish and other aquatic invertebrates from marine and freshwater sources that are intended for human consumption. In general, the fish manufacturing process constitutes post-harvest handling, receiving, pre-processing, processing, packing, storage, transportation, retail and display. All these processes are specific to each fish or product. Regardless of the complexity of process, the production of the desired product relies on the consecutive execution of individual steps.

This section describes the process flow chart and the manufacturing processes. It should be noted that there are a variety of processing operations for fish and shellfish and for illustrative purposes the general manufacturing process and three examples are taken into consideration.

I. Process Flow Chart and Brief of Manufacturing Process

1. General Process Flow Chart for Fish & Fish Product



Manufacturing Process- in brief:

All fish and shellfish deemed fit for human consumption should be handled properly with attention being paid to time and temperature control. Temperature is the single most important factor affecting the rate of fish and shellfish deterioration and multiplication of micro-organisms.

1. General manufacturing process

Note: Care should be taken to avoid microbial contamination in all stages.

1.1 Raw material receiving - All incoming raw materials including fish, shellfish as well as ingredients should be subjected to an examination for food safety hazards and defects based on existing food regulations by the concerned supervisor and recorded.

In case of raw fish, shell fish- the best method of assessing the freshness or spoilage of fish is by sensory evaluation techniques. Fish should be rejected if it does not conform to the raw material standards (For eg. fishes treated with formaldehyde, ammonia, gill rakers smeared with blood or any other coloured substances).

Every lot should be received from the approved supplier. For The supervisor should verify and record the standard information about the harvesting area, chemical treatments if carried out (for e.g., the presence of sulphites applied to the shrimps for preventing black spot) and transportation conditions. Temperatures of all incoming lots should be recorded.

Only ingredients, packaging material and labels complying with the existing food regulations and specifications of the processors should be accepted into the processing facility. For E.g. Packaging material used should be clean, sound, durable, sufficient for its intended use and of food grade material.

All these materials should be inspected on receipt by the supervisor. Representative samples should be taken and examined to ensure that the product is not contaminated and meets specifications for use in the end product. Also, Cleanliness and suitability of the transport vehicle that carry food products should be examined.

1.2 Storage - Raw fish/shellfish materials 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 processing. The fish and fish products should be kept between 0 °C and +4 °C.

The fish should be stored in shallow layers and surrounded by sufficient finely divided ice or with a mixture of ice and water such that damage from over stacking or overfilling of boxes will be prevented. The chill room should be equipped with a calibrated indicating/self-recording thermometer. Ingredients and packaging material should be properly protected and segregated to prevent cross-contamination and stored appropriately in terms of temperature and humidity. Systematic stock rotation plan should be in place to follow FIFO/FEFO.

1.3 Pre-processing - Pre-processing operations vary with the species or according to product specifications.

Each product has a specific pre-processing procedure. For example, pre-processing of shrimp/ prawn (depending on the product) includes processes such as washing, sorting, grading, beheading, peeling, deveining, etc. Pre-processing in fin fishes consists of washing, sorting, grading, gutting, beheading, de skinning, cutting, filleting, trimming etc. They shall be well iced or appropriately chilled in clean insulated containers, protected from dehydration and stored in appropriate areas within the processing facility.

1.4 Processing - Each product category has as specific mode of processing.

Product Category as per Food Safety and Standards (Food Products Standards and Food Additives) Regulations,2011.

1.5 Primary Packing –Packing of fish and fish products shall be done as per applicable regulation specified in FSSRs. (Packaging & Labelling) & Legal metrology (Packaged Commodities).The food grade declaration/ certificate to be verified on COA during receiving of the packing material.

Labels that are to be used in direct contact with the fish should be made of a non-absorbent material and the ink or dye used on that label should be approved by the competent authority and should be food grade.

1.6 Secondary/ Final Packing - Packaging in corrugated master cartons should be done under clean and hygienic conditions. The packaging material should be of food grade quality and able to withstand damage and contamination of the products.

Packages should be checked regularly for weight control and labelling as per regulation specified in FSSRs. (Packaging & Labelling) & Legal metrology (Packaged Commodities).

1.7 Storage/ Ware Housing – Final Product should be stored under appropriate storage conditions. For e.g. frozen product should be stored at or below -18^{o}C. Final packed products should be stacked on pallets and not be kept on floor. FIFO / FMFO /FEFO method shall be followed in the storage for dispatch of product.

1.8 Transportation – It should be done under appropriate conditions and at stipulated temperature. For e.g. Frozen fish products under normal conditions are transported by road/rail in refrigerated containers (for long distance) or small insulated vans (for short distance) to local retail outlets or directly to the consumers.

Cleanliness and suitability of the transport vehicle to carry fish and fish products should be inspected before loading and transportation.

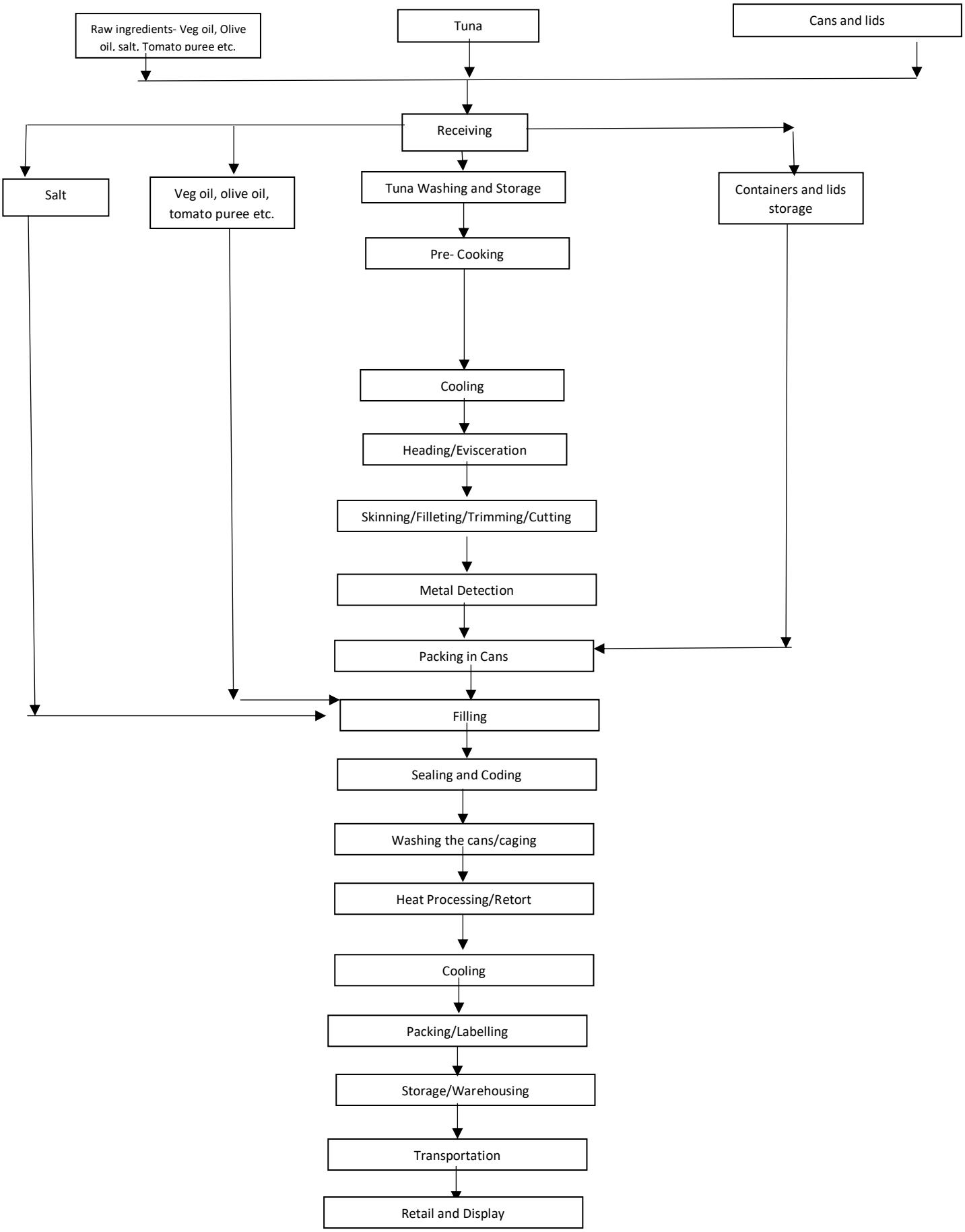
1.9 Retail and Display -During display suitable precautions should be taken to maintain the product at appropriate temperature and its appearance (like colour, packaging intact, etc.).

Ensure that products are:

- Stored in hygienic display cases.
- Retails area should be free from pests and insects.
- Temperature differential or range should be kept minimum.
- Adopt first-in-first-out (FIFO) method in the display of products for sale.
- Proper declaration on the products is needed & it should comply requirements of FSSRs. (Packaging & Labelling).
- All containers and retail area should be cleaned and disinfected daily.

Fig 1: Retail Shop- Display Units (Frozen or Chilled)

2. Canned Tuna



Canning is a method of preservation in which spoilage can be prevented by killing micro-organisms through heat. The canning process involves pre-treatment of fish, preparation of can, filling and sealing of the can, technique of retorting the filled cans to kill micro-organisms without damage to fish, finally cooling, cleaning and storage and distribution of the product.

2.1Receiving -Refer to section 1.1.
In case of fish, the fish received is inspected by the concerned person and is accepted if it conforms to the standards. For species, prone to scombrotoxin (histamine) production, time and temperature control may be the most effective method for ensuring food safety. Temperatures of all incoming lots should be <4°C as temperature abuse may result in histamine formation.

However, for Ingredients and packaging materials, they also to be inspected on receipt and records are maintained. During transportation and unloading, the cans should be carefully handled to avoid shocks, which can deform the containers.

Containers and covers for canned fish and shellfish should meet the following requirements-

- They should protect the contents from contamination by microorganisms or any other substance.
- Should be made from suitable material and constructed so that they can be easily closed and sealed to prevent the entry of any contaminating substance.
- Their inner surfaces should not react with the contents in any way that would adversely affect the product or the containers.
- Their outer surfaces should be resistant to corrosion under any likely conditions of storage.
- They should be sufficiently durable to withstand the mechanical and thermal stresses encountered during the canning process and to resist physical damage during distribution.

2.2 Washing and Storage- Refer to section 1.2 for storage of raw fish.
All materials for containers or packages should be stored in satisfactorily clean and hygienic conditions. Containers and lids should be protected from dirt, moisture and temperature fluctuations during storage to avoid condensation on containers and the development of corrosion in the case of tin cans.

2.3Pre-cooking- The fish should be arranged on the metal trays in the belly-down position for precooking to allow the drainage of fish oils and juices, which may accumulate and affect product quality during the heating process. The temperature and time combinations of pre-cooking are often regarded as critical points. Precooking should be sufficient in order to avoid excessive release of water during heat processing. Time and temperature schedule should be established for pre-cooking and the schedule should be checked. Fish precooked together in batches should be very similar in size and should be at the same temperature when they enter the cooker. Potable Water used for precooking should also be changed frequently in order to avoid contamination.

2.4Cooling - Cooling can be achieved by spraying water or dipping in chilled potable water. The same water should not be used for cooling more than one batch unless it is recycled in cooling towers. Cooling should be done as quickly as possible as per the size of the fish/fish fillet to bring the product temperatures in a range limiting microbial proliferation or toxin production. Cooling firms the fish flesh and make the subsequent cleaning and picking operations easier.

2.4. Heading/Evisceration- Gutting and heading should be carried out carefully, to remove head, viscera and blood from the body of the fish. The gutted fish should be washed to remove all undesired materials and drained and well iced or appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility.

2.5 Skinning/Filleting/Trimming/Cutting- This stage in the process produces clean tuna meat of excellent quality. The skin, bones, tail and fins are removed; the skin is scraped from the flesh surface and the white and dark meat portions are taken, segregated and then transferred to filling areas.

2.6. Metal Detection- Tuna is passed through metal detector to detect metal pieces in Tuna. Metal detector shall be calibrated/ verification at frequency appropriate to assure food safety.

2.7. Packing in cans, filling- Before filling, empty cans and lids should be cleaned and inspected to ensure that they are not damaged, without visible flaws and does not contain any impurities. Care should also be taken to remove defective containers, because they can jam a filling or sealing machine, or cause trouble during heat processing (inadequate sterilization, leaks). Empty cans should be packed carefully by employing the manual labour or through mechanical device. The clean tuna steaks are cut into portions according to the size of the can to be used. The pieces of steak are placed in the can and liquid is added to cover it. Cans should be filled as directed in the established schedule such that the end product meets the regulatory provisions or the accepted standards concerning weight of contents. Headspace should be allowed as specified by the can manufacturer. While packing, care should be taken to see that no air pockets are left which cannot be removed by exhausting.

Vegetable oils, olive oils, brine or tomato sauces are used for filling the cans. The quality and the amount of ingredients should be carefully controlled to bring about the optimal desired effect. Filled containers should be inspected to ensure the product quality and to verify that they have been properly filled and will meet accepted standards for weight of contents before they are closed. After filling the cans should be carefully checked by the operators to verify that container flanges or closure surface have no product residues, which could impede the formation of a hermetic seal.

2.8. Sealing and coding- Filled can is sealed hermetically. Sealing the container and covers is one of the most essential processes in canning. The operation, maintenance, regular inspection and adjustment of sealing machines should receive particular care. The sealing machines should be adapted and adjusted for each type of container and each closing

method used. The instructions provided by the manufacturer or equipment supplier should be followed meticulously. Each container of canned fish should bear indelible code markings from which all-important details concerning its manufacture (type of product, cannery where the canned fish or shellfish was produced, production date, etc.) can be determined. Coding equipment must be carefully adjusted so that the containers are not damaged and the code remains legible. Coding may sometimes be carried out after the cooling step.

2.9. Washing- After seaming, containers should be handled carefully to prevent any damage capable of causing defects and microbiological recontamination. Filled and sealed cans should be thoroughly washed before heat processing to remove grease, dirt and fish stains on their outside walls. To avoid microbial proliferation, the waiting period should be as short as possible. If the filled and sealed cans must be held for a long time before heat processing, the product should be held at temperature conditions that minimize microbial growth.

2.10. Heat processing/Retorting- Heat processing is one of the most essential operations in canning. Properly sealed cans are heated in a retort at a temperature which is sufficient to kill the potential inactive spoilage microorganisms without any damage to the fish inside. The processing time and temperature required for each food depends on various factors like types of pack, size of cans, retort system, etc. A sterilization schedule should be established by the cannery. Standard heat processing procedures and experimentally established sterilization schedules should be checked and validated by an expert to confirm that the values are appropriate for each product and retort. Only qualified and properly trained personnel should operate retorts. It is essential to comply with the initial temperature described in the schedule process to avoid under-processing. In order that the heat processing is effective and process temperature is controlled, air must be evacuated from the retort through a venting procedure. During the application of heat processing, it is important to ensure that the sterilization process and factors such as container filling, minimal internal depression at closing, retort loading and initial product temperature are in accordance with the sterilization schedule. Permanent records of the time, temperature and other pertinent details of each retort load should be kept. The thermometers should be calibrated regularly and records should be maintained. The control treatments (heat, pressure, etc.) should be closely monitored to ensure that the product does not undergo textural changes in the flesh that are unacceptable to the consumer. By the retorting process the majority of the spoilage agents or bacteria are killed. If any bacteria remain after retorting they can be eliminated by subjecting the cans to rapid cooling immediately after processing.

2.11 Cooling- After heat processing, the can should be water cooled to a temperature of 35°C under pressure. This helps to prevent deformations, which could result in a loss of tightness. Rapid cooling of canned fish prevents the formation of struvite crystals and also controls organoleptic defects such as scorch or overcooking. Chlorinated water of 5 ppm can be used for cooling purpose.

2.12 Packing/Labelling- Before packing the cans should be inspected for faults and for quality assessment. Representative samples from each code lot should be examined to ensure that the containers do not exhibit external defects and the product meets the standards for weight of contents, vacuum, texture, colour, odour, flavour etc.

Each product should be provided with an identifiable lot number. This lot number must include an identification code, the number of the establishment that distributes the product, day and month of packaging, in order to facilitate the traceability/recall of the product.
The materials used for labelling and casing canned fish should not cause corrosion of the container. Cases and boxes should be the correct size and strong enough to protect the canned fish and shellfish during distribution. Code marks appearing on containers of canned fish should also be shown on the cases in which they are packed.

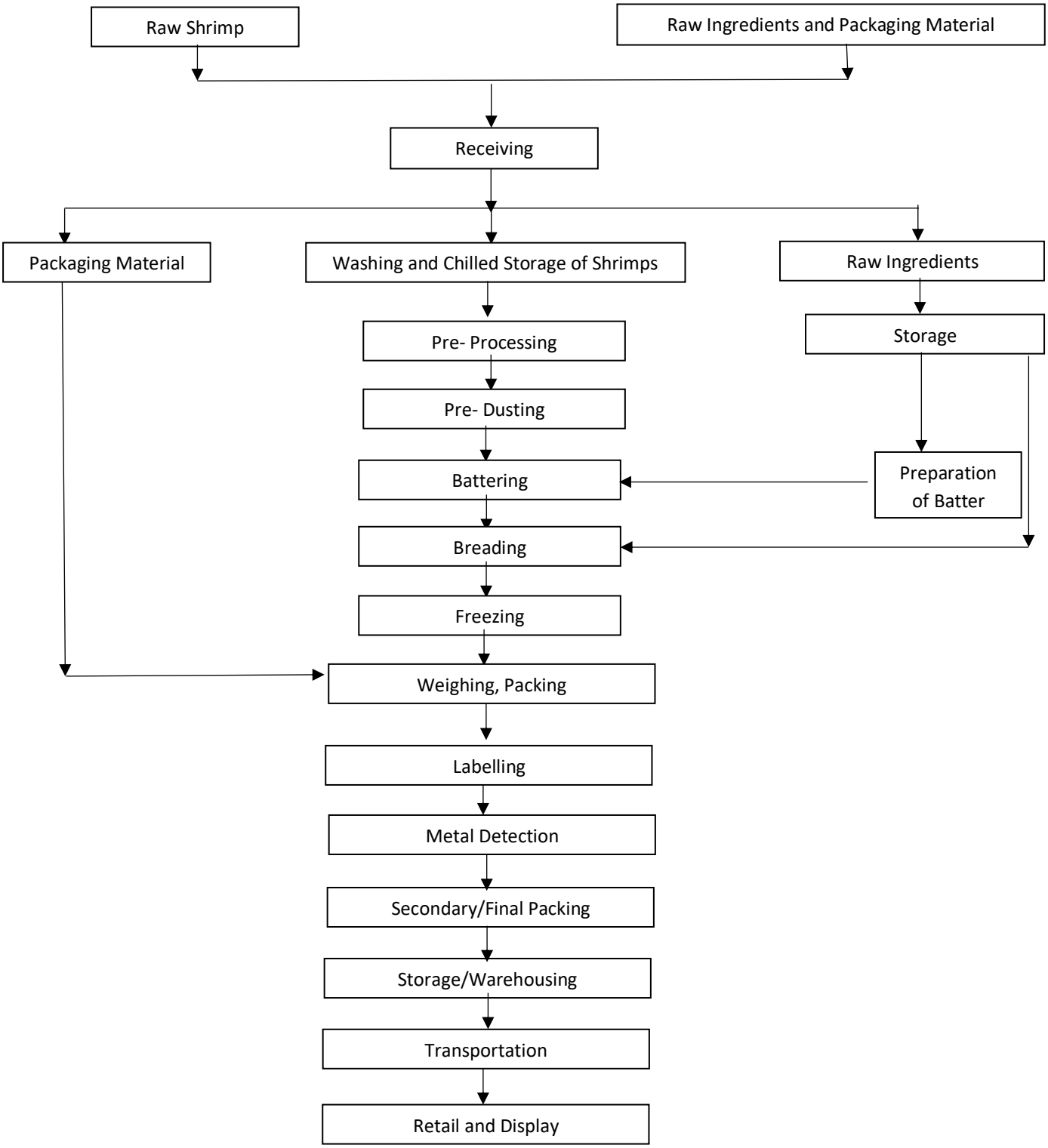
2.13 Storage- Storage of canned fish should be done in such a way as not to damage the cans. They should be kept dry and not exposed to extremes of temperature. Packed cartons should not be stacked excessively high and the forklifts used for the storage should be used in a proper manner.

2.14 Dispatch and Transportation- Loading and transportation should be e conducted in such a way as to avoid damage and contamination of the products and to ensure the packaging integrity. Before loading, the cleanliness, suitability and sanitation of the vehicles should be verified. Cartons and cans should be kept dry during transportation in order to avoid corrosion and/or rust.

2.15 Retail and Display- Canned fish should be displayed in a cool, clean dry place. Canned fish should always be kept dry to prevent rusting of the can. During display precautions should be taken to maintain can quality (such as free from bulges, leaks, rust or dent)

3. IQF Breaded and Battered Shrimps

Breaded and battered shrimps are shrimp products coated with par fry batter and breading ingredients. Production methodology of coated shrimps varies widely. However, they should be manufactured from good-quality shrimps that have been processed under good hygienic and sanitary conditions that properly control food safety hazards.



3.1. Receiving - Refer to section 1.1.

3.2. Washing + Storage – Refer to section 1.2

3.3. Pre-processing - In this step the whole shrimp is sorted, graded, peeled and deveined according to product specification. Usually during the pre-processing of coated shrimps only partial peeling is done retaining the tail and the alimentary canal or "dorsal vein" are also removed. They are then either split (butterfly style) or kept round and washed in potable water. According to specification and legislation, certain treatments may be applied to shrimps to improve organoleptic quality or preserve yield. For example, sodium tri poly phosphate (STPP) treatment is used to prevent drip loss.

3.4. Pre-dusting - Pre-dusting is the process of covering the meat with a fine coat of flour. Pre-dusting is commonly used as the first layer before batter and breading are applied. The pre- dust adheres to the surface by absorbing free water on the surface, which depends on the temperature and amount of free water on the surface. Care should be taken to avoid clumping of pre- dust material. Clumping can result in an uneven surface on the product and interfere with the application of the next coating of batter. The pre dust should be checked against declared specifications and ideally sieved before use to remove extraneous matter.

3.5. Battering- In this step the product is coated with batter solution. This wet coating creates the base for adhesion of the next layer of dry bread crumbs. Shrimp must be well coated from all sides. Viscosity of the batter is essential in determining the amount of batter remaining on the product and hence amount of pick-up. Batter viscosity should be monitored to ensure the proper pick-up of coating .Batter that is too thin or too thick may result in a coating/flesh ratio that does not meet specifications and regulatory requirements. To avoid microbial contamination of the hydrated batter, appropriate means should be adopted (such as batter should be kept below 10^0C to prevent toxin formation). Reconstituted batter should be properly refrigerated or discarded at regular intervals to prevent microbial growth and toxin formation.

3.6. Breading- Dry coating must cover the whole product and should stick well on the wet coating. Surplus coating is removed by blowing away with clean air and/or by vibration of conveyors and must be removed in a clean and hygienic way if further use is intended. Flow of breading from the application hopper should be free, even and continuous. Coating defects should be monitored regularly. Breadcrumb formulation and grist, or particle size will need to be checked against buying specification and stored according to supplier instructions to avoid staling. Individual shrimps should be well separated during the coating process to ensure complete coating of the product. Shrimps that exhibit incomplete or defective coating should be removed. The total coating and flesh percentages should be regularly monitored using recognized methods to ensure that the specified flesh and coating ratio is attained. Air blowers that eliminate excess coating from the shrimps should be adjusted and regularly monitored to ensure that the proper coating level is maintained.

3.7. Freezing - Products should be allowed to stay in freezer cabinet till it attains a core temperature of –18 °C or lower.

3.8. Weighing/Packing - Refer to section 1.5.

3.9 Labelling - Labelling to be done as per Food Safety and Standards (Packaging and Labelling) Regulations, 2011. Allergens should be mentioned in the label in case of fish products.

3.10. Metal detection- Shrimps are passed through metal detector to detect metal pieces in Shrimps. Metal detector shall be calibrated/ verification at frequency appropriate to assure food safety.

3.11. Secondary/Final Packing- Refer to section 1.6

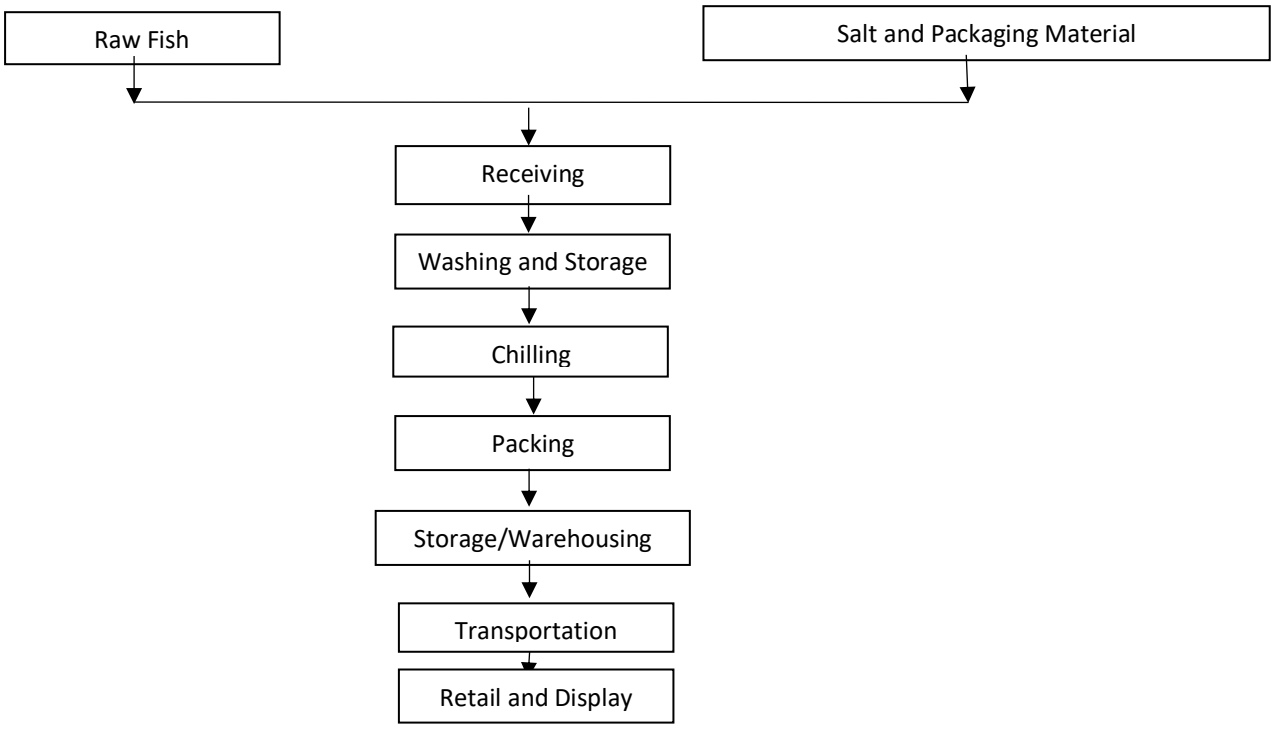
3.12. Storage/Warehousing - All end products should be stored at or below -18^{o}C in a clean, sound and hygienic environment. Severe fluctuations in storage temperature (more than 3 °C) must be avoided. Products should be properly protected from dehydration, dirt and other forms of contamination. Refer to section 1.7.

3.13. Transportation – Refer to Section 1.8

3.14. Retail and display – Refer to Section 1.9

4. Chilled Fish

Chilling is a process by which temperature of the fish is lowered to a point at temperature 0-4-degree Celsius by means of heat withdrawal. Chilling should be regarded as a short-term storage method. However, it can increase the storage life of some fish by between14-21 days.



4.1. Receiving - Refer to section 1.1.

4.2. Washing + Storage – Refer to section 1.2. Grading of fish/shellfish done based on species, size and freshness.

4.3. Chilling

Generally, fish is chilled by packing them in ice. Fish and ice are packed in shallow layers so that fish is fully surrounded by ice. Core Temperature shall be kept at or below 4ºC.

4.4. Packing

Chilled fish are normally packed in plastic crates or insulated boxes along with ice in 1:1 or 1:2 ice to fish ratio. All steps in the packaging process should be performed without unnecessary delay and under conditions that will prevent the possibility of contamination, deterioration and the growth of pathogenic and spoilage micro-organisms.

4.5. Storage /Warehousing

Fish should be moved to the chilled storage facility without undue delay. Storage area and fish holding containers should be kept clean, tidy, and health hazard items and materials which may cause cross contamination should not be stored in the same storage. The facility should be capable of maintaining the temperature of the fish between 0 °C and +4 °C.

4.6. Transportation

Chilled fish should be transported at a temperature between 0°C - 4°C.

4.7. Retail and Display

Chilled products should be stored in a hygienic conditions (e.g. proper packaging, off the floor etc.) at temperature between 0 - 4 °C and to minimize microbial growth other hazards and loss of quality. A proper product rotation system should be established (first in first out). Temperatures of products should be recorded at regular intervals.

Retail Displays should have proper drainage facility preferably self-draining. If ice is used, proper drainage of melt water should be in place. Ice should be replaced daily. Each commodity in retail displays should have its own container and serving utensils to avoid cross-contamination. Care should be taken to avoid arranging product in such a large mass/depth that proper chilling cannot be maintained and product quality is compromised. Seafood in full-service display cases should be properly labelled by signs or placards to indicate the commonly accepted name of the fish so the consumer is informed about the product.

B.PRE-REQUISITE PROGRAMS

For the production of safe fish and fish products each segment of the fish industry must be supported by prerequisite programmes based on GMP/GHP. The prerequisite programmes would be specific for each segment and will require monitoring and evaluation to ensure their continued effectiveness.

- ***Note: Pre-requisite programmes for Fishing vessels and Fish landing centres are given as Annexure 2 and should to designed to comply with existing food safety regulations. For Aquaculture please refer to CAA guidelines- http://caa.gov.in/uploaded/doc/Guidelines-Englishnew.pdf***

I. Establishment – Design and Facilities

1. Location and Surroundings

The selection of the right location for the food facility is important to minimize any food safety risk and to ensure that neighboring industries and activities does not become a contamination source due to transferring hazards by wind or water or pollution or increasing the risk of pest infestation.

1.1. The Site selected shall have approval of all statutory authorities including Local Self Government and Pollution Control Board. There shall be legal rights on the proposed land.

1.2. The site boundaries shall be clearly identified with appropriate access control to prevent the chances of theft and sabotage. Dogs, cats or other pet animals should not be allowed to enter the premises.

1.3. The location should be preferably near to fish landing site, or accessible by road very easily.

Fig 2: External boundary wall to prevent un-authorized entry of pets/ animals, etc.

1.4. The premises shall be kept clean and shall have defined curtilage. All the roads in the premises shall be concreted / tarred or turfed to prevent wind-blown dust and contamination from the surroundings.

1.5. There shall be continuous provision of sufficient electrical power supply with proper back up to maintain the cold chain and to operate freezers and cold stores.

1.6. There shall not be any swamps, stagnant water or signs of any rodent harbourage inside the premises.

1.7. The food establishment shall be located away from:

1.7.1. environmentally polluted areas and industrial activities which produce disagreeable obnoxious odour, fumes, excessive soot, dust, smoke chemical or biological emissions and pollutants, and which pose a serious threat of contaminating food or adequate measures shall be taken to enclose and protect the manufacturing premises from any possible environmental hazards.

1.7.2. areas which are prone to infestations of pests;

1.7.3. flood prone area. Where unavoidable, it is recommended that height of the manufacturing area should be suitably elevated.

1.7.4. Areas where wastes, either solid or liquid, cannot be removed effectively.

2. Premises & Rooms – Construction, design, Layout, Internal structures & fittings

'Premises' refers to all the elements of building and building surroundings.

The correct plant layout is crucial to produce safe products. A well laid out plant helps to reduce the risk of product contamination caused by pest, microorganism, people and material movement and helps in satisfactory performance of all operations.

2.1 Construction, Design and Layout

2.1.1 The establishment shall be such so that there is sufficient protection from the environment and shall be of sufficient size for the work to be carried out under hygienic conditions.

2.1.2 The design and layout shall be such as to preclude contamination and protect against accumulation of dirt, contact with toxic materials, shedding of particles into fish products and formation of condensation or undesirable mould on surfaces.

2.1.3 Layout of different sections shall be such as to facilitate smooth and orderly flow of work and to prevent possible cross contamination of finished product from raw materials. The layout shall also ensure sufficient space in different sections for machinery, equipment, personnel etc. without congestion. Also, flow of drain should be opposite to the flow of the production.

2.1.4 Non–operative areas (residential areas, machine room, toxic chemical storage areas, dry storage of food grade chemicals and packaging materials, offal and waste storage areas) inside the establishment shall be properly separated from operative areas (fish products handling areas) to avoid possible cross-contamination.

2.1.5 The processing areas should have separation between clean and dirty sections and should be organised.

2.1.6 There shall be a raised platform for receiving the material and the sides and roof of the platform shall be sufficiently protected from extraneous contamination.

2.1.7 Separate and adequate facilities should be provided to prevent contamination

i. Hazardous substances;
ii. Cleaning chemicals
iii. Dry storage of materials, packaging etc.;
iv. Waste disposal

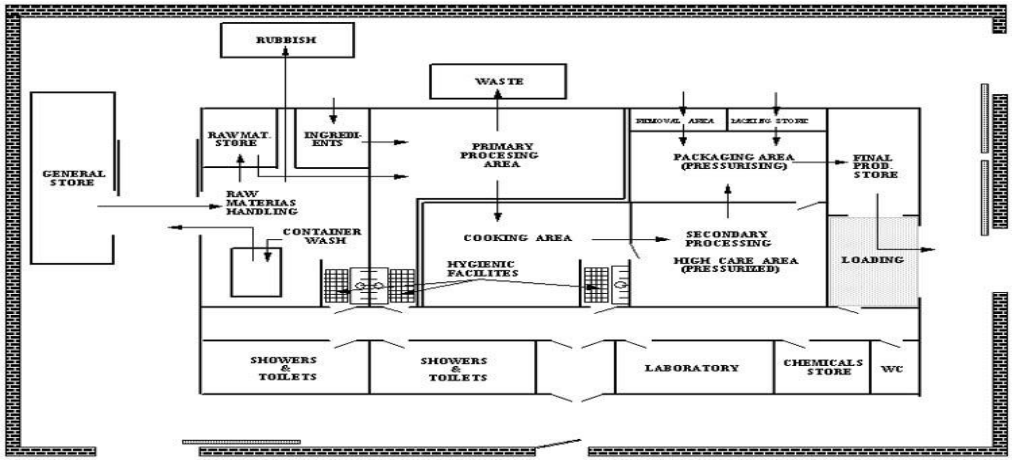


Fig 3– Design and Layout

2.2 Internal structures

This applies to areas used for fish handling, cleaning, sanitising and personal hygiene. Following specific conditions are necessary to be met to protect the safety and suitability of fish and fish products:

2.2.1 Walls and Partitions

2.2.1.1. The walls shall be constructed of materials that are durable, smooth, light coloured, cleanable, impervious to food, grease and water with no toxic effect in intended use. For example: emulsion oil paint (which is easily cleanable by wiping); tiles (which are less porous and causes less crevices) up to a height of 5-6 feet.

2.2.2.2. The walls should have no projections and the entire fittings on the wall shall be made in such a way so as to clean and disinfect them easily. If possible, the electric switches or other fittings shall be fixed in other areas where no handling of fish product is carried out.

2.2.2.3 The wall to floor and wall-to-wall junctions shall be rounded off to facilitate easy cleaning

Fig 4- Wall and pillar guards used to avoid daily wear and tear of the surfaces

2.2.2 Ceilings and overhead fixtures

2.2.2.1 Shall be maintained in sound condition and constructed of materials that are durable, cleanable, and impervious to food, grease and water with no toxic effect in intended use.

2.2.2.2 If structural elements or fittings are suspended below the ceiling, suitable protection shall be given to prevent falling of debris, dust or droppings.

2.2.3 Floors

2.2.3.1 Shall be non-slippery, sloped appropriately, to allow adequate drainage. The drainage shall flow opposite to the flow of manufacturing process flow.

2.2.3.2 Shall be made of materials that are durable and easy to clean such as Epoxy coated floors or any other suitable flooring and shall be maintained in good repair with no cracks and crevices.

2.2.4 Doors, Windows, roof vents and all other opening

2.2.4.1 All doors and windows shall be durable and made of corrosion resistant material (preferably not wooden) and in sufficient number to minimise the accumulation of dirt.They shall be properly fitted with removable and cleanable insect-proof screens to protect internal environment from flies and other insects/ pests/animals.

2.2.4.2 The windows / ventilators shall be constructed at least one meter above the floor and windowsills, if any, shall slope inwards.

2.2.4.3 The doors shall be of close-fitting type with suitable precautions such as strip PVC/air curtains/ wire mesh doors/ doors with automatic self-closing devices etc. to prevent entry of pests and vermin.

2.2.4.4 Gaps if any between the door and the floor should be closed with suitable material like rubber strips, polyurethane etc.to avoid pest entry.

2.2.4.5 Mechanical ventilation / exhaust fans shall be provided in areas were stagnation of air, condensation of fluid etc. are present. The opening of ventilation / exhaust fan shall be provided with suitable fly proofing system

2.2.4.6 If window panes are made of glass, it should be laminated.

2.2.5 Operating systems for waste treatment and disposal

2.2.5.1 Proper waste treatment (both solid and liquid wastes) systems should be designed, constructed and operated.

Note: *The waste water disposal system / effluent treatment plant shall be put in place as approved by State Pollution Control Board.*

2.2.6 Civil work for repairs during production

2.2.6.1 It is preferable not to carry out civil work during production of foods. When necessary, adequate protection to be taken to avoid any contamination of the food.

2.2.7 Stairs, lift cages and auxiliary structures such as platforms, ladders, chutes

2.2.7.1 Should be so situated and constructed as not to cause contamination of food. They should also be well maintained.

3. Equipment & containers – for fish handling, monitoring and waste materials

The location, design and fabrication of all equipment and containers are important for necessary maintenance and cleaning functions as per its intended use.

3.1 Used for fish handling and monitoring

All surfaces of equipment in fish handling areas should be non-toxic, smooth, non-corrosive, impervious and in sound condition to minimise the build-up of fish slime, blood, scales and guts and to reduce the risk of physical and microbial contamination.

Fig 5- Equipment of SS(stainless steel)

3.1.1 Wherever applicable, use equipment made of stainless steel (SS304)

3.1.2 Working surfaces that come into direct contact with fish, shellfish and their products should be in sound condition, durable, light coloured, smooth, easily cleanable and easy to maintain. They should be made of smooth, corrosion resistant and non-toxic materials, and inert to fish, shellfish and their products, detergents and disinfectants under normal operating conditions.

3.1.3 They should be provided with adequate drainage facilities and constructed to ensure that they can be adequately cleaned, disinfected and maintained to avoid contamination.

Fig 6-Placement of Equipment for easy and effective cleaning

3.1.4 Equipment and utensils should be designed to minimise sharp inside corners and projections and tiny crevices or gap to avoid dirt traps and crushing of the product.

3.1.5 They shall be placed in the premises to achieve easy and effective cleaning of adjacent areas like floors, walls, ceilings and other surfaces.

3.1.6 Chutes and conveyors should be designed to prevent physical damage caused by long drops or crushing.

3.1.7 Chill rooms of adequate size with mechanical refrigeration system to maintain temperature at the required level (0°C to 4°C) or adequate number of insulated boxes shall be provided to store raw material.

3.1.8 Freezing equipment shall be suitable to freeze fish products and shall to achieve the required core temperature within the stipulated time. The equipment shall be fitted with necessary gauges to indicate the temperature; pressure etc. The recording devices shall be calibrated at specified intervals.

3.1.9 Tables should be provided with pipes which will collect and direct the waste water into the drains to avoid splashing.

3.2 Containers for waste/inedible materials

3.2.1. All equipment and containers which are used for waste or inedible or hazardous substances or cleaning chemicals shall be labelled (may be color coded) and shall be suitably constructed, with a fitted lid and made of impervious material.

3.2.2. Containers used to hold cleaning chemicals and other hazardous substances shall be closed when not in use, stored separately and lockable to prevent malicious or accidental contamination of food.

Fig 7- Waste containers separately coloured

4. Facilities/Utilities

The facilities are essential services that play a vital role to industry. Quality facilities and utilities provided such as water, ice, light, hygiene facilities etc. are a prerequisite for an effective food safety.

Various requirements are explained as below:

4.1 Water Supply

4.1.1. Establishment shall use own supply of fresh or sea water or other water sources and shall have an efficient water treatment plant. Sufficient quantity of water should be available for daily activities for maintaining proper hygiene.

4.1.2. Water used shall be of potable nature and shall meet the requirements of latest edition of BIS standard on drinking water (IS 10500-2012). Potable water shall be analysed at least semi-annually to confirm that it meets the requirements of this standard.

4.1.3. Where it is necessary to store potable water, availability of appropriate facilities including the storage tanks and water pipes should be available. They shall be adequately designed, made of material that is non-toxic and corrosion resistant and periodically cleaned and maintained to prevent contamination and records of the same should be maintained. It is recommended to construct water storage tanks with food grade PVC or HDPE tiles using porcelain as inner lining. The tanks shall be covered to prevent access by animals, birds, pests and other extraneous matter.

4.1.4. The taps having hose connections shall be fitted with non- return valves to prevent contamination of water in the tank by back suction. They should be numbered for proper monitoring.

4.1.5. Non-potable water lines should be clearly identified and separated from potable water to avoid contamination. Colour coding is recommended.

4.1.6. Should be sufficient quantity of potable water available for day to day work as well as cleaning at the end of the schedule for maintaining hygiene

4.2 Ice

4.2.1. Suitable and adequate facility should be provided for storage and/or production of ice using potable water (IS10500-2012) to protect it from contamination.

4.2.2. Block ice should be manufactured only in non-corrosive containers like Stainless Steel.

4.3. Steam

4.3.1. For operations that require steam, an adequate supply at sufficient pressure should be maintained.

4.3.2. Steam used in direct contact with fish or shellfish and its products or food contact surfaces should not constitute a threat to the safety or suitability of the fish and fish products.

4.4 Drains and Waste Disposal

4.4.1. Foot operated refuse bin shall be placed in all appropriate places with a proper cover and shall be emptied regularly. They shall be washed daily with a disinfectant and dried before next use.

4.4.2. Drains shall be designed to meet expected flow loads, constructed to prevent accumulation or back flow of waste water. Drains located inside establishment should be properly covered to prevent cross contamination.

Fig 8- Drainage properly covered

4.4.3. Drains shall be equipped with appropriate traps to effectively capture contaminants.
4.4.4. The open end of the drainage shall be protected against the entry of rodents.
4.4.5. Wherever existing, refuse stores are to be designed and managed in such a way as to enable them to be kept clean and free from animals and pests.

4.5 Cleaning facilities

4.5.1. Adequate facilities for cleaning, disinfecting of premises, utensils and equipment shall be provided.
4.5.2. Adequate facilities for cleaning of cleaning equipment shall also be provided.

4.6 Personnel Hygiene Facilities

Personnel hygiene facilities shall be available to ensure that an appropriate degree of personal hygiene can be maintained to avoid any cross contamination. Such facilities shall be suitably located & designated, isolated from fish handling area.

4.6.1. Suitable washing and sanitizing facilities for feet and hands shall be provided at the entry points.
4.6.2. The washbasins shall be provided with foot operated taps or non-hand operated taps. Liquid soap, disinfectant, nail brushes, single use towels or hand driers etc. shall be provided in sufficient quantities at all entry point hand wash stations.
4.6.3. Waste bins provided for collecting used towels shall be of foot-operated / non-hand operable type.
4.6.4. Self-drying hand sanitizer should be provided to disinfect hands after drying.
4.6.5. Adequate and separate change rooms for male and female workers shall be provided for changing their clothes, keeping their personal belongings and cleaning their footwear.
4.6.6. Separate areas should be provided for home personal clothes and company uniforms (in case there is a designated full uniform used by employees during processing).

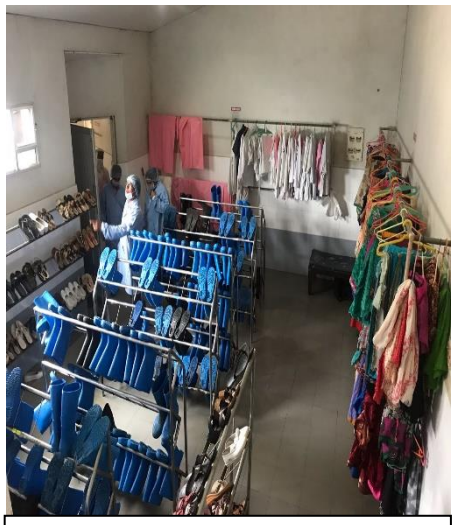


Fig 9- Changing Facility

4.6.7. The change rooms shall be of adequate size having smooth washable walls and floors.
4.6.8. There shall be sufficient number of toilets (Generally, 1:25 is followed for facility: employee ratio) should be provided in the change rooms and it shall not open directly to the working area.
4.6.9. The toilets shall have self-closing doors and proper fly proofing system.
4.6.10. Adequate supply of water should be provided in toilets and urinals. Potable water should be used at the toilet wash basin stations, as the employees may need to touch fish items while in production areas.
4.6.11. Changing room and toilets should not open directly in fish handling area.
4.6.12. Establishment should have appropriate first aid room for use of employees.

A display board mentioning' Dos' and 'Don'ts' for workers should be posted in a prominent place inside the facility, in English and local language, for all to understand. This will help all the employees to maintain their alertness on good hygiene practices.

4.7 Food Testing Facilities

4.7.1. The establishment shall have a well-equipped in house laboratory and trained and competent testing personnel for food testing.
4.7.2. It should not be open directly to the fish processing area.

4.8 Air Quality and Ventilation

4.8.1. Measures to control humidity should be adopted inside the factory.
4.8.2. The air shall not flow from contaminated to clean areas. For this, natural / mechanical Ventilation systems including air filters, exhaust fans, shall be so designed and constructed.
4.8.3. It is recommended to have adequate ventilation in sanitary conveniences.
4.8.4. Ventilation should be sufficient to remove excess steam, smoke and objectionable odours, and cross-contamination.

4.9 Lighting

4.9.1. There shall be adequate lighting and light fixtures shall be protected with proper covering, wherever appropriate, to ensure fish and fish products does not get contaminated by sudden breakage of lights/ electrical fittings.
4.9.2. The intensity of light should be adequate to the nature of the operation.

Fig 10- Adequate Intensity of light and covered fixtures

Processing Areas	Recommended Light Intensity (Lux/foot candles)
All Inspection areas	540 Lux/ 50-foot candles
Work rooms	220 Lux/ 20-foot candles
Other areas	110 Lux/ 10-foot candles

4.10 Storage

4.10.1. Storage facilities shall be designed and constructed to allow adequate cleaning and maintenance so that the fish and fish products are effectively protected from contamination during storage.

4.10.2. There shall be separate stores for wet and dry items and all the chemicals / disinfectants should be properly labelled in a language which can be understood by all concerned.

4.10.3. Material to be stored away from the walls and above the floor.

4.10.4. Packaging material store shall be of adequate size with proper fly and dust proofing system. Cartons shall be kept on cleanable pallets other than wood, away from the walls and covered properly. There shall be enough space for a person to walk around. Pest and rodent control measures shall also extend to the storerooms.

Fig 11- Packaged Material Storage

4.10.5. Establishments processing frozen fish products shall have cold storage having suitable refrigeration system to maintain the product temperature at -18°C or below:

- The floor, ceiling and walls of the cold storage shall be smooth and easy to clean and disinfect.
- There shall be suitable defrosting system and suitable arrangement to remove melt water from the frost. It shall be ensured that during defrosting, variation in temperature is minimal and for a very short period to ensure that the product temperature of the material stored does not rise above –18°C.
- Emergency alarm to be provided in the cold storage. There shall be automatic temperature recording device for the cold storage (data logger) and the temperature sensor shall be located at the warmest place in the cold storage.
- There shall be adequate lighting with protective covers.

4.10.6. Adequate facilities for the storage shall be provided. Storage space should be physically separated or segregated for –

- Raw material (like seasonings, spices, additives, ingredients etc.)
- Packaging material
- Returned/rejected material
- Recalled material
- Allergens
- Semi processed material
- Final product
- Hazardous chemical (used in engineering)
- Cleaning & disinfection chemical
- Engineering tools
- Waste material (both bio degradable & non-biodegradable)

4.11 Compressed Air and Other Gases

Compressed air and other gas systems used for refrigeration, manufacturing and/ or filling and gas pipe lines shall be constructed and maintained in good condition so as

to prevent contamination and accidents. Colour coding to be done for high pressure and low pressure.

4.12 Transportation facilities

The establishment shall have suitable and adequate facilities for the transportation of raw material, finished products etc. The food contact surfaces of the vehicles shall be smooth made of non-corrosive material and easy to clean and disinfect.

4.13 Utility Chemicals

The source of boiler/water treatment chemicals which comes in direct contact with the food materials during processing should be of food grade. Boiler/ water treatment chemicals should be appropriate for the intended use and should be used in accordance with the manufacturer's instructions.

4.14 Others

A stand by generator shall be installed in a separate generator room for the continuous power supply during power failure/breakdown. For ensuring the safety of equipment's and personnel, proper earthing of the electrical lines should be done.

II – Establishment - Control of Operation

Control of operation is necessary to produce safe food fit for human consumption and free from contamination and/or cross contamination.

Note: As the manufacturing processes are specific to each fish product, the processing establishment should establish operation controls specific to the product to ensure safety.

The basic steps required to manufacture and distribute fish product include – receiving, pre-processing and processing, packaging, storage and distribution. All these operations shall be conducted in accordance with adequate sanitation principles.

1. Receiving of Incoming Materials

Fig 12- Receiving of Incoming material

1.1. There should be written specifications/quality standards for all incoming materials – fish and shellfish, ingredients and packaging materials. This should meet the relevant regulations prescribed by regulatory bodies.

1.2. Suppliers of raw materials and ingredients should be evaluated regularly.

1.3. Materials on receipt shall be inspected and those complying with the specifications should be accepted into the processing facility and non-conforming materials should be rejected and proper records should be maintained thereof.

1.4. Immediately on receipt, the raw material shall be washed or cleaned as necessary to remove soil or other contaminants using potable water. It is recommended that temperature of fish at the time of delivery should be in the range of 0°C to +4.0°C.

1.5. All packaged raw materials shall be checked for 'expiry date'/'best before'/'use by date'.

1.6. The incoming vehicles that bring the raw material should be checked for cleanliness and hygiene i.e. the trucks are clean, with no pests or dirt, with no strong odour and does not contain materials other than the raw material.

1.7. The fishing vessels should be registered and licensed by the competent authorities. They should maintain the GHP as described under annexure 3

1.8. Containers and carriers of seafood must be inspected on receipt to ensure that their condition has not contributed to the contamination or deterioration of the seafood.

1.9. To prevent cross contamination, the raw material receiving station shall be separate with adequate space to receive and store raw material in chilled conditions

2. Storage – Raw Materials & Packaging Materials

There is a need for storage practices which are affordable and available to the small-scale processors also.

2.1 Fish should be stored such that damage from over stacking or overfilling of boxes will be prevented and should be kept in shallow layers surrounded by sufficient finely divided ice or with a mixture of ice and water before processing. The temperature of the fish should be maintained between 0°C and +4°C.

2.2 Ingredients and packaging materials should also be stored appropriately in terms of temperature and humidity and protected and segregated to prevent cross contamination.

2.3 A fish processing establishment shall store raw material and packaging materials in appropriate dry and ventilated areas for effective protection from dust, condensation, drains, waste and other sources of contamination during storage. Packaging material storage room should be closed from all sides to restrict entry of flies, rodents, birds, insects/pests etc.

2.4 Storage of raw material/ ingredient, /packaging material shall be done as per FIFO (First in First Out) / FEFO (First Expire First Out) stock rotation system, as applicable.

2.5 The food materials/ ingredient/ packaging material shall be stored on racks/ pallets such that they are stored off the floor on pallets and off the walls to ensure easy and adequate cleaning and prevent harbouring of any insects, pests or rodents.

2.6 The storage of raw, processed, semi processed, rejected, recalled or returned materials or products, shall be made separately and properly segregated. These areas shall be marked for identification and shall be secured.

2.7 All raw materials/food additives and ingredients shall be stored separately from printed packaging materials, sanitary, hardware and cleaning materials/chemicals.

2.8 Storage of ready to eat products should be above the raw products.

NOTE* In case detached cold storage to be used, it shall meet the above requirements and shall be approved by the competent authority.

3. Fish and Fish Products- Processing including Pre-Processing

3.1 The flow diagram of processing operations and standard operating procedures shall be documented, implemented and should be displayed at appropriate locations in the production area. In addition, standard operating procedures for process changeover i.e. from one kind of product to another or from one kind of fish to another shall also be maintained and implemented.

Fig 13- Handling of Fish and Fish Product

3.2 Fish and shellfish should be handled and conveyed with care during pre-processing and processing operations to avoid physical damage such as puncture and mutilation as this can accelerate the rate of decomposition. Tables made of food grade steel with adequate water supply and provision for waste disposal should be used for handling, cleaning, cutting and processing of fish in pre-processing and processing units.

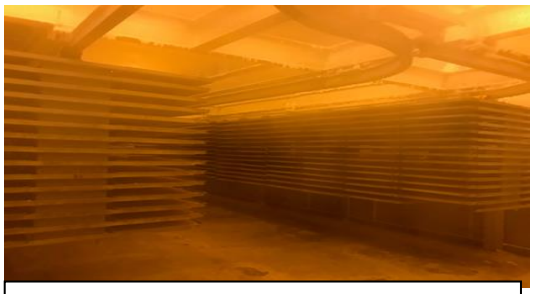


Fig 14- Handling of Product during freezing

3.3 The fish processing should be done in clean and hygienic environment with no cross contamination. The processes shall be specific for each product and could be blast freezing /chilling/ drying mechanically / salting and drying further / or any other local technology

3.4 The processing establishment should ensure the product attains the specified core temperature during processing as prescribed by the competent authority and records to be maintained. For e.g., the core temperature of chilled products should be 4oC; in core temperature of frozen fish products shall be -18°C or below.

3.5 Samples should be taken during processing and tested for critical parameters and test results should be recorded and maintained.

3.6 Ice used in cooling and holding raw product should not be mixed with ice used to store processed and packed products.

4. Allergen Management

Any Allergen Control Plan should address the below minimum requirements:

4.1. Listing of all allergens:

Major Allergens are –

1. Cereals containing gluten; i.e., wheat, rye, barley, oats, spelt or their hybridized strains and products of these;
2. Crustacean and products of these;
3. Eggs and egg products;
4. **Fish and fish products;**
5. Soybeans and products of these;
6. Milk and milk products (lactose included);
7. Peanut, tree nuts and nut products; and
8. Sulphite in concentrations of 10 mg/kg or more."

4.2. **Paste list of allergens at the relevant places** in the processing areas for awareness among all the employees.

The allergens may include:

- All that are used intentionally
- All that enter your site unintentionally (staff food, via contractors, transport, neighbours (air borne, etc.)

4.3 Allergen Control and Management

a.) Supplier monitoring

- COAs should be obtained for all allergens from the approved suppliers.
- When reviewing specifications, the responsible person should look for formulations of the listed ingredients of the raw material.

b.) Plant traffic flow

- Maintain all ingredient flow during the manufacturing from non-allergen using areas to allergen using areas. This will help prevent cross-contamination.

c.) Raw material storage

- All raw materials that are allergens should be labelled with a tag that states "allergen." The label can be made Bold and with Bright colour for quick identification.
- Store all allergic foods or ingredients to a designated and separate area. For partially used allergic packets, the production staff should ensure the partially used packet should be stored separately and completely sealed and identified with label.
- Color-coding charts can also be placed throughout the production area, especially above all wall-mounted equipment and near storage areas for easy identification by plant personnel.

d.) Colour coding system for allergen specific utensils

- Dedicated scoops and utensils shall be used for specific allergens.
- Bright colours and words can be used for easy identification of different allergens.

e.) Production scheduling and Cleaning

- Thorough cleaning should be there between allergic containing product manufacture and non-allergic containing product manufacture. Process should be there to ensure any allergen residues on the production line.
- Preferably products containing non-allergen ingredients should run before the product containing allergic ingredients.
- When production scheduling and cleaning operations are not performed between allergen containing production runs, allergen testing must be performed. For. E.g. ELIZA test kits are used to verify.

5. Packaging of Fish and Fish Products and warehousing

5.1 Food Packaging: Packing area

5.1.1. All steps in the packaging process should be performed without unnecessary delay and under conditions that will prevent the possibility of contamination, deterioration and the growth of pathogenic and spoilage micro-organisms; preferably in an area that should be closed from all sides to restrict the entry of flies, rodents, birds and pests.

5.1.2. All packaging equipment like weighing scale shall be calibrated on daily basis against certified standards & their records should be maintained.

5.1.3. The packaging design and materials shall provide protection for products in order to prevent contamination, damage and accommodate required labelling as laid down under the FSS Act & the Regulations there under. Only Food grade packaging materials shall be used. Usually, food grade polythene film is used in all the different procedures of packing.

5.1.4. Labelling shall be done as per FSSR (Packaging and Labelling) Requirements.

5.1.5. The food packaging materials shall be inspected before use to prevent the use of damaged, defective or contaminated packaging, which may lead to contamination of the product. The food business operator shall have effective procedures in place to confirm that contaminated, damaged or defective reusable containers are properly cleaned and sanitized, repaired or replaced, as appropriate, before re-use.

5.1.6. The packaging materials or gases where ever used, shall be non-toxic and shall not pose any threat to the safety and suitability of food under the specified conditions of storage and use.

5.2 Warehousing/Storage of final product

5.2.1. It is recommended to follow best practices for warehousing. All packed goods should be stored 18" away from walls, preferably stocks to be kept on pallets.

5.2.2. The warehouses should be kept clean, ventilated, lighted and under hygienic condition to avoid pest infestation, dirt, dust, smell.

Fig 14- Storage of Final product

5.2.3. Where specified for a particular kind(s), temperature and humidity control systems should be introduced and must be carried out with calibrated recording equipment with appropriate maintenance of records.

5.2.4. All end products should be stored at right temperature in a clean, sound and hygienic environment.

5.2.5. Severe fluctuations in storage temperature (more than 3 °C) should be avoided.

5.2.6. Too long storage time (depending on fat content of species used and type of coating) should be avoided.

5.2.7. Products should be properly protected from dehydration, dirt and other forms of contamination.

5.2.8. In chilled storages, direct blowing of cold air to iced fish in crates should be avoided to prevent dehydration of fish. Extra ice may be placed on the top crate along with proper covering.

5.2.9. In the case of frozen storage there shall be suitable defrosting system and suitable arrangements to remove melt water from the frost. It shall be ensured that during defrosting, variation in temperature to be minimized so as to ensure that product temperature may not rise above -18°C.

5.2.10. Where the product is susceptible to temperature abuse and / or weather damage, covered bays should be provided for loading and unloading.

6. Rework & Control of non-conforming products

6.1. Non-conforming products detected through internal defect findings, internal audits, external audits, incoming material inspection or simply during normal testing and inspection activities shall be reprocessed or stored, handled, labelled and used in such a way that product safety, quality, traceability and regulatory compliance are maintained.

6.2. All Traceability records for rework shall be maintained.

6.3. Stored rework/non-conforming material shall be protected from exposure to microbiological, chemical or extraneous matter contamination.

6.4. Where rework/non-conforming is incorporated into a product as an “in-process” step, the acceptable quantity, the process step and method of addition, including any necessary pre-processing stages, shall be defined.

6.5. Where ever rework activities involves product decantation from filled packages adequate controls shall be put in place to ensure removal and segregation of packaging materials and to avoid contamination of the product with extraneous matter.

6.6. Standard operating procedure should be defined and documented for handling any rework or non-confirming products.

7. Transportation and distribution of Fish and Fish Products

7.1 The dispatches of finished goods must follow FIFO or FEFO (First Expiry First Out) system.

7.2 Avoid unnecessary exposure to elevated temperature during loading and unloading of fish and fish products.

7.3 Loading to be done in such a way to ensure good air flow between product and walls, roof and floor.

7.4 During transportation, all precautions should be taken to maintain the appropriate temperatures so that dis-colouration, foul smell, and microbial spoilage could be avoided.

7.5 Conveyances and/or containers or tankers used for transporting Fish and Fish products shall be kept clean, hygienic and maintained in good repair condition. Where direct contact with Fish can occur such as during bulk transportation, the materials used in carrier construction should be suitable for food contact.

7.6 Appropriate measures should be applied to minimize damage to products and to ensure packaging integrity.

During Transportation

1. Frozen product to be maintained at -18°C or below (recommended to have max fluctuation +3°C)
2. Fresh fish, shellfish and their products – temperature close to 0°C. It is recommended to use freezer bags, ice slurry, chilled seawater or refrigerated seawater, where appropriate.
3. Fresh whole fish should be kept in shallow layers of melting ice and maintained at a temperature between 0-4 degree Celsius.

7.7 Facilities for recording temperature or data logger should be present.

7.8 The transport vehicle should be examined for possible cross-contamination of ready-to-eat fish and fish products by raw fish and fish products.

8. Product traceability and recall procedures

8.1 Experience has demonstrated that a system for recall of product is a necessary component of a prerequisite programme because no process is fail-safe. Product tracing, which includes lot identification, is essential to an effective recall procedure.

8.2 Establishment shall have a traceability system for assigning codes or lot numbers to incoming materials, packaging materials and finished products, etc. This will help to identify products backward & forward movement.

- Forward traceability- movement from raw material to stages in supply chain.
- Backward traceability- movement from point of receiving of the supply chain to the source of raw materials.

8.3 The establishment shall have a documented and effective product recall plan in place in accordance with the Food Safety & Standards Recall Regulations, 2017. Such a plan shall allow the establishment to effectively locate all affected food products that may cause a potential threat to public health and enable the complete, rapid recall of the implicated lot of the product from the market.

8.4 Product recall procedure should be internally tested and documented through mock recalls at least once in a year by facility recall team.

8.5 Appropriate records of processing, production and distribution should be kept and retained for a period that exceeds the shelf-life of the product.

8.6 For traceability of the catchment area/ aquaculture farm records are to be maintained, to ensure from where fish has been collected.

8.7 Where there is a health hazard, products produced under similar conditions, and likely to present a similar hazard to public health, may be withdrawn. The need for public warnings should be considered.

8.8 Recalled products should be held under supervision until they are destroyed, used for purposes other than human consumption, or reprocessed in a manner to ensure their safety.

** Product recall procedure shall be as per FSSAI recall protocol mentioned in* Food Safety and Standards (Food Recall Procedure) Regulations, 2017.

9 Quality Control

9.1 The fish processor shall have a quality control programme in place for the inspection and testing of incoming fish, in process and finished products.

9.2 A laboratory facility along with trained and competent testing personnel should be available for food testing. If there is no in-house laboratory present, then all the regular testing shall be done through an accredited external laboratory/laboratory notified by FSSAI. In case of complaints or feedback on the product, the processor shall carry out the testing either though their in-house/ external accredited labs/ lab notified by FSSAI to ensure product compliance to standards.

9.3 All incoming raw materials / Bulk chemicals / Ingredients test records or COA shall be maintained.

9.4 In-process and finished product samples should be tested and records should be maintained. Each category or type of finished product shall be tested as per FSS standards & regulations 2011, at least once in six months from FSSAI approved labs. It is recommended to retain the control samples in a separate area, till the end of shelf life. Further, it should be disposed of. Testing records shall be maintained. Refer to approved external laboratory list by FSSAI Regulation http://www.fssai.gov.in/Lab.aspx

9.5 If pathogen testing is conducted in-house, the tested sample and remnant should be autoclaved before disposing off.

9.6 Calibration of laboratory equipment shall be done periodically.

III - Establishment– Maintenance and Sanitation

Cleaning and Sanitation

The establishments and equipment shall be kept in an appropriate condition to facilitate all sanitation procedures and, prevent contamination of food.

> **Cleaning** is required to remove all the physical contamination like – foreign matter, dust, dirt, etc.
> **Disinfection** is required for destruction of microorganism (especially those which are pathogenic to human)

1.1 Cleaning and sanitizing programmes shall be established at facility to ensure that the food-processing equipment and environment are maintained in a hygienic condition to prevent contamination of food, such as from metal shards, flaking plaster, food debris and chemicals and records of the same shall be maintained. The programme should ensure that all parts of the establishment are appropriately clean, and shall also include the cleaning of cleaning equipment.

1.2 The establishment should have written Sanitation SOPs that clearly describe procedures to prevent direct contamination or adulteration of product. These sanitation SOP must:

- Contain all the procedures the establishment will conduct daily, before, during and after operation.
- Identify the procedures to be conducted prior to operations (pre-op) and address, at a minimum, the cleaning of food contact surfaces of facilities, equipment, and utensils.
- Specify the frequency with which each procedure in the Sanitation SOP is to be conducted identify the establishment employee or position, responsible for the implementation and maintenance of the procedures.
- The procedures should be signed and dated by the individual with overall authority on-site or a higher-level official of the establishment. This signature signifies that the establishment will implement the Sanitation SOPs as written and will maintain the Sanitation SOPs in accordance with the requirements of this part.

1.3 Cleaning and disinfection chemicals shall be food grade wherever chances of it may come in direct or indirect contact through equipment or plant surfaces, handled. It should be used carefully and in accordance with manufacturers' instructions, for example, using the correct dilutions, and stored, where necessary, separated from food, in clearly identified containers to avoid the risk of contaminating food.

Fig 16- Cleaning of Conveyor

1.4 Cleaning and disinfecting process may involve the following steps and the cleaning schedule should be displayed -

1.4.1 **Pre-cleaning,** preparation of area and equipment for cleaning: Major solids (like removal of extra fish and fish products from the area, the removal of packaging material from water etc.) from floors, equipment and food contact surfaces.

1.4.2 **Rinse:** All surfaces are rinsed with clean water.

1.4.3 **Cleaning with detergent (food Grade):** Equipment and food contact surfaces are scrubbed using brushes with a suitable detergent to remove food residues, dirt, grease and other objectionable matter.

1.4.4 **Rinsing:** with potable water, as appropriate to remove all soil and detergent residues.

1.4.5 **Disinfection:** Food contact surfaces are then disinfected with 100mg/lit sodium hypochlorite sanitizer solution for 10 minutes to destroy most microorganisms on surface. Adequate contact time should be given for effective disinfection.

1.4.6 **Post Rinse:** As appropriate, a final rinse with potable water to remove all disinfectant residues.

1.4.7 **Storage:** Cleaned and disinfected equipment, container and utensils should be stored to prevent their contamination.

> ***Meaning of Adequate hot water supply****: Often there are multiple hot water supplies in a food manufacturing facility used for cleaning, hand washing etc. But if there is only one hot water supply, the term "adequate" should mean that even at times where large amounts of hot water is used. (e.g. during cleaning operations) the water supply from any tap in the establishment should not be decreased*

S. No.	Purpose	Recommended levels of available chlorine content
1.	Process water, glaze water and ice production. *	<5ppm
2.	Hand dip water	<20ppm
3.	Foot dip water	100-200ppm
4.	Water for sanitation of utensils, processing table, processing machinery etc.	100ppm
5.	Water for sanitation of floor and wall	100-200ppm
6.	Water for sanitation of drain	250-500ppm

*In case of process water and water for ice production higher level of chlorine to the tune of 10-15ppm is recommended for water disinfection, provided the chlorine level shall be reduced to recommended residue level before water/ice is used for food processing.

*In case of hand dip; after passing through 20ppm; it is recommended to wash hands through 2 ppm chlorine solution followed by potable water, so as to reduce the chlorine residue level in the hands at an acceptable level.

Chlorination Schedule

1.5 A validation mechanism should be in place for all cleaning programme.

1.6 The schedule of maintenance should be displayed at every appropriate place and the concerned supervisor should moderate such activities.

1.7 Handlers or cleaning personnel, as appropriate, should be well trained in the use of special cleaning tools and chemicals, and in methods of dismantling equipment for cleaning and they should be knowledgeable in terms of the significance of contamination and the hazards involved.

1.8 Designated area with lock & key provision should be allocated for cleaning equipment & chemical.

1.9 The premises shall be cleaned thoroughly with disinfectants, prior to every production day and the equipment used shall be sterilized/sanitized before use.

1.10 Preventive action shall be taken to avoid any paint flakes on walls and ceilings.

Fig 17- Hand Dip and Foot Dip

1.11 If rooms are used for any other food preparation purposes, then cleaning and disinfection are necessary immediately before and after use of every different product.

1.12 Planned and frequent microbial analyses of food contact areas must be carried out after cleaning and sanitizing to verify the adequacy of the sanitation regime and records of verification analyses have to be maintained.

1.13 Raw and in-process products must be protected during cleaning and sanitation activities.

1. Maintenance

2.1 Preventive maintenance of equipment and machinery shall be carried out regularly as per the instructions of the manufacturer.

2.2 A preventive maintenance programme must include all devices used to monitor and/or control food safety hazards and cover the maintenance procedure, frequency and identification of the person (and/ or external agency) responsible for maintenance activity.

2.3 Internal & External calibration schedule for critical food safety equipment's should be maintained.

2.4 Corrective maintenance shall be carried out in such a way that production on adjoining lines or equipment is not at risk of contamination and post maintenance verification to be get verified.

2.5 Lubricants, heat transfer fluids or any other similar material used shall be food grade where there is a risk of direct or indirect contact with the product.

2.6 Equipment's breakdown and maintenance records should be maintained.

2.7 Loose items control policy (Nut & bolts, Nails broken pieces or smaller parts of machines) should be followed to prevent any contamination with product or packaging material.

2.8 Regular maintenance checks (which includes thermometers, thermostats, temperature gauges etc.) should be made for fish tanks, equipment and transporting vehicles.

2. Pest control systems

3.1 Buildings shall be kept in good repair and condition to prevent pest access and to eliminate potential breeding sites. Holes, drains and other places where pests are likely to gain access shall be kept sealed. Wire mesh screens, for example on open windows, doors and ventilators, will reduce the problem of pest entry. Animals, birds and pets shall be excluded from the food premises.

3.2 Establishment should have a nominated person to manage pest control activities, and/or with the help of an external appointed contractors with a valid and legal contract. Major pest activities for rodent, lizard, cockroaches, flies, rats, mice and vermin, insects; to exclude from the establishments and processing areas.

3.3 Shall have an effective pest monitoring programme and shall include the placing of detectors and/or trap in key locations to identify pest activity.

3.4 A map of detectors and/or traps shall be maintained. Detectors and/traps shall be designed and located so as to prevent potential contamination of materials, products or facilities.

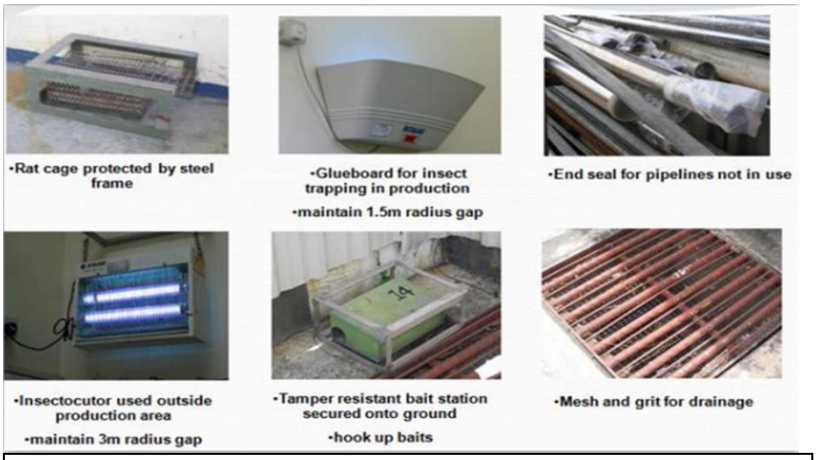


Fig 18- Pest Control Systems

3.5 Treatment with permissible chemical, physical or biological agents, within the permissible limits, shall be carried out without posing a threat to the safety or suitability of food by trained operatives

3.6 Records of pesticides / insecticides used along with dates and frequency shall be maintained to show the type, quantity and concentrations used; where, when and how applied and the target pest.

3.7 If any pest treatment chemicals / tools stored inside plant facility shall always be kept under lock & key.

3.8 Proper records of pest control activities should be kept and maintained.

Pest control 4 D method

1D – Deny Entry- preventing Entry	2D-Deny Shelter- Elimination of Harborage of Pests	3D- Deny Food- Eliminate food sources to pests	4D- Destroy
• Seal all holes, crevices at ceilings, walls and floors. • Threshold clearances of doors <6mm, fix metal kicking plates. • Double door/air curtains/strip curtains/ mesh screens, self-closing doors at appropriate locations. • Missing/damaged gratings of drains installed/replaced.	• Avoid False sealing in processing and storage area. • Repair defects on walls, floors, ceilings, woodwork and other structure. • Remove disused/ obsolete articles from food premises.	• Store all foods and condiments in sealed/ covered containers. • Floor free from food remnants. • Prohibit preparing food and utensils cleaning at other places. • Store refuse in dedicated closed container and discard periodically to prevent accumulation	• Clean and disinfect pest infected places, clothing and equipment. • Use insectocutor- place 4.5-6m away from food handling area. • Use low wall mounted insectocutors. • Clean insectocutor every week. • Cover all foods during Pest control treatment. • Use glue pads inside and rodent boxes outside the processing areas. • Pest or chemical contaminated food be discarded.

3. Waste Disposal Management

4.1 All fish waste and other waste materials (like dressing of shrimp/cleaning of fish by evisceration or splitting the belly, or filleting the fish) including solid, semisolid or liquid wastes shall be removed from time to time from the places where food is handled, or processed or packed and carried to the disposal area to prevent contamination of fish.

4.2 Covered and non-hand operated waste bins shall be provided in sufficient numbers for collection and removal of all garbage, filth and refuse from the processing halls at a convenient time to a place away from the factory for disposal. Waste bins shall be thoroughly cleaned and disinfected immediately after use and when not in use.

4.3 The drains should be cleared for easy flow of water while cleaning and sanitation as well as excess water spillage or washing facility as per requirement.

4.4 Waste disposal shall be done in accordance with local rules and regulations in a hygienic manner.

4.5 The disposal of sewage and effluents (solid, liquid and gas) shall be as per the Factory/Environment Pollution Control Board requirements.

Fig 19- Keep no open drain inside the plant and Install covered drainage system inside the premises

4.6 Waste stores and dust bins must be kept appropriately clean, free of pests and in closed conditions and shall be disposed as per local rules and regulations including those for plastic and other non- environment friendly materials.

4.7 Waste disposal SOP should be defined & Hazardous waste disposal records to be maintained

4.8 It is recommended as best practice to store bio degradable & non-degradable waste separately.

4. Others

5.1 Proper precautions should be taken to reduce the potential for food contamination, food-contact surfaces, or food-packaging materials; and to protect food in outdoor bulk vehicles.

5.2 In case of any civil work during production, adequate protection shall be taken to avoid sand / stone contamination.

IV. Establishment – Personal Hygiene

Personal hygiene plays an integral part to safeguard the food produced from any sort of cross contamination. A good personal hygiene and behaviour prevents the food from contamination and subsequently hazards in the product and hence illnesses to the consumers. Personal hygiene will include health and hygiene of food handlers, duties of employers as equal to employees in the area of personal hygiene by providing the appropriate environment and facilities.

1. Health Status and Illness and Injury

1.1 Any person affected by symptoms of illness (jaundice, diarrhoea, vomiting, fever, sore throat with fever, visibly infected lesions and discharges from ear, eye or nose), shall immediately report illness or symptoms of illness to the management for possible exclusion from food handling area and medical examination of the food handler shall be carried out apart from the periodic check-ups, if clinically or epidemiologically indicated.

1.2 A food handler/ worker who comes back to work after a medical leave (infected by a communicable disease) should carry his fitness certificate, authorised by a certified medical practitioner.

Fig 20- Cuts, wounds to be properly covered

1.3 Medical examination of all food handlers / employees of the establishment shall be done once in a year to ensure that they are free from any infectious, contagious and other communicable diseases or asymptomatic carriers. A record of these examinations signed by a registered medical practitioner shall be maintained supported by test reports.

1.4 Inoculation of factory staff including workers against the enteric group of diseases shall be done once a year and records there to be maintained.

1.5 In case of an epidemic, all factory staff including workers shall be vaccinated irrespective of the yearly vaccination.

1.6 In fish handling area, personal with open cuts, wounds or burns shall be required to cover them with suitable water proof bandage before starting operations. Any lost dressing must be reported. The bandage should preferably be brightly coloured and metal detectable.

2. Personal Cleanliness

2.1 Fish handlers shall maintain high degree of personal cleanliness and shall wear clean protective clothing, head covering, face mask, gloves (wherever necessary) and footwear while at work.

2.2 It is recommended to have separate clothing for high risk and low risk areas.

2.3 Working without gloves can be done provided there are necessary controls on periodic usage of disinfectants at work sections and nature of the product being handled. However, where gloves to be used for product contact, they shall be clean and in good condition.

Fig 21- Proper Protective Clothing

2.4 Head caps/headgears should be worn first and footwear to be worn at the last.

2.5 To avoid loose hair contamination of food products, it is advisable to roll-on the sticky lint rollers on the dress. Other options being air tunnel for food handler passage before entering the processing hall.

2.6 Fingernails shall be kept trimmed and clean without nail polish.

2.7 All people entering food processing, storage, distribution and handling areas shall wash their hands with soap and potable water, followed by drying and sanitizing, where required

- Before start of fish or shellfish handling activities and upon re-entering a processing area;
- after handling chemicals;
- after handling contaminated materials;
- after breaks;
- after coughing or sneezing or blowing their nose;
- after using toilet facilities.
- after using telephone / cell phones,
- after smoking in designated areas etc.

*Hand washing notices shall be posted at appropriate places.

Fig 22- How to wash hands

Fig 23- Touch free (hands free) taps at wash basins to avoid cross contamination

Fig24: Automatic IPA hand sanitizer at entrance

Fig25: Auto Shoe cover dispenser

Fig26: Automatic hand-washing and foot cleaning system

Fig 27 : Provision of hand dryer for drying hands at entrance

Fig28 : Usage of sanitizer (IPA) before going inside process

Fig 29 -Storage of personal hygiene clothing

3. Personal behaviour

3.1 The Fish manufacturer shall implement an effective personal hygiene programme that identifies hygienic behaviour and habits to be followed by personnel to prevent contamination of food.

3.2 Any behaviour or unhygienic practices which could result in contamination of food should be prohibited in food processing, distribution, storage and handling areas. This includes smoking, chewing or eating, sneezing or coughing over unprotected food, spitting etc.

Fig 30 -Lockers

3.3 Personal effects such as jewellery, watches, pins or other items should not be worn or brought into food handling areas if they pose a threat to the safety and suitability of food.

3.4 Should provide separate lockers/place provided for persons regularly work in food processing areas to keep their personal belongings, tiffin etc.

3.5 Food contact tools and equipment shall not be kept in personal lockers.

4. Visitor control

4.1 Fish Manufacturers should implement and display visitor control policy

4.2 As a practice visitor should not be allowed in the processing hall, however in case of unavoidable circumstances, they shall ensure that visitors to its food manufacturing, processing or handling areas must wherever appropriate, wear protective clothing, footwear and adhere to the all the personal hygiene provisions required for personnel required in the food business.

4.3 Visitor identity cards provisions should be in place to maintain control on visitor's access into restricted areas.

4.4 Check points for entry and exit should have the facility for recording the movement of employee using electronic devises.

V. Establishment- Product Information and Consumer Awareness

1. Product Information and Labelling

1.1 Information shall be presented to consumers in such a way so as to enable them to understand its importance and make informed choices. Information may be provided by labelling or other means, such as company websites, education programmes and advertisements, and may include storage, preparation and serving instructions applicable to the product.

2. Consumer Awareness and Complaint Handling

2.1 The Food Business Operator shall have a system to handle product complaints with identified person or people responsible for receiving, evaluating, categorizing, investigating and addressing complaints. Complaints shall be accurately categorized according to safety concerns and other regulatory concerns, such as labelling and shall be investigated by appropriately-trained technical personnel.

2.2. An effective complaint handling system should comprise the following:

a) Policy and complaints handling procedure
b) Clear identification of all possible complaint sources
c) Complaint capturing and categorizing based on the health and safety risk
d) Investigation and root cause analysis (RCA)
e) Corrective action
f) Complaint trending and analysis
g) Continual improvement

VI. Establishment- Training and Management

1. Awareness and responsibilities

1.1 All personnel should be aware of their role and responsibility in protecting food from contamination or deterioration. Food handlers shall have the necessary knowledge and skills to enable them to handle food hygienically.

1.2 Those handling strong chemicals or potentially hazardous substances shall be trained in safe handling procedures and techniques.

2. Training programmes

2.1 Every fish and fish product manufacturer should have at least one trained and certified person in their premise to ensure food safety. (FSSAI has provided an easy solution for training and certification through its new initiatives of Food Safety Training and Certification (FoSTAC) portal).

2.2 Training in species identification and communication in product specification should be provided to fish handlers and appropriate personnel to ensure a safe source of incoming fish where written protocols exist.

2.3 Skills should be acquired by fish handlers and appropriate personnel in sensory evaluation techniques to ensure raw fish meets the essential quality provisions of the appropriate standards from FSSAI.

2.4 Suitable trainings shall be given to all personnel handling food. Fish and shellfish hygiene training is of fundamental importance. All personnel should be aware of their role and responsibility in protecting fish or shellfish from contamination and deterioration. to enable them to have the required knowledge and skills in GHP and GMP for specific tasks along with personal hygiene requirements commensurate with their work activities, the nature of food, its handling, processing, preparation, packaging, storage, service and distribution.

2.5 These training programmes shall be conducted by qualified, trained, and authorized personnel. Records of training shall be kept.

3. Instruction and supervision

3.1 Periodic assessments of the effectiveness of training, instructions programmes as well as routine supervision and checks should be made to ensure that food hygiene and food safety procedures are being implemented correctly and effectively by all personnel.

3.2 Managers and supervisors of food processes should have the necessary knowledge and skills in food hygiene GMP, GHP & HACCP) principles and practices to be able to judge potential risks and take necessary action to remedy deficiencies.

3.3 Handlers should have the necessary knowledge and skill to enable them to handle fish or shellfish hygienically. Those who handle strong cleaning chemicals or other potentially hazardous chemicals should be instructed in safe handling techniques.

4. Refresher training

Training programmes shall be routinely reviewed and updated wherever necessary. Systems should be in place to ensure that food handlers remain aware of all procedures necessary to maintain the safety and suitability of food.

5. Management & supervision

5.1 The management shall lead establishment of Food safety management systems in their premises.

5.2 The management shall ensure providing necessary trainings & resources to their employees to develop food safety culture at plant site.

5.3 Shall appoint trained & competent managers and supervisors for management and supervision of food safety systems.

5.4 The management shall provide and maintain documented standard operating procedure for FSMS systems compliance and its supervision at site through records /checklists on routine basis to control any possible hazards throughout supply chain.

VII. Establishment- Audit, Documentation and Record Keeping

1. Self-evaluation and review

1.1. The fish manufacturer shall conduct a self-evaluation process to review the effectiveness of the implemented food safety system at periodic intervals through internal and external audits or other mechanisms, at least once in a year. Necessary corrective actions based on self-evaluation results shall be taken. Internal audit to be carried out by cross sectional departments.

1.2. The Fish manufacturer should also undertake a complete review of the systems including self- evaluation results, customer feedback, complaints, new technologies and regulatory updates at periodic intervals, but at least once in a year for continual improvement.

2. Documentation and record

1.1 Appropriate documentation & records of receiving, processing, production and distributions shall be maintained in a legible manner, retained in good condition for a period of one year or the shelf-life of the product, whichever is more.

1.2 Following records shall also be maintained by the Fish manufacturer:

- Incoming materials checks – raw materials, ingredients, packaging materials. Etc.
- Inspection and testing
- Operational controls such as temperature, pressure, time etc.
- Product recall and traceability
- Storage
- Cleaning and sanitation
- Pest control
- medical examination and health status
- Training
- Calibration
- Complaints and customer feedback
- Corrective and preventive actions
- Self-evaluation results

Documentation, records and periodic audits/ inspection enhances the credibility and effectiveness of food safety control system.

HACCP IMPLEMENTATION INCLUDING CRITICAL CONTROL POINTS

Hazards Associated with Fish and Fish Products Manufacturing & HACCP Implementation for Important Control Measures

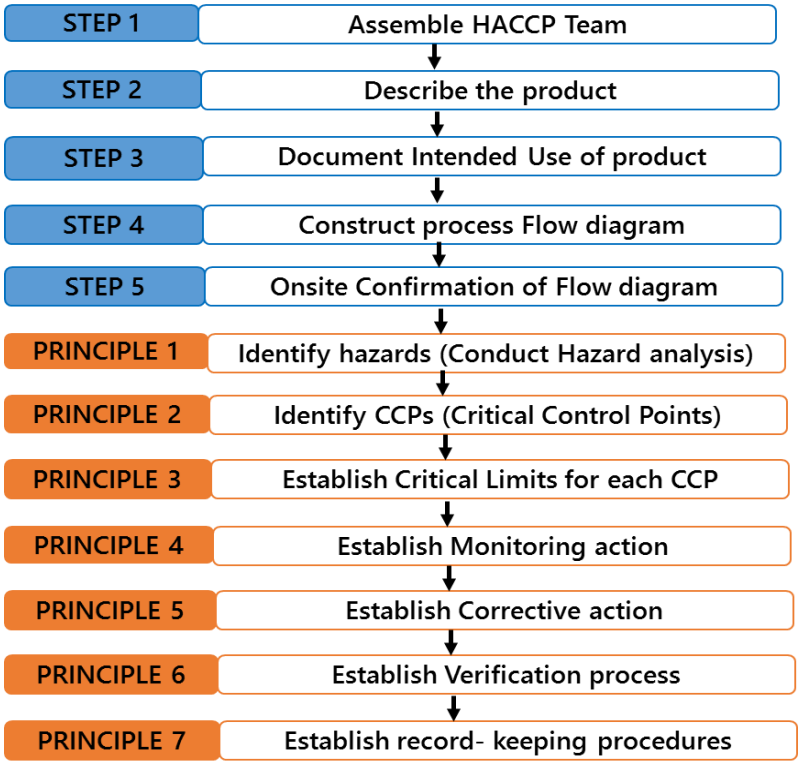
Implementing Hazard Analysis and Critical Control Point (HACCP) is crucial for any food manufacturing process. A HACCP plan covers the total supply chain, from inbound logistics, through storage, processing, sanitation and maintenance to the final use by the consumer. Across the operations, it must be ensured that procedures are available for internal logistics, processing specifications, working instructions, hygiene procedures and preventive maintenance plans. These procedures must cover start-ups, shutdown and unexpected stoppages during processing.

Brief Introduction of HACCP:

Hazard Analysis and Critical Control Point (HACCP) is an internationally recognized system for reducing the risk of safety hazards in food.

A HACCP System requires that potential hazards are identified and controlled at specific points in the process. This includes biological, chemical or physical hazards. Any company involved in the manufacturing, processing or handling of food products can use HACCP to minimize or eliminate food safety hazards in their product.

A HACCP plan is required to be in place before initiating the HACCP system. A HACCP plan consists of 5 initial steps and 7 major HACCP principles.



The requirements for Sanitation Standard Operating Procedures (SSOPs) along with Good Manufacturing Practices (GMPs) should be considered as Pre-Requisite for HACCP.

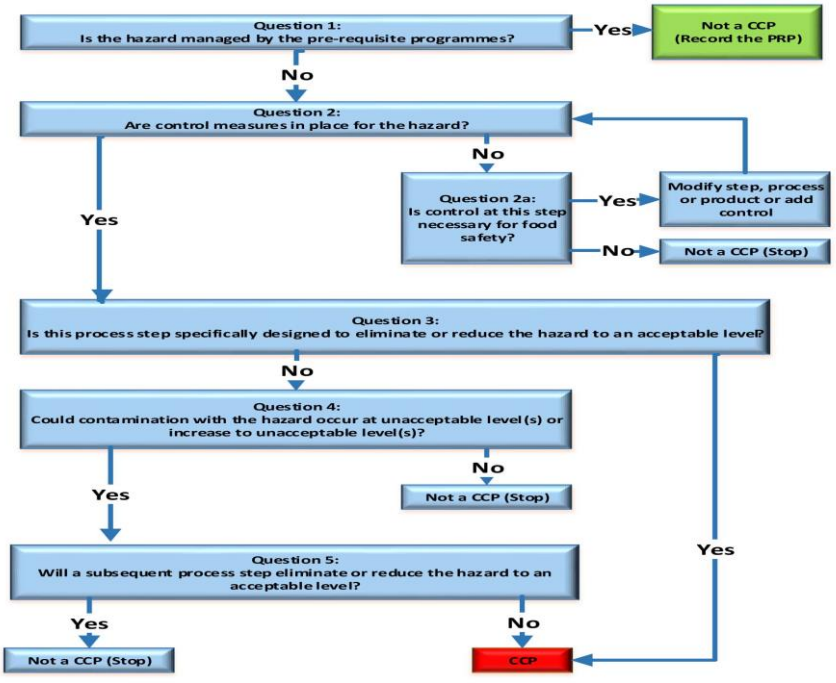
Risk assessment is a critical step in a HACCP plan. Below is a template to determine what severity and probability a processing step is involved with and therefore what level of criticality is holds in the processing

			Consequence/ Severity				
			How severe could the outcome be if the risk event occurs?				
			Severe	**Major**	**Significant**	**Minor**	**Insignificant**
Probability/ Likelihood	What's the chance of the risk occuring?	**Frequent**	Extreme	Extreme	Very High	High	Medium
		Likely	Extreme	Very High	High	Medium	Medium
		Occasional	Very High	High	Medium	Medium	Low
		Seldom	High	Medium	Medium	Low	Very Low
		Unlikely	Medium	Medium	Low	Very Low	Very Low

Introduction to Decision Tree

Hazard Analysis and Critical Control Point (HACCP) decision trees are tools that can be used to help you decide whether a hazard control point is a critical control point (CCP) or not. A CCP is a step at which control can be applied. However, it is not always possible to eliminate or prevent a food safety hazard, but allows you to reduce it to an acceptable level.

The purpose of a decision tree is to support the judgement of the team and help you to confirm whether the hazard needs more food safety controls. Decision trees are not mandatory elements of HACCP but they can be useful in helping you determine whether a particular step is a CCP.
It is vital that you determine the correct CCPs to ensure that food is managed effectively and safely. The number of CCPs in a process will depend on how complex the process is and how many hazards are present.



POSSIBLE HAZARDS IN FISH PRODUCTS MANUFACTURING

1. BIOLOGICAL HAZARDS

Biological hazards include pathogenic parasites, bacteria and viruses. These hazards can come from raw materials or from food processing steps. Fish caught from off shore waters are free from almost all pathogens, except *Vibrio parahaemolyticus* and *Vibrio vulnificus*, because these organisms are part of the normal bacterial flora of marine and brackish water environments.

1.1 Parasites-

The parasites known to cause disease in humans and transmitted by fish or crustaceans and mostly include helminths or parasitic worms. These are commonly referred to as nematodes, cestodes and trematodes. Fish can also be parasitized by protozoans, but there are no records of fish protozoan disease being transmitted to human beings. Parasites have complex life cycles involving one or more intermediate hosts and are generally passed to human beings through the consumption of raw, minimally processed or inadequately cooked products that contain the parasite infectious stage, causing foodborne disease. Freezing at –20 °C or below for seven days or –35 °C for about 20 hours for fish intended for raw consumption will kill parasites. Processes such as brining or pickling may reduce the parasite hazard if the products are kept in the brine for a sufficient time but may not eliminate it. Candling, trimming belly flaps and physically removing the parasite cysts will also reduce the hazards but may not eliminate them.

1.1.1 Parasitic Worms-

Nematodes

Many species of nematodes are known to occur worldwide and some species of marine fish act as secondary hosts. Among the nematodes of most concern are Anisakis spp., Capillaria spp., Gnathostoma spp. and Pseudoteranova spp., which can be found in the liver, belly cavity and flesh of marine fish. An example of a nematode causing disease in human beings is Anisakis simplex; the infective stage of the parasite is killed by heating (60 °C for one minute) and by freezing (–20 °C for 24 hours) of the fish core.

Cestodes

Cestodes are tapeworms and the species of most concern associated with the consumption of fish is Dibothriocephalus latus. This parasite occurs worldwide and both fresh and marine fish are intermediate hosts. Similar to other parasitic infections, the foodborne disease occurs through the consumption of raw or under-processed fish. Similar freezing and cooking temperatures as applied to nematodes will kill the infective stages of this parasite.

Trematodes

Fish-borne trematode (flatworm) infections are major public health problems that occur endemically in about 20 countries around the world. The most important species with respect to the numbers of people infected belong to the genera Clonorchis and Ophisthorchis (liver flukes), Paragonimus (lung flukes), and to a lesser extent Heterophyes and Echinochasmus (intestinal flukes). The most important definitive hosts of these trematodes are human beings or other mammals. Freshwater fish are the second intermediate host in the life cycles of Clonorchis and Ophistorchis, and freshwater crustaceans in the case of Paragonimius. Foodborne infections occur through the consumption of raw, undercooked or otherwise under processed products containing the

infective stages of these parasites. Freezing fish at –20 °C for seven days or at –35 °C for 24 hours will kill the infective stages of these parasites.

1.1.2 Protozoan Parasites -These are single celled animals

***Entamoeba histolytica* -** Can cause severe disease as classical amoebic dysentery which may be fatal if the parasite invades extra-intestinal tissues, such as liver, lungs or brain.

***Giardia lamblia*-** It is associated with diarrhoea, constipation and gastrointestinal pains, rarely invade the tissues.

***Toxoplasma gondii*-** Illness caused by this parasite is known as "Toxoplasmosis". Symptoms are hydrocephalus, blindness in children and Less severe in adults. Source of infection is under cooked or raw meats i.e. pork, lamb, beef, poultry & cats. Its intermediate host is domestic cat.

***Cryptosporidium* spp**. -These are the most frequently diagnosed opportunistic pathogens associated with diarrhoea and wasting syndrome in patients with AIDS. Cryptosporidium produces a life-threatening, prolonged cholera like illness in immunocompromised patients. "Cryptosporidiosis" is acquired after ingesting food or water contaminated with infective cryptosporidium oocysts. The mean prevalence of C.parvum in Europe and the U.S. is between 1 and 3% and it is considerably higher in developing countries.

1.2 Bacterial hazards

The level of contamination in fish at the time of capture will depend on the environment and the bacteriological quality of the water in which fish are harvested. Many factors influence the microflora of finfish, the most important ones being water temperature, salt content, proximity of harvesting areas to human habitations, quantity and origin of food consumed by fish, and method of harvesting. The edible muscle tissue of finfish is normally sterile at the time of capture and bacteria are usually present on the skin, gills and in the intestinal tract.

There are two broad groups of bacteria of public health importance that may contaminate products at the time of capture: (i) those that are normally or incidentally present in the aquatic environment, referred to as indigenous microflora: and (ii) those introduced through environmental contamination by domestic and/or industrial wastes. Examples of indigenous bacteria that may pose a health hazard are *Aeromonas hydrophyla, Clostridium botulinum, Vibrio parahaemolyticus, Vibrio cholerae, Vibrio vulnificus*, and Listeria monocytogenes. Non-indigenous bacteria of public health significance include members of the Enterobacteriaceae, such as Salmonella spp., Shigella spp. and *Escherichia coli*. Other species that cause foodborne illness and that have occasionally been isolated from fish are *Edwardsiella tarda, Pleisomonas shigeloides* and Yersinia enterocolitica. Staphylococcus aureus may also appear and may produce heat-resistant toxins.

Indigenous pathogenic bacteria, when present on fresh fish, are usually found in fairly low numbers, and food safety hazards are insignificant where products are adequately cooked prior to consumption. During storage, indigenous spoilage bacteria will outgrow indigenous pathogenic bacteria, thus fish will spoil before becoming toxic and will be rejected by consumers. Hazards from these pathogens can be controlled by heating seafood sufficiently to kill the bacteria, holding fish at chilled temperatures and avoiding postprocess cross-contamination.

Vibrio species are common in coastal and estuarine environments and populations can depend on water depth and tidal levels. They are particularly prevalent in warm tropical waters and can be found in temperate zones during summer months. Vibrio species are also natural contaminants of brackish-water tropical environments and will be present on farmed fish from these zones. Hazards from Vibrio spp. associated with finfish can be controlled by thorough cooking and preventing cross-contamination of cooked products. Health risks can also be reduced by rapidly chilling products after harvest, thus reducing the possibility of proliferation of these organisms. Certain strains of Vibrio parahaemolyticus can be pathogenic

1.3 Viral Hazards

Molluscan shellfish harvested from inshore waters that are contaminated by human or animal faeces may harbour viruses that are pathogenic to human beings. Enteric viruses that have been implicated in seafood-associated illness are the hepatitis A virus, caliciviruses, astroviruses and the norovirus. The latter three are often referred to as small round structured viruses. All of the seafood-borne viruses causing illness are transmitted by the faecal–oral cycle and most viral gastro-enteritis outbreaks have been associated with eating contaminated shellfish, particularly raw oysters.

Generally, viruses are species-specific and will not grow or multiply in foods or anywhere outside the host cell. There is no reliable marker for indicating the presence of viruses in shellfish harvesting waters.

Seafood-borne viruses are difficult to detect, requiring relatively sophisticated molecular methods to identify the virus.

Occurrence of viral gastro-enteritis can be minimized by controlling sewage contamination of shellfish farming areas and pre-harvest monitoring of shellfish and growing waters as well as controlling other sources of contamination during processing. Depuration and relaying are alternative strategies, but longer periods are required for shellfish to purge themselves clean of viral contamination than of bacteria. Thermal processing (85–90 °C for 1.5 minutes) will destroy viruses in shellfish.

2. CHEMICAL HAZARDS

Fish may be harvested from coastal zones and inland habitats that are exposed to varying amounts of environmental contaminants. Of greatest concern are fish harvested from coastal and estuarine areas rather than fish harvested from the open seas. Chemicals, organ chloric compounds and heavy metals may accumulate in products that can cause public health problems. Veterinary drug residues can occur in aquaculture products when correct withdrawal times are not followed or when the sale and use of these compounds are not controlled. Fish can also be contaminated with chemicals such as diesel oil (when incorrectly handled) and detergents or disinfectants (when not properly rinsed out).

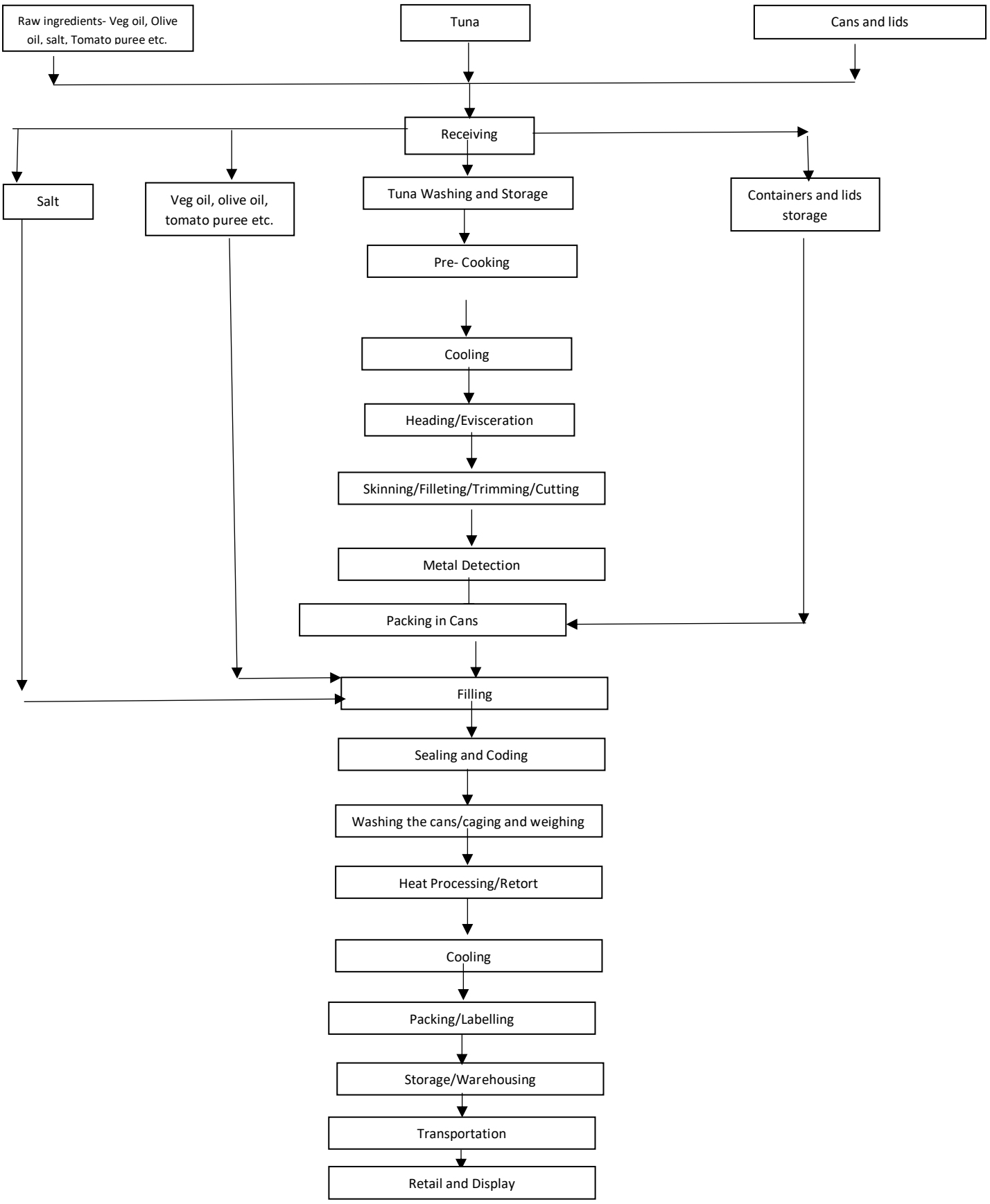
3. PHYSICAL HAZARDS

These can include materials such as metal or glass fragments, shell and bones.

However, many hazards were linked in the process which can be removed or reduced to acceptable level by an adequate food safety control and measures.

Process flow chart, Hazard Analysis

1. Canned Tuna (Oil/Brine/Sauce)- An example



1 a Table -Hazard Analysis Example – Canned Tuna

Note: This is only a reference model for Risk Assessment & CCP determination example. These may vary from manufacturing plant to plant depending on risk assessment and process control

Sl No.	Process Step	Hazard Type	Potential hazard	Likelihood	Severity	Risk	Preventive Measure	Q1	Q2	Q2A	Q3	Q4	Q5	CCP Y/N	Remark
1. 1.a.	Receiving of Tuna	Biological	Microbial pathogens	M	L	ML	Taken care by PRPs and eliminated during retorting stage	Y	-	-	-	-	-	N	Microbial pathogens are reduced or eliminated in the subsequent pre-cooking and retorting stage
		Chemical	Histamine	M	H	MH	Time-Temperature control; Proper handling &icing during harvest, transportation & storage of Tuna	N	Y	-	Y	-	-	Y CCP-1	Tuna subjected to time-temperature abuse can develop scombrotoxin (Histamine).
		Physical	None	M	L	ML	Taken care by PRPs	Y	-	-	-	-	-	N	Visual Inspection to detect presence of foreign material
1.b.	Receiving of other raw material	Biological	None	-	-	-	-	-	-	-	-	-	-	-	-
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	Presence of foreign material	M	L	ML	Taken care by PRPs a	Y	-	-	-	-	-	N	Visual Inspection to detect presence of foreign material
1.c.	Receiving and storage of cans and lids	Biological	Contamination of cans due to poor storage conditions	L	M	LM	Taken care by PRP's	Y	-	-	-	-	-	N	Maintain good air quality and humidity of the storage room
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	Low quality or damaged cans and lids	L	M	LM	Taken care by PRP's	Y	-	-	-	-	-	N	Purchase specifications and visual inspection of all

			Damaged cans and lids due to poor storage conditions												lots of empty cans and lids. Cans must be stacked properly
2.	Washing	Biological	Microbial Pathogens	M	L	ML	Taken care by PRPs and eliminated during retorting stage	Y	-	-	-	-	-	N	Microbial pathogens are reduced or eliminated in the subsequent pre-cooking and retorting stage
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
3.	Storage	Biological	Microbial pathogens	M	L	ML	Taken care by PRPs and eliminated during retorting stage	Y	-	-	-	-	-	N	Microbial pathogens are reduced or eliminated in the subsequent pre-cooking and retorting stage
		Chemical	Histamine	M	H	MH	Taken care by PRPs	Y	-	-	-	-	-	N	Controlled by PRP's
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
4.	Pre-cooking	Biological	Microbial pathogens	M	L	ML	Controlled during retorting	Y	-	-	-	-	-	N	Completely eliminated or reduced to safe level during retorting
		Chemical	None	-	-	-	NA	-	-	-	-	-	-	-	_
		Physical	Metal Fragments	M	L	ML	Controlled in the following steps	N	Y	-	N	Y	Y	N	Controlled during the metal detection step.
5.	Cooling	Biological	Microbial pathogens	L	M	LM	Controlled in the following steps	Y	-	-	-	-	-	N	Eliminated in the retorting process
		Chemical	None	-	-	-	NA	-	-	-	-	-	-	-	_
		Physical	None	-	-	-	NA	-	-	-	-	-	-	-	
6.	Heading/Evisceration	Biological	Microbial pathogens	M	L	ML	Taken care by PRPs and eliminated during retorting stage	Y	-	-	-	-	-		Microbial pathogens are reduced or

														N	eliminated in the subsequent pre-cooking and retorting stage
		Chemical	None												
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
7.	Skinning/Filleting/Trimming/ cutting	Biological	Microbial pathogens	M	L	ML	Taken care by PRPs and eliminated during retorting stage	Y	-	-	-	-	-	N	Microbial pathogens are reduced or eliminated in the subsequent pre-cooking and retorting stage
		Chemical	None	-	-	-	NA	-	-	-	-	-	-	-	_
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
8.	Metal Detection	Biological	None	-	-	-	-	-	-	-	-	-	-	-	-
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	Metal fragments	M	H	MH	Reject or reprocess the pouch containing metal pieces	N	Y	-	Y	-	-	Y; CCP-2	Metal fragments entering into the product from the processing machinery are detected at this step. Product containing metal fragments are rejected or reprocessed.
8.	Packing in Cans	Biological	Microbial pathogens	M	L	ML	Taken care by PRPs and eliminated during retorting stage	Y	-	-	-	-	-	N	Microbial pathogens are reduced or eliminated in the subsequent pre-cooking and retorting stage
		Chemical	Metal poisoning	M	L	ML	Taken care by PRP's								All cans used should be made up of food grade material.

		Physical	Impurities present in the can	M	L	ML	All cans are cleaned and inspected before packing; Defective cans are discarded	-	-	-	-	-	-	-	Taken care by operational controls
9.	Weighing	Biological	None	-	-	-	-	-	-	-	-	-	-	-	-
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
10.	Filling of Oil/Brine/ Sauce	Biological	Microbial pathogens	M	L	ML	Taken care by PRPs and eliminated during retorting stage	Y	-	-	-	-	-	N	Microbial pathogens are reduced or eliminated in the subsequent pre-cooking and retorting stage
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
11.	Sealing and coding	Biological	None	-	-	-	-	-	-	-	-	-	-	-	-
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
12.	Washing of cans and weighing	Biological	Microbial pathogens	M	L	ML	Taken care by PRPs and eliminated during retorting stage	Y	-	-	-	-	-	N	Only potable water is used
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
13.	Heat Processing /Retorting	Biological		M	H	MH	Proper cooking; Control of retorting time and temperature	N	Y	-	Y	-	-	Y; CCP-3	Adequate retorting is essential to eliminate the microbial pathogens
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
14.	Cooling	Biological	Pathogen recontaminati on	M	L	ML	Controlled by sanitation programmes	Y	-	-	-	-	-		Recontamination can be prevented by adopting proper

														N	sanitation controls
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
15.	Packing/Labelling	Biological	None	-	-	-	-	-	-	-	-	-	-	-	-
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
16.	Storage/ Warehousing	Biological	Microbial Load	M	H	MH	Temperature to be maintained	N	Y	-	Y	-	-	N	Finished Product Storage done makes hazard unlikely to occur.
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
17.	Transportation	Biological	Microbial pathogens	M	L	ML	Cleaning of vehicles Temperature to be maintained	Y	-	-	-	-	-	N	Controlled by sanitation programmes
		Chemical	None												
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
18.	Retail & Display	Biological	Microbial pathogens	M	L	ML	Adherence to GHP	Y	-	-	-	-	-	N	SOP for finished product storage during retail and display makes hazard unlikely to occur
		Chemical	None												
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-

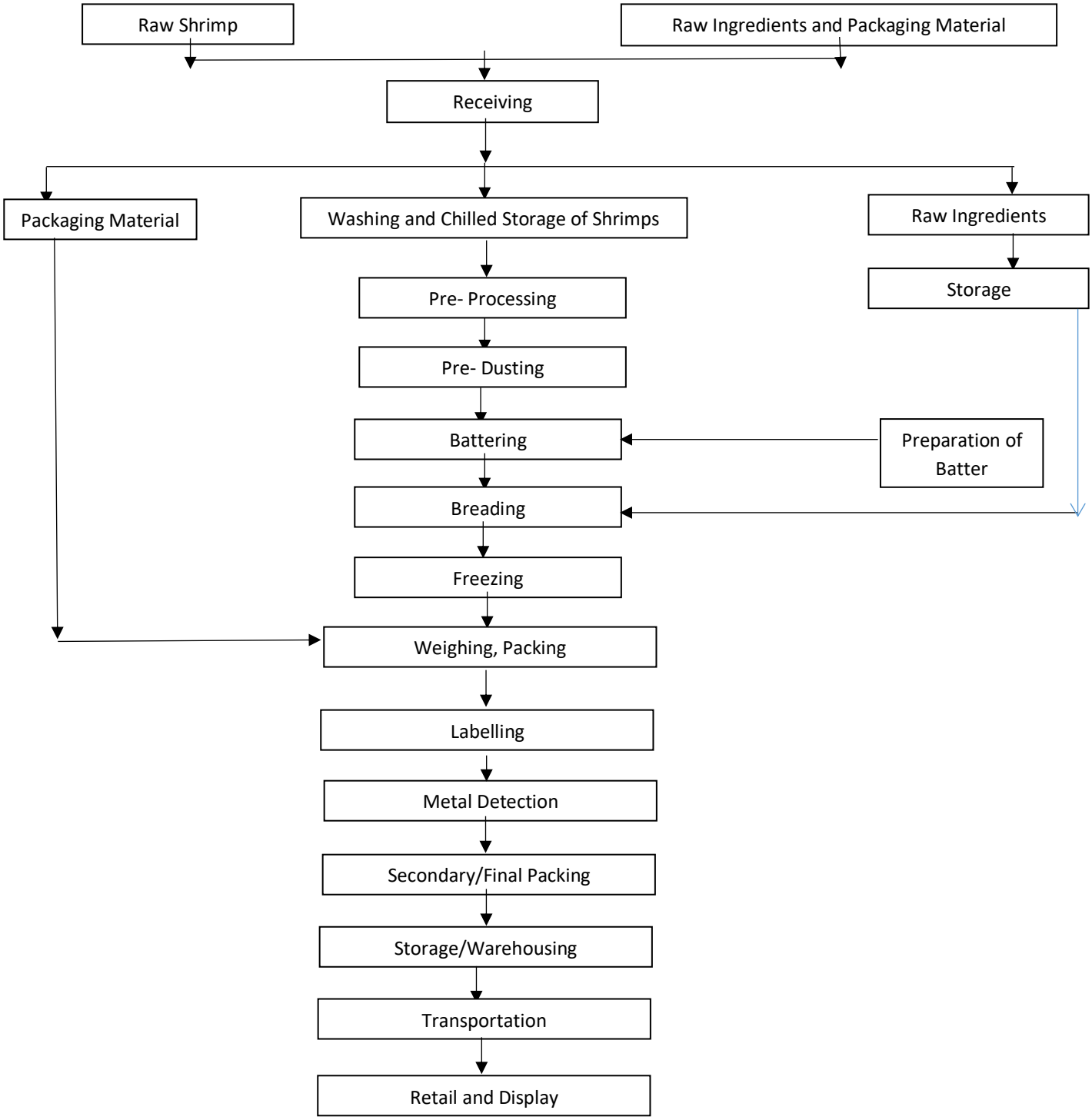
1. b. Table – HACCP Plan

Note: This is only a reference model for Risk Assessment & CCP determination example. These may vary from manufacturing plant to plant depending on risk assessment and process control

Sl.No.	CCP			Critical limit	Monitoring	Corrective Action		Verification	HACCP Record
						Immediate	**Long term**		
1.	CCP No. 1	**Process Step-** Receiving	**Hazard Addressed-** Histamine	**Critical Limit (CL)-** Fish surrounded by ice. Receiving temperature of fish should be ≤ 4°C. (Documentation of Validation of Critical limit to be made available)	**What -** Amount of ice and temperature of fish **How –** Visual check **When-** Every lot received **Where** - Receiving area **Who –** Receiving Supervisor	If icing is not adequate check the temperature of fish; If temperature ≥4°C reject the lot. Check the histamine content of suspected lot; reject if it exceeds 50ppm	Proper Training of Suppliers or if needed change the supplier.	**What:** Fish Temperature and Histamine concentration **How:** Probe type thermometer. **When:** Once in a day **Where:** Receiving Area **Who:** QC/QA Supervisor/Manager	1. Hazard Analysis records for justification for CCP's 2.CL Validation Records 3.Fish Temperature Monitoring Record. 4. Histamine Report 5. Correction and Corrective Action Records 6. Daily verification Records. 7. Raw Material Receiving log; 8.Supplier guarantee/declaration form 9.Audit Records 10. Calibration Records of probe.
2.	CCP No. 2	**Process Step-** Metal Detection	**Hazard Addressed-** Physical (Metal Particles)	**Critical Limits-** Metal detector should able to detect test stripes of 1.5 mm Ferrous, 2.5 mm SS & 2.0 mm Nonferrous (Documentation of Validation of Critical Limit to be made available)	**What:** Metal Detector sensitivity **How:** by passing all three test stripes from the metal detector **When:** before start of each shift and every hour **Where:** Metal Detector Point **Who:** Production Supervisor/Manager	Supervisor to hold previous production back to last "passed" calibration check. Re pass the product after proper calibration.	Periodic Maintenance of metal detector	**What:** Metal detector operation **How:** by passing test stripes **When:** At least two times per shift **Responsibility:** QC/QA Supervisor/Manager	1. Hazard Analysis Records 2. CL validation record. 3. Monitoring Records 4. Daily Verification Records. 5. Internal Audit Records 6. Correction Records 7. Corrective Action Records 8. Calibration Records of Probes

3.	CCP No. 3	**Process Step-** Heat Processing/ Retorting	**Hazard Addressed-** Microbial Pathogens	**Critical Limit (CL)-** Retorting Time: 30 minutes Temperature: 120°C. (Documentation of Validation of Critical limit to be made available)	**What -** Retorting Time & Temperature **How –** Monitoring of gauges/display **When-** Every lot **Where -** Retort **Who –** Operator	Reprocess the lot if a process deviation occurs	Proper Maintenance of Retort.	**What:** Product Temperature **How:** With probe type thermometer **When:** Once in a day **Where:** Retort Area **Who:** QC/QA Supervisor/Manager	1. Hazard Analysis records for justification for CCP's 2.CL Validation Records 3.Retorting Time and Temperature Monitoring Record. 4. Correction and Corrective Action Records 5. Daily verification Records. 6.Audit Records 7. Calibration Records of monitoring equipment's 8. Process Control log 9. Microbiological analysis record

2.IQF Breaded Shrimp- (An example)



2 a Table -Hazard Analysis Example – IQF Breaded Shrimp

Note: This is only a reference model for Risk Assessment & CCP determination example. These may vary from manufacturing plant to plant depending on risk assessment and process control

Sl No.	Process Step	Hazard Type	Potential hazard	Likelihood	Severity	Risk	Preventive Measure	Q1	Q2	Q2A	Q3	Q4	Q5	CCP Y/N	Reason for decision
1.	Receiving Of Shrimp	Biological	Microbial pathogens	M	L	ML	Controlled in further processing steps	Y	-	-	-	-	-	N	Reduced to acceptable level in the subsequent freezing step.
		Chemical	Sulphite Pesticide Antibiotic in case of Aquaculture	M	L	ML	Adherence to raw material specifications Supplier's guarantee that sulphiting agents are not used and the raw product is free from pesticide residues. Supplier's gurantee taking into account withdrawal period	Y						N	Supplier's declaration Adherence to specifications.
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
1.b.	Receiving of other raw material	Biological	None	-	-	-	-	-	-	-	-	-	-	-	-
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	Presence of foreign material	M	L	ML	Taken care by PRPs a	Y	-	-	-	-	-	N	Visual Inspection to detect presence of foreign material
1.c.	Receiving and storage of Packaging material	Biological	Contamination due to poor storage conditions	L	M	LM	Taken care by PRP's	Y	-	-	-	-	-	N	Maintain good air quality, cleanliness and humidity of the storage room
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	Low quality packaging material	L	M	LM	Taken care by PRP's	Y	-	-	-	-	-	N	Purchase specifications and visual inspection of all lots of packaging material. Packaging material used must be

															food grade.
2.	Washing	Biological	Microbial Pathogens	M	L	ML	Taken care by PRPs and eliminated during retorting stage Use only potable water for washing	Y	-	-	-	-	-	N	Microbial pathogens are reduced or eliminated in the subsequent pre-cooking and retorting stage. Testing of potable water done against IS10500 standard requirements.
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
3.	Storage	Biological	Microbial pathogens	M	L	ML	Time – Temperature control	Y	-	-	-	-	-	N	Adherence to PRP's control microbial multiplication.
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
4.	Pre-processing	Biological	Microbial pathogens	M	L	ML	Taken care by GHP	Y	-	-	-	-	-	N	Adherence to GHP prevents microbial contamination
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	Metal Fragments	M	L	ML	Controlled in the following steps	N	Y	-	N	Y	Y	N	Controlled during the metal detection step.
5	Pre-dusting	Biological	Microbial pathogens	M	L	ML	Controlled by GHP	Y	-	-	-	-	-	N	Adherence to GHP
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	Metal fragments	M	L	ML	Final Product is passed through metal detector	Y	-	-	-	-	-	N	There are chances of metal contamination from the conveyor belts and equipment. Metal detection step eliminate the hazard.
6.	Battering	Biological	Microbial Pathogens	M	L	ML	Taken care by PRPs and GHP	Y						N	Adherence to GHP controls bacterial multiplication.
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	Metal fragments	M	L	ML	Final Product is passed through metal detector	Y	-	-	-	-	-	N	There are chances of metal

															contamination from the conveyor belts and equipment. Metal detection step eliminate the hazard.
7.	Breading	Biological	Microbial pathogens	M	L	ML	Taken care by PRPs	Y	-	-	-	-	-	N	Adherence to GHP controls bacterial multiplication
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	Metal fragments	M	L	ML	Final Product is passed through metal detector	Y	-	-	-	-	-	N	There are chances of metal contamination from the conveyor belts and equipment. Metal detection step eliminate the hazard.
8.	Freezing	Biological	Microbial pathogens	M	H	MH	Proper and adequate freezing	N	Y	-	Y	-	N	Y CCP - 1	Improper freezing may lead to pathogen growth and multiplication
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
9.	Weighing/ Packing	Biological	None	-	-	-	-	-	-	-	-	-	-	-	-
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
10.	Labelling	Biological	None	-	-	-	-	-	-	-	-	-	-	-	-
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
11.	Metal Detection	Biological	None	-	-	-	-	-	-	-	-	-	-	-	-
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	Metal fragments	M	H	MH	Reject or reprocess the pouch containing metal pieces	N	Y	-	Y	-	-		Metal fragments entering into the product from the processing

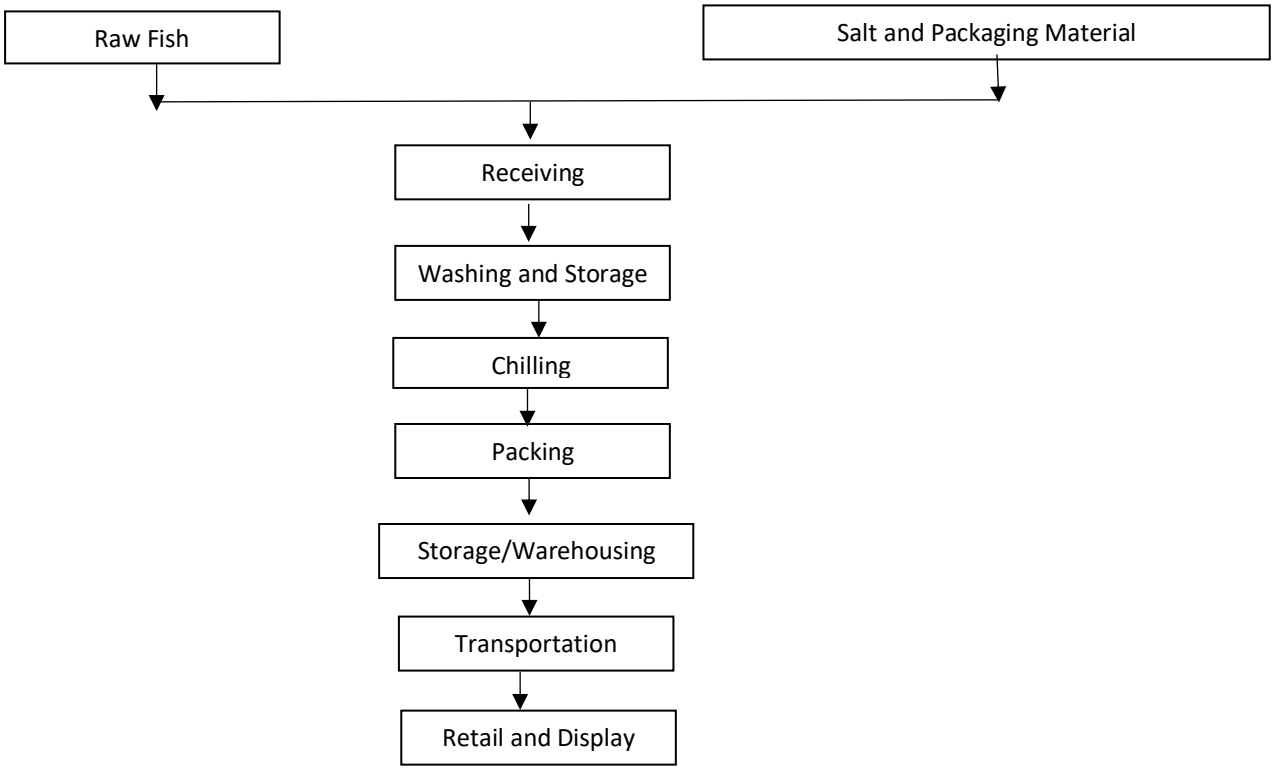
															Y; CCP-2	machinery are detected at this step. Product containing metal fragments are rejected or reprocessed.
12.	Secondary /Final Packing	None	-	-	-	-	-	-	-	-	-	-	-	-	-	None
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-	-
13.	Storage/ Warehousing	Biological	Microbial pathogens	M	L	ML	Temperature to be maintained	N	Y	-	Y	-	-	N		Finished Product Storage done makes hazard unlikely to occur.
		Chemical		-	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-	-
14.	Transportation	Biological	Microbial pathogens	M	L	ML	Cleaning of vehicles Time-temperature control	Y	-	-	-	-	-	N		Controlled by sanitation programmes and PRP's
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-	-
15.	Retail & Display	Biological	Microbial pathogens	M	L	ML	Adherence to GHP	Y	-	-	-	-	-	N		SOP for finished product storage during retail and display makes hazard unlikely to occur
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-	-

2.b. Table – HACCP Plan-

Note: This is only a reference model for Risk Assessment & CCP determination example. These may vary from manufacturing plant to plant depending on risk assessment and process control

Sl.No.	CCP			Critical limit	Monitoring	Corrective Action		Verification	HACCP Record
						Immediate	Long Term		
1.	CCP No. 1	**Process Step-** Freezing	**Hazard Addressed** Microbial Pathogens	**Critical limit (CL)-** Freezing Time – 10 – 20minutes Temperature- -25°C Core temperature at or below -18°C (Documentation of Validation of Critical Limit to be made available)	**What -** Freezing Time & Temperature Frozen Product Temperature **How –** Monitoring of gauges/display Thermometer Probes **When-** Every half an hour **Where -** Freezer hall **Who –** Operator	Reprocess the lot if a process deviation occurs. Ensure the core temperature is ≥ -18°C	Proper maintenance of freezer	**What -**Product core temperature **How –** Using probe type thermometer **When-** Once in a shift **Who –** QA/QC Supervisor/Manager	1.Hazard Analysis records with justification for CCPs. 2. CL Validation Records 3.Freezing time and temperature monitoring records 4. Fish temperature monitoring record 5. Correction Record 6. Corrective Action Records 7. Daily Verification Records 8. Audit Records 9. Calibration Records of Probes 10. Microbiological Analysis Record. 11. Online QC Record
2	CCP No. 2	**Process Step-** Metal Detection	**Hazard Addressed-** Physical (Metal Particles)	**Critical Limits-** Metal detector should able to detect test stripes of 1.5 mm Ferrous, 2.5 mm SS & 2.0 mm Nonferrous (Documentation of Validation of Critical Limit to be made available)	**What:** Metal Detector sensitivity **How:** by passing all three test stripes from the metal detector **When:** before start of each shift and every hour **Where:** Metal Detector Point **Who:** Production Supervisor/Manager	Supervisor to hold previous production back to last "passed" calibration check. Re pass the product after proper calibration.	Periodic Maintenance of metal detector	**What:** Metal detector operation **How:** by passing test stripes **When:** At least two times per shift **Responsibility:** QC/QA Supervisor/Manager	1. Hazard Analysis Records 2. CL validation record. 3. Monitoring Records 4. Daily Verification Records. 5. Internal Audit Records 6. Correction Records 7. Corrective Action Records 8. Calibration Records of Probes

3.Chilled Fish- (An example)



3.a. Table -Hazard Analysis Example – Chilled Fish

Note: This is only a reference model for Risk Assessment & CCP determination example. These may vary from manufacturing plant to plant depending on risk assessment and process controls

Sl No.	Process Step	Hazard Type	Potential hazard	Likelihood	Severity	Risk	Preventive Measure	Q1	Q2	Q2A	Q3	Q4	Q5	CCP Y/N	Reason for decision
1.	Receiving	Biological	Microbial pathogens	M	L	ML	Taken care by PRPs	Y		-	-	-	-	N	Not intended for raw consumption. To be fully cooked by the consumer.
		Chemical	Histamine (only for scombroid fishes)	M	H	MH	Time-Temperature control; Proper handling &icing during harvest, transportation & storage	N	Y	-	Y	-	-	Y CCP-1	Scombroid fishes (e.g. Tuna, Seer fish, Mackerel) subjected to time-temperature abuse can develop scombrotoxin (Histamine).
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
1.b.	Receiving of raw ingredient i.e. salt	Biological	None	-	-	-	-	-	-	-	-	-	-	-	-
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	Presence of foreign material	M	L	ML	Taken care by PRPs a	Y	-	-	-	-	-	N	Visual Inspection to detect presence of foreign material
1.c.	Receiving and storage of Packaging material	Biological	Contamination due to poor storage conditions	L	M	LM	Taken care by PRP's	Y	-	-	-	-	-	N	Maintain good air quality, cleanliness and humidity of the storage room
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	Low quality packaging	L	M	LM	Taken care by PRP's	Y	-	-	-	-	-		Purchase specifications and

			material											N	visual inspection of all lots of packaging material. Packaging material used must be food grade.
2	Washing	Biological	Microbial pathogens	M	L	ML	Controlled by PRP Use of potable water for washing	Y	-	-	-	-	-	N	Product should be cooked by the consumer Potable water to be tested against IS10500 standard requirements.
		Chemical	None	-	-	-	NA	-	-	-	-	-	-	-	_
		Physical	None	-	-	-	NA	-	-	-	-	-	-	–	_
3	Storage	Biological	Microbial pathogens	M	L	ML	Taken care by PRPs and eliminated during retorting stage	Y	-	-	-	-	-	N	Microbial pathogens are reduced or eliminated in the subsequent pre-cooking and retorting stage
		Chemical	Histamine	M	H	MH	Taken care by PRPs	Y	-	-	-	-	-	N	Controlled by PRP's
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
5.	Chilling	Biological	Microbial pathogens	M	H	MH	Proper and adequate Chilling	N	Y	-	Y	-	-	Y CCP-2	Improper chilling may lead to pathogen growth and multiplication; Product should be cooked by the consumer
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-

6.	Packing	Biological	Microbial Pathogens	M	L	ML	Controlled by PRP. Food handlers are the source of hazard	Y	-	-	-	-	-	N	Microbial contamination can be prevented by adopting proper sanitation controls. Product should be cooked by the consumer
		Chemical	None	-	-	-	-	-	-	-	-	-	-	N	
		Physical	None	-	-	-	-	-	-	-	-	-	-	N	
7.	Storage/ Warehousing	Biological	Microbial Pathogens	M	L	ML	Temperature to be maintained	N	Y	-	Y	-	-	N	Finished Product Storage done makes hazard unlikely to occur. Product should be cooked by the consumer.
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
8.	Transportation	Biological	Microbial pathogens	M	L	ML	Cleaning of vehicles Time-temperature control	Y	-	-	-	-	-	N	Controlled by sanitation programmes and PRP's
		None	None	-	-	-	-	-	-	-	-	-	N	None	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-
9.	Retail & Display	Biological	Microbial Pathogens	M	L	ML	Controlled by sanitation programmes	Y	-	-	-	-	-	N	SOP for finished product storage during retail and display makes hazard unlikely to occur Microbial contamination can

																be prevented by adopting proper sanitation controls. Product should be cooked by the consumer
		Chemical	None	-	-	-	-	-	-	-	-	-	-	-	-	-
		Physical	None	-	-	-	-	-	-	-	-	-	-	-	-	-

3.b. Table – HACCP Plan Example

Note: This is only a reference model for Risk Assessment & CCP determination example. These may vary from manufacturing plant to plant depending on risk assessment and process controls

Sl.No.	CCP			Critical limit	Monitoring	Corrective Action		Verification	HACCP Record
						Immediate	Long term		
1.	CCP No. 1	**Process Step-** Receiving	**Hazard Addressed-** Histamine	**Critical Limit (CL)-** Fish surrounded by ice. Receiving temperature of fish should be ≤ 4°C. (Documentation of Validation of Critical limit to be made available)	**What -** Amount of ice and temperature of fish **How –** Visual check **When-** Every lot received **Where** - Receiving area **Who –** Receiving Supervisor	If icing is not adequate check the temperature of fish; If temperature ≥4°C reject the lot. Check the histamine content of suspected lot; reject if it exceeds 50ppm	Proper Training of Suppliers or if needed change the supplier.	**What:** Fish Temperature **How:** Probe type thermometer. **When:** Once in a day **Where:** Receiving Area **Who:** QC/QA Supervisor/Manager	1. Hazard Analysis records for justification for CCP's 2.CL Validation Records 3.Fish Temperature Monitoring Record. 4. Histamine Report 5. Correction 6. Corrective Action Records 7. Daily verification Records. 8. Raw Material Receiving log; 9.Supplier guarantee/declaration form 10.Audit Records 11. Calibration Records of probe.
2.	CCP No. 2	**Process Step-** Chilling	**Hazard Addressed-** Microbial Pathogens	**Critical Limit (CL)-** Temperature of fish should be ≤ 4°C. (Documentation of Validation of Critical limit to be made available)	**What -** Amount of ice and temperature of fish **How –** Visual check **When-** Every lot taken for production **Where** - Chilling area **Who –** Production Supervisor	If icing is not adequate check the temperature of fish; If temperature ≥4°C hold the lot.	Proper Training of Production in charge	**What:** Fish Temperature **How:** Probe type thermometer. **When:** Once in a day **Where:** Production Area **Who:** QC/QA Supervisor/Manager	1. Hazard Analysis records for justification for CCP's 2.CL Validation Records 3.Fish Temperature Monitoring Record. 4. Correction and Corrective Action Records 5. Daily verification Records. 6.Supplier guarantee/declaration form 7.Audit Records 8. Calibration record of probe

ANNEXURE

Annexure 1- Fish Poisoning

FISH POISONING

While most marine and fresh water fish are safe for human consumption, certain varieties may contain toxins harmful to human health at the point of harvest. These toxins are very potent and cause serious illness. The information is intended for:

- Fishermen, who can take care not to land such harmful fish
- Fish processors, who can avoid processing and marketing poisonous fish portions
- Fish traders, who can avoid placing such fish or harmful portions in market.
- Consumers, who can avoid purchasing and consuming poisonous fish.

A. CIGUATERA FISH POISONING (CFP)

Ciguatoxins are heat stable lipophilic molecules; hence they cannot be destroyed by cooking. Highly potent and it is estimated that ingestion of as little as 0.1 µg toxin can cause illness in a human adult.

Ciguatera Fish Poisoning (CFP) caused by consumption of fish and other marine products, mainly from tropical coral reef areas containing toxin produced mainly by the marine dinoflagellate algae belonging to *Gambierdiscus* spp. CFP is known to occur throughout tropics and in some subtropical areas. There have been sporadic cases reported from India and a large outbreak involving over 150 people occurred in 2016. The toxin is known to be heat-stable. There is still much to be learned about this toxin, and the only control measure that can reasonably be taken is to avoid marketing fish that have a known consistent record of toxicity.

Fish species implicated: Mostly coral reef associated fish can accumulate the toxin. Over 400 fish species can be carriers of ciguatoxin, but the common ones are red snapper (*Lutjanus*spp), reef cod/grouper (*Epinephelus*spp), barracuda (*Sphyraena*spp), king fish, trevally (*Caranx*spp), parrotfish, wrasseandgiant moray (*Gymnothorax*spp).

B. SCOMBROID POISONING (HSP)

Scombroid in toxication, sometimes referred to as histamine poisoning, results from eating fish that have been incorrectly chilled after harvesting. Scombrotoxin is attributed mainly to Enterobacteriaceae, which can produce high levels of histamine and other biogenic amines in the fish muscle when products are not immediately chilled after catching. The main susceptible fish are the scombroids such as tuna, mackerel, and bonito, although it can be found in other fish families such as Clupeidae. The intoxication is rarely fatal and symptoms are usually mild. Rapid refrigeration after catching and a high standard of handling during

processing should prevent the development of the toxin. The toxin is not inactivated by normal heat processing. In addition, fish may contain toxic levels of histamine without exhibiting any of the usual sensory parameters characteristic of spoilage.

C. SHELLFISH POISONING

The poisonous ingredients are toxins made by algae-like organisms called dinoflagellates, which build up in some types of seafood. There are many different types of shellfish poisoning. The most well-known types are **paralytic shellfish poisoning, neurotoxic shellfish poisoning, and amnestic shellfish poisoning.**

Generally, the toxins remain toxic through thermal processing, hence, knowledge of the species identity and/or origin of fish or shellfish intended for processing is important.

Note-

Tetrodotoxin - Some fish species, mainly belonging to the family Tetradontidea ("puffer fishes"), may accumulate this toxin, which is responsible for several poisonings, often lethal. The toxin is generally found in the fish liver, roe and guts, and less frequently in the flesh. Unlike most other fish biotoxins that accumulate in the live fish or shellfish, algae do not produce this toxin. The mechanism of toxin production is still not clear. However, there are often indications of the involvement of symbiotic bacteria.

Annexure 2

A. GOOD HYGIENE PRACTICES AT WHOLESALE AND RETAIL SALE (GENERAL CONSIDERATIONS):

At retail, fish, shellfish and their products should be received, handled, stored and displayed to consumers in a manner that minimizes potential food safety hazards and defects and maintains essential quality.

To ensure hygiene and safety of fish being sold, the following general requirements should be followed:

1. Location

1.1 The facility shall be located in the areas not subjected to regular and frequent flooding, and shall be free from undesirable odour, smoke, dust, pest, and-other contaminants.

1.2 The facility shall have adequate drainage and provision for easy cleaning. The facility premise shall be constructed / located in a way that drain/ storm water should not enter the premises, to avoid contamination of fish and fish products.

1.3 The area should provide ease of transportation of fish towards the market and outwards in minimum possible time and be easily accessible for vehicles and public

2. Premises Requirements and Construction

1.3 Facility shall be constructed to enable hygienic processing and sale of fish and fish products to ensure food safety.

1.4 Sufficient parking facility, loading and unloading facility for fish, cleaning facility for fish transportation vehicle, fish storage crates,chilled fish storage, solid waste disposal facility, effluent treatment plant etc may be provided.

1.5 In wholesale fish markets raised platforms with drainage facility and easy fish movement facility may be provided for auctioning of fish.

1.6 A sign board indicating the type of fish and fish products sold shall be displayed prominently. In case more than one type of fish is being sold, care should be taken to avoid cross-contamination.

1.7 The surfaces of walls, partitions and floors of retail area shall be made of impervious materials for easy cleaning and sanitation and to avoid accumulation / absorption of dust, blood / fish material, microbial / fungal growth.

1.8 Facility shall be designed so as to provide adequate space for the fixtures, fittings and equipment used.

1.9 Fish laid down for sale shall not come into direct contact with floors, walls or other fixed structures, except those which are specifically designed for contact with fish.

1.10 Doors, windows and floors shall be constructed for effective cleaning & sanitation to avoid accumulation / absorption of dust, blood / fish particles, microbial / fungal growth. Floors shall have adequate drainage and must be strong enough to withstand movement of trolleys carrying fish and ice.

1.11 The facility shall provide protection to avoid entry of flies, other pests and stray animals to avoid contamination

1.12 There shall be an adequate supply of potable water.

1.13 Fish handlers shall be provided facilities for cleaning their hands and toilet facilities. When wholesale activities will take place in early morning hours, lodging facility may be provided, if required, to wholesale traders.

3. Equipment and Accessories

3.1 The equipment such as knives etc in the facility shall be of such material so as to enable easy cleaning, maintain hygiene and to avoid contamination. Those shall be durable, resistant to corrosion and capable of withstanding repeated exposure to normal cleaning and disinfection.

3.2 The weighing scales used shall be easily cleanable and subitizable and calibrated.

3.3 The chopping block should be of food-grade synthetic material, which does not contaminate the fish and fish products. If the block is of wooden it should be of hardwood trunk, must be free of splits, cracks and holes and must be maintained in a hygienic condition and shall not contaminate the fish and fish products.

3.4 For retailing frozen fish and fish products, the facility shall have deep freezers capable of maintaining product temperature of -18°C or lesser. In case of chilled product, must be stored below 4 degree Celsius.

3.5 Facility for temperature recording should be present and all temperature monitoring equipment must undergo regular, annual internal and external calibration

3.6 Clean, disinfected fish holding crates made of PVC must be used for storage and transportation of fish. It is ideal different colour crates (preferably 'blue" for storing fish and 'red' or 'yellow') for waste disposal.

3.7 Fish vending tables should be used for display and sale of fish that are easy to clean, maintain and durable and made of smooth, non-absorbent materials, and must be inert to the food, to detergents and disinfectants under normal operating conditions.

3.8 There should be a drain tube from the vending table / platform to the drain so that water from the vending table / platform will not splash in the ground and will form a source of contamination and inconvenience. Fish trading table/ platforms have to be provided with ridge all around to prevent spilling of water. It must have proper slope towards drain tube for easy flow of water. However, small level area has to be provided in the platform / table for placing weighing balance.

4. Sanitary Practices

4.10 To prevent contamination of equipment and facility shall be cleaned and sanitized before and after use.

4.11 Cleaning and disinfection shall be done preferably with hot water or 50 ppm chlorinated water.

4.12 Fish and Fish products should be always stored in cool conditions.

4.13 All fish and fish products, if not meant for immediate sale over the counter, shall be chilled and stored at or below 4 °C

5. Storage and Disposal of Waste

5.1 Facility shall have waste and garbage collection bins with lids which should be effectively cleaned and sanitized.

5.2 The garbage bins shall be lined with garbage collection bags and should have lids to be kept closed so they do not provide a breeding ground for pests.

6. Pest Control

6.1 Facility shall ensure there are no pest infestations which may cause food safety threat.

6.2 Facility shall use approved pesticides with appropriate precautions to prevent contamination of product. Before pesticides are applied all fish and fish products should be removed from the room and all equipment and utensils should be thoroughly washed prior to being used again.

6.3 Regular pest control treatments have to be adopted.

7. Personnel Hygiene and Cleanliness

7.1 Fish and fish products handlers of the facility shall undergo a medical examination by a registered medical practitioner annually to ensure that they are free from any infectious and other communicable diseases.

7.2 Every person engaged in a fish and fish product handling area shall keep their finger nails trimmed and should wash his hands frequently and thoroughly with a suitable hand cleaner with potable water. Hands should always be washed before commencement of work, immediately after using the toilets, after handling contaminated material and whenever else necessary.

7.3 The fish and fish products handlers working in a retail shop shall wear clean clothing and head wears and if possible disposable gloves.

7.4 Eating & chewing of tobacco, gums, any other items, smoking and spitting should be prohibited in any part of retail facility. It is recommended to display sign boards like 'No Smoking' and 'No Spitting'.

7.5 Does and Don'ts of hygienic practices have to be displayed prominently within and outside the fish markets.

8. Sourcing of Fish and Fish Products from Processing units

8.1 Fish and Fish Products shall only be procured approved vendors.

8.2 The quality of fish and fish products should be checked for organoleptic:

- 8.1.1. The texture, colour, odour, and eyes should be normal
- 8.1.2. Gills to be checked- red in colour indicated good quality
- 8.1.3. As soon as material is received it should be deveined to remove the microbial load.

8.3 The temperature at receiving should be between 0-4 0C. However, in case of frozen products it should be -18oC.

8.4 Ice, produced using potable water (as per IS: 10500-2012), should be used for chilling the fish.

9. Consumer Information and Traceability

9.1 Consumer information such as storage conditions, preparation procedures and potential risks of seafood products if mishandled or improperly prepared, should be made available at the point of purchase to ensure product safety and quality.

9.2 A system of tracking the origin and codes of fish, shellfish and their products should be established to facilitate product recall in the event of failure of prevention of health protection.

10. Training

10.1 All personnel handling fish in the markets should be trained in all aspects of food safety and hygienic fish handling practices such as –

- Personal hygiene
- Hygienic handling of fish
- Spoilage of fish and its prevention
- Ideal practices in fish sale, fish dressing and storage
- Use of chilled storage
- Waste disposal
- Do's and Don'ts in the fish market

11. Reception of Fish and Fish products at the retail facility

11.1 Due to the potential for growth of pathogenic and spoilage micro-organisms under conditions of inadequate temperature control, fish and fish products should be transported at temperatures that achieve safety and suitability i.e. at or below 4 °C in case of fresh/chilled product and -18°C or below in case of frozen, MAP product, if not frozen should be maintained at or below 4oC. Upon receipt, product temperature should be taken from several locations in the vehicle and recorded.

11.2 Also, data logger of the vehicle, wherever applicable should be checked, records should be examined to verify adherence to temperature requirements.

11.3 Care must be taken to avoid cross contamination like ready to eat product not to be exposed to raw product.

11.4 Incoming frozen seafood should be examined for signs of thawing.

11.5 All products should be examined for decomposition and spoilage at receipt. Products exhibiting signs of decomposition should be rejected.

11.6 The transport vehicle should be examined for overall hygienic condition.

11.7 Products subject to filth taint or contamination should be rejected.

11.8 Seafood should be regularly examined for adherence to purchasing specifications.

12. Storage Facilities

12.1 Retail operators should develop and use written purchase specifications designed to ensure food safety and desired quality levels.

12.2 Seafood should be properly protected from filth and other contaminants through proper packaging and stored off the floor.

12.3 Product should be stacked to allow proper air circulation.

12.4 Retail operators should be responsible for maintaining quality and safety of products.

12.5 A proper product rotation system should be established. This system could be based on first-in, first-out usage, production date or "best before" date on labels, sensory quality of the lot, etc. as appropriate.

12.6 Live products must be kept at an appropriate temperature and in a manner, that does not adversely affect food safety or their viability.

12.7 Raw product should be stored on shelves below cooked product to avoid cross-contamination from drip.

13. Processing including Pre-processing:

13.1 Preparation and packaging chilled/ frozen products at retail

13.1.1 Care should be taken to ensure that handling and packaging (including labelling) of products is conducted in accordance to the recommended guidelines including allergens.

13.1.2 Care should be taken to ensure that product is not subjected to temperature abuse during packaging and handling.

13.1.3 Care should be taken to avoid cross-contamination between ready-to-eat and raw shellfish, or between shellfish and their products in the work areas or by utensils or personnel.

14. Retail display

14.1 Retail Display of chilled/ frozen seafood

14.1.1. Ready-to-eat items and molluscan shellfish should be separated from each other and from raw food products in a chilled display.

14.1.2. Products in an open full display should be protected from the environment, for example, by the use of display covers (sneeze guards).

14.1.3. Product should not be added above the "load line" where a chilled state cannot be maintained in cabinet self-service display cases of packaged products.

14.1.4. Upright freezer self-service display cases should have self-closing doors or air curtains to maintain a frozen state.

14.1.5. Each commodity in a display should have its own container and serving utensils to avoid cross-contamination

14.1.6. If ice is used, proper drainage of melt water should be in place, particularly, self-draining. Replace ice daily and ensure ready-to-eat products are not placed on ice upon which raw product has previously been displayed.

14.1.7. Care should be taken to arranging product to such depth so that proper chilling is maintained and product quality is compromised.

14.1.8. Care should be taken to avoid drying of unprotected products in full-service displays. Use of an aerosol spray, under hygienic conditions, is recommended

14.1.9. Product should not be exposed to ambient room temperature for a prolonged period of time when filling/stocking display cases.

14.1.10. Seafood in display cases should be properly labelled by signs or placards to indicate the commonly accepted name of the fish so the consumer is informed about the product.

14.1.11. Frozen seafood in retail displays should be examined periodically to assess packaging integrity and the level of dehydration or freezer burn.

B. SPECIFIC CONSIDERATIONS FOR PETTY FISH VENDORS

Fish vendors may be grouped into two major categories:

a. Stationary street vendors - Those operating on fixed locations such as fish market or petty shop at the road side.
b. Moving street food vendors - Those who move from one place to another carrying their wares by hand or on the head or in wheeled transport such as bicycles, push carts and wagons.

To ensure the safety of street-vended fish/shellfish the following requirements and practices shall be taken into consideration and implemented.

1. General Requirements

1.1 No vendor shall conduct sale of fish/shell fish unless he/she is licensed/ registered under the relevant food regulations.

1.2 It is recommended that basic training in food hygiene shall be carried out by the relevant authorities prior to issuing or renewing the license/ registration of street food vendors.

2. Facility location, design, structure and construction

2.1 Location

2.1.1 The location of street fish stall(s) should be suitable for the purpose of avoiding contamination of the fish/shell fish and shall be located in areas designated by the relevant authorities. The area where the stall is located and the immediate surroundings should be easily cleaned and capable of withstanding repeated washing and scrubbing. The space in and around the fish stall shall be free of unnecessary stored goods, waste and toxic materials. The stall should have a convenient access to an inlet of a drainage system or any suitable means of disposing waste water in a sanitary manner.

2.2 Structures

2.2.1 Food handling areas and food contact surfaces should be made of corrosion-resistant, smooth impervious material that is easy to clean.

2.2.2 The surfaces of walls, partitions and floors also should be made of impervious, non-toxic materials.

2.2.3 All structures should be designed and constructed to minimize sharp inside corners and projections and tiny crevices or gaps in order to avoid dirt traps.

2.2.4 All structures, working tables, shelves and cupboards on or in which food is placed should be at least 45 cm above the ground.

2.2.5 There should be adequate provision of artificial light of sufficient intensity to ensure illumination for every part of the stall.

2.2.6 Should be free from dust, pests etc. Entry of stray animals has to be prevented.

2.3 Containers/Utensils

2.3.1 All containers and utensils including those used for storing drinking water, should be made of materials which are resistant to corrosion, non-absorbent, do not transmit toxic substances, odour or taste and capable of withstanding repeated cleaning and disinfection.

2.3.2 All cutting equipment including knives should be made of corrosion free material and to be maintained in good state of repair and working order.

2.3.3 Every vendor should ensure that all defective, damaged, cracked, rusted, chipped and unsuitable utensils are removed from use and discarded.

2.3.4 Disposable materials shall be used only once and properly disposed of.

3. Sanitation

3.1 Supply of water and Ice

3.1.1 Water used for cleaning the fish/utensil should be clean, potable and chlorinated as per recommendation (IS: 10500) for the product concerned. The residual content of chlorine should not exceed that of potable water. Where necessary, such as in the case of mobile vendors or where potable water supply is not yet available, potable water should be stored in clean water containers.

3.1.2 Ice, produced using potable water (as per IS: 10500), should be used for chilling the fish.

3.2 Waste Management

3.2.1 Fish market/stall should have an efficient waste water disposal system which should be maintained in a good state of repair and working order. The system should be large enough to carry peak loads and be provided with traps to ensure only liquid waste is discharged into the drain.

3.2.2 Solid waste material should be handled in such a manner as to avoid contamination of fish and/or potable water. Waste should be removed from the working area of the stall as often as necessary and at least daily. All solid waste should be properly disposed into suitable containers which are covered with tight fitting lids.

3.3 Cleaning

3.3.1 All food contact surfaces should be cleaned and disinfected before and after daily operations; and whenever they get contaminated. Floors and surrounding areas should be thoroughly cleaned at least daily.

3.3.2 The waste storage area should also be cleaned and disinfected daily. Immediately after disposal of the waste, receptacles used for storage and any equipment which has come into contact with the waste should be cleaned.

3.4 Toilets

3.4.1 Every vendor, helper or food handler should have easy access to sanitary facilities which are kept in a clean and operational condition.

4. Pest and Animal Control

4.1. Every vendor should take appropriate measures to keep his/her stall free from animals (e.g. cats and dogs) and pests (e.g. rodents or insects) to prevent contamination of the food.

4.2. The direct or indirect contamination of food with pest control materials must be prevented.

4.3. Any food found to have become contaminated by pests shall be appropriately disposed of in a hygienic manner.

5. Personal Health and Hygiene

5.1 Health condition of the vendors

5.1.1 Vendor shall not be allowed to perform his/her job if showing any of the following symptoms: jaundice, diarrhoea, vomiting, fever, sore throat with fever, discharge from ear, eye and nose, visibly infected skin lesions (boils, cuts, etc.) In such cases, he/she shall cease from handling food and seek medical treatment.

5.1.2 Any vendor who has been identified as or is known to be or has previously been a carrier of food borne disease organisms, shall not be involved in any food handling activity until certified by a Medical Officer of Health or any other medical practitioner as a non-carrier.

5.2 Personal Hygiene and behaviour

5.2.1 Personal hygiene contributes largely to food safety. Every vendor shall observe the following conditions while handling and dressing fish for consumer.

5.2.2 Wear clean and proper clothing.

5.2.3 Wash hands thoroughly with soap and running clean water before and after handling food, after visiting the toilet, after handling unsanitary articles, touching animals, after handling toxic and dangerous materials as and when necessary. If running clean water is not available, an acceptable alternative hand washing method should be agreed to by the relevant authority.

5.2.4 Fish should not be handled with bare hand. Appropriate gloves (disposable) should be used

5.2.5 Finger nails should be kept short and clean at all times, and avoid wearing jewellery or ornaments.

5.2.6 Hair should be kept clean and tidy and should be covered.

5.2.7 Wounds or cuts shall be completely protected by a waterproof dressing which is firmly secured and routinely changed.

5.2.8 Vendors shall not smoke or chew tobacco.

5.2.9 Refrain from any unhygienic practices such as spitting and cleaning nose, ears or any other body orifice or touching any body part while handling food.

5.2.10 Shall not sneeze or cough over or onto the food.

5.2.11 No vendor is allowed to use the stall as a sleeping or dwelling place, or for any other personal activity.

5.2.12 The vendor shall ensure that he/she and all food handlers and helpers have completed basic food hygiene training by the competent authority or other institution recognized or approved by the competent authority.

Annexure 3

A. GMP-GHP for Fishing Vessel

There are different types of fishing vessel used in Indian waters. In order to ensure hygienic, high-quality handling of fresh fish and shellfish intended for direct sales and further processing, all vessels should have the basic requirements for cleaning, minimising damage, contamination and decomposition.

1. Design and Construction

1.1 The design and construction of a fishing vessel used to harvest fish and shellfish should take into consideration the following:

1.1.1. All surfaces in fish handling areas should be non-toxic, smooth, impervious and made of corrosion resistant material and in sound condition in order to minimise the build-up of fish slime, blood, scales and guts and to reduce the risk of physical and microbial contamination.

1.1.2. Vessels should be designed and constructed to minimise sharp inside corners and projections in order to avoid dirt traps and damage to fish.

1.1.3. Construction should facilitate ample drainage.

1.1.4. In boxing and shelving storage areas, the design should preclude excessive pressure being exerted on the fish and shellfish.

2. Equipments and Containers

2.1 Fishing gears, equipment and containers should be made of corrosion resistant material and should be designed for their rapid and efficient handling without causing any mechanical injury or damage. They should be easily cleanable and free from contamination.

2.2 Vessels designed and equipped to preserve fresh fish products for more than 24 hours shall be equipped with holds, tanks or containers. These holds shall be separated from the engine room, machinery space and the crew cabins by partitions which are sufficient to prevent any contamination of the stored fish products.

3. Facilities and Utilities

3.1 A good supply of clean or potable water at adequate pressure should be available. Non potable waterlines should be clearly identified and separated.

3.2 Ice prepared from potable water under hygienic conditions should be available to preserve fish.

3.3 Fish receiving deck shall be smooth, clean and free from engine oil, grease, etc. Adequate facilities should be provided for washing and disinfecting equipment, where appropriate.

3.4 Objectionable substances, which could include bilge water, smoke, fuel oil, grease, drainage and other solid or semi-solid wastes, should not contaminate the fish and shellfish.

3.5 Containers for offal and waste material should be clearly identified, covered and made of impervious material.

3.6 Separate and adequate facilities should be provided to prevent the contamination of fish and shellfish by poisonous or harmful substances; offal and waste materials.

3.7 Adequate hand washing and toilet facilities, isolated from the fish and shellfish handling areas, should be available where appropriate.
3.8 The artificial lights provided on the deck and in the hold shall have protective covers.
3.9 Facilities to prevent the entry of birds, insects or other pests, animals or vermin should be provided, where appropriate.

4. Good hygienic practices

4.1 Utmost care shall be taken while catching / storing / handling of fish to avoid injury / damage to the animal.
4.2 Fish products shall be handled / stored in hygienic manner to avoid contamination and should not be dumped directly on the deck. Clean food grade polythene sheet may be used for receiving the fish.
4.3 As soon as the fish and shellfish are taken on board, they must be protected from contamination and from the effects of sun or any other source of heat. Fish, other than those kept alive, which are stored for more than 8 hours on board, should be preserved in ice or maintained at a temperature below 4°C.
4.4 It shall be ensured that all the fish contact surfaces shall be periodically cleaned with potable water or clean seawater and disinfected.
4.5 Staff assigned for handling of fish products should maintain a high standard of cleanliness and personal hygiene.
4.6 Cleaning products and toxic substances shall be stored in locked premises or cupboards.
4.7 Details of fish products caught by the vessels should be recorded and maintained by a responsible staff.

B. GMP-GHP for Fish Landing Site/ Harbour

1. Location and Surroundings

1.1 The Landing Site / Fishing Harbour shall be located at a site ideal for the purpose and shall be free from undesirable smoke, dust, other pollutants and stagnant water. The premises shall be kept clean.

2. Design and Construction

2.1 The design and construction of a fish landing site/harbour should take into consideration the following to preclude contamination.
2.2 Suitable covering shall be given at the fish landing site/harbour to protect fish and shellfish from environmental hazards such as sun light, rain, wind blown dust etc.
2.3 Adequate working space shall be provided for hygienic handling of fish and shellfish.
2.4 Floor and walls shall be smooth and easy to clean and disinfect. The floor shall have sufficient slope for proper drainage and to avoid stagnation of water.
2.5 Drainage lines of adequate size and slope shall be provided to remove waste water, the outlet of which shall not open to the sea near the landing berth.
2.6 Landing site shall be constructed in such a way to avoid entry of exhaust fumes from vehicles.
2.7 Preferably, separate auction hall(s) may be provided, which is well protected from the entry of pests/insects, for display and sale of fish and shellfish.

2.8 Fish and shellfish shall not be kept directly on floor. Raised platforms shall be constructed for display, which are smooth, easy to clean and disinfect. However, instead of raised platforms, any other suitable provision can be made so as to ensure that fish and shellfish will not come in contact with the floor directly.

3. Equipments and Containers

3.1 The containers and equipment used to handle fish and shell fish shall be smooth, impervious and made of corrosion free material, which is easy to clean and disinfect and kept in a good state of repair and cleanliness.

4. Facilities and Utilities

4.1 Provision for adequate quantity of potable water or clean sea water shall be available in the landing sites for cleaning and sanitation. Non potable waterlines should be clearly identified and separated

4.2 Facilities for hygienic handling and storing of sufficient quantity of good quality ice and provision for crushing the ice hygienically shall be provided, as applicable.

4.3 Adequate facilities should be provided for washing and disinfecting equipment, where appropriate.

4.4 Adequate hand washing and toilet facilities, isolated from the fish and shellfish handling areas, should be available where appropriate. There shall be sanitary facilities at appropriate places for hand washing with sufficient number of washbasins, soap, disinfectants and single use hand towels. Appropriate number of flush lavatories shall also be provided outside the landing sites / auction centres.

4.5 Sufficient artificial lighting shall be provided and the lights shall be protected with suitable covering.

4.6 Separate area may be earmarked for storage of fish products unfit for human consumption.

4.7 Separate and adequate facilities should be provided to prevent the contamination of fish and shellfish by poisonous or harmful substances; offal and waste materials. Insecticides and other toxic chemicals shall be stored in lockable cupboards.

4.8 Suitable mechanism shall be adopted to prevent entry of birds / other pests inside the landing platform, auction areas and other storage areas.

5. Good Hygiene Practices

5.1 Landing sites / harbours shall be maintained hygienically. Cleaning and sanitation shall be implemented at all areas of the landing site on a laid down frequency to avoid cross contamination.

5.2 The premises and all the surfaces that come in contact with fish products shall be cleaned before and after each sale.

5.3 Floors, walls, partitions, ceilings, utensils, instruments and other food contact surfaces shall be kept in a satisfactory state of cleanliness and repair. The crates / utensils shall

also be cleaned and rinsed inside and outside with potable water or clean sea water and disinfected before use.

5.4 A responsible, experienced person shall be deputed as hygiene inspector, to ensure the implementation of cleaning and sanitation effectively and good hygienic practices. Hygiene inspector shall ensure the quality of fish and shell fish and also adequate icing.

5.5 Detergents / disinfectants used shall not have adverse effect on the machinery, equipment and fish. They shall be stored in a suitable place away from fish landing area.

5.6 Sign boards prohibiting smoking, spitting, eating, drinking etc. inside the landing sites shall be exhibited at prominent positions.

5.7 Fish and shell fish shall be properly iced using good quality ice made up of potable water so as to maintain the core temperature of fish products below 4ºC.

5.8 Fish products, ice, utensils etc. shall not be kept on the floor directly.

5.9 Proper waste management shall be adopted to remove solid and liquid wastes immediately after its formation so as to avoid cross contamination.

5.10 Workers coming in direct contact with fish and shellfish shall maintain highest degree of cleanliness. They shall wash their hands properly before and after handling fish and shellfish, ice and food contact surfaces. Workers shall adopt good personal hygiene practices to avoid contamination. Person responsible for hygiene shall ensure that employees are following personal hygiene practices strictly.

5.11 Unauthorized person(s) shall not be permitted to enter into the landing site / fishing harbour.

5.12 Hygiene inspector shall maintain records of fishing vessels landed and variety-wise details and quality of fish supplied by each vessel. He / she shall monitor the fishing vessels during berthing on a laid down frequency to assess the hygienic condition/ infrastructure of the vessel, quality/ quantity of ice used etc. and maintain records.

Annexure 4

Templates of documents and records required by Fish and Fish products Manufacturer's

Some of the formats have been specified by FSSAI; hence also other below templates can be used as reference.

Mandatory

1.1 Medical Fitness Certificate for Food handlers (Template)

MEDICAL FITNESS CERTIFICATE FOR FOOD HANDLERS

(FOR THE YEAR .....)
(See Para No. 10.1.2, Part- II, Schedule - 4 of FSS Regulation, 2011)

It is certified that Shri/Smt./Miss..... employed with M/s....., coming in direct contact with food items has been carefully examined* by me on date ..... Based on the medical examination conducted, he/she is found free from any infectious or communicable diseases and the person is fit to work in the above-mentioned food establishment.

Name and Signature with Seal
of Registered Medical Practitioner /
Civil Surgeon

***Medical Examination to be conducted:**
1. Physical Examination
2. Eye Test
3. Skin Examination
4. Compliance with schedule of Vaccine to be inoculated against enteric group of diseases
5. Any test required to confirm any communicable or infectious disease which the person suspected to be suffering from on clinical examination.

1.2 **FORM E**

Form of Guarantee

(Refer Regulation 2.1.14(2))

Invoice No. _____

Place:_____

From: _____

Date:_____

To: _____

Date of sale	Nature and quality of article/brand name, if any	Batch No or Code No.	Quantity	Price
1	2	3	4	5

I/We hereby certify that food/foods mentioned in this invoice is/are warranted to be of the nature and quality which it/ these purports/purported to be.

Signature of the manufacturer/Distributor/Dealer

Name and address of

Manufacturer/Packer

(in case of packed article)

License No. (wherever applicable)

Recommendatory

2.1 Incoming Vehicle Inspection Record (Template)

Sr. No.	Parameters to be Checked		Vehicle 1	Vehicle 2	Vehicle 3
1.	Department	1.1 Dry store (✓/x)			
		1.2 Packing store (✓/x)			
2.	*Vehicle*	2.1 Supplier Name			
		2.2 Vehicle No.			
		2.3 Vehicle Destination			
		2.4 DC/Invoice No.			
		2.5 Vehicle Phy. condition (Rust, Piercing nails,			
		2.6 Vehicle Cleanliness (✓ / x)			
		2.7 Objectionable odour			
		2.8 Vehicle type (Close/Open)			
		2.9 Arrival Time			
3.	Material Received	3.1 Material Received			
		3.2 Damaged material (✓ / x)			
		3.4 Leak/ Open/ Torn C/P/B			
		3.5 Pest Infestation (✓ / x)			
		3.6 Dirty/Crushed C/P/B			
		3.7 No. of C/P/B			
4.	Other Observation	4.1 Any hazardous material in vehicle. (✓ / x)			
		4.2 Inspection of empty vehicle (✓ / x)			
5.	Security & Safety	5.1 Seal of Vehicle (✓ / x)			
6.	Corrective Action	Corrective action for Non-Conformance			
7.	Signature	7.1 Inspected by			
		7.2 Security			
8.	Verification	By Q.C.			
9.	Remark	Accepted/ Not Accepted for unloading (✓ / x)			

2.2Incoming Raw Material (Ingredients) Inspection Report (Template)

INCOMING RAW MATERIAL (Ingredients) INSPECTION REPORT

Deliver Date .....

Lot No./MRN No. .....

Supplier Name & Address .....

Product Name .....

Brand Name if any .....

Quantity received .....

Colour .....

Odour .....

Texture .....

Purity% / pH .....

Moisture % .....

Packing/Container condition .....

Cleanliness of the vehicle .....

Vehicle with lock .....

Batch No. .....

Best before date. .....

Microbiological Report

Parameters	Findings	Microbiologist Signature

Remarks: Overall Quality : Accepted /Rejected

Inspected by Verified by

2.3 Glass & Brittle Plastic Monitoring record (Template)

S.No.	Item number	Item placed at	Condition (OK/Not OK)	Correction done	Remarks

2.4 Knife/ Other Utensil Monitoring record (Template)

S.No.	Item number	Item placed at	Condition (OK/Not OK)	Correction done	Remarks

2.5 Product Release Record (Template)

Name of Product:	
Date of Manufacturing:	
Time of Manufacturing:	
Batch/Lot No.:	
Best Before/ Expiry Date:	
Quality Acceptance	
Analytical	
Microbiological	
Sensory	
Others, if any	
Quality Lab signature	

2.6 Operation Log Sheet (Template for Temperature Control)

S.No.	Date	Time	Temp. Gauge Number	Specification / Range allowed	Actual Result	Remarks	Sign

2.7 Rework Record

Batch No	Date	Qty	Material	Source	Time	Finished Product

2.8 Non-conforming Material/Product (Template)

HOLD: ☐ **REJECT:** ☐

Material Type:

Finished Product ☐ Raw Material ☐

In-Process Product ☐ Packaging Material ☐

Material Name:
Date of Manufacturing/Receipt:
Quantity of Manufacturing/Receipt:
Lot/Batch No.
Quantity used:
Lot/Batch No.
Quantity Hold:
Lot/Batch No.
Quantity Rejected:
Lot/Batch No.

Reason for Hold:
Reason for Rejection:

Corrective Action:
Preventive Action:

Remarks:

Signature:
QC Executive *Qualiity Manager* *Mfg. Manager*

2.9 Outgoing Vehicle Inspection Record (Template)

Sr. No.	Dispatch Parameters		Vehicle 1	Vehicle 2
1.	Dispatch Conditions	1.1 Fresh (√/x)		
		1.2 Frozen (√/x)		
2.	Vehicle	2.1 Vehicle No.		
		2.2 Vehicle Destination		
		2.3 DC/STM No.		
		2.4 Vehicle Physical Condition (Rust, Piercing nails, Pests inf. etc.)		
		2.5 Vehicle Cleanliness (√ / x)		
		2.6 RU Functioning (√ / x)		
		2.7 Pre-cooling Temp. (< -12^{0}C)		
		2.8 Strip Curtains (√ / x)		
		2.9 Departure Time.		
		2.10 Departure Temp.		
		2.11 Temp. Data logger (√ / x)		
3.	Product	3.1 Product Temp.		
		3.2 Damage Product		
		3.3 Leak/Open/ Torn C/B/P (√/x)		
		3.4 Dirty/Crushed C/B/P (√ /x)		
		3.5 No. of C/B/P		
4.	Security	4.1 Sealing of Vehicle (√ / x)		
		4.2 Seal No.		
5.	Corrective Action	Corrective action for Non-Conformance		
6.	Signature	6.1 Inspected by		
		6.2 Security		
		6.3 Driver		
7.	Verification	By Q.C.		
8.	Remark	Accepted/Not Accepted for dispatch (√ / x)		

2.10 Product Identification & Traceability (Template)

Traceability Detail Format

Product Description

Plant Name: Manufacturing Date:
Product Name: Manufacturing Time:
Pack Size: Batch/Lot no.:

Traceability Details

Investigation Date: InvestigationTime End:
InvestigationTime Start: Total Time Taken:

A. CIP Details

Equipment Name	CIP Details			Remarks
	Date	Time	Person responsible	

B.Ingredient Details

Material Description		Remarks
Name	Batch/Lot No.	

C. Water Treatment Details

Chemical/Material Description		Remarks
Name	Batch/Lot No.	

D. Primary Packaging

Material Description		Remarks
Name	Batch/Lot No.	

E.Manufacturing Details

Date	Shift	Cases Manufactured	CCP Compliance	Remarks

F. Analytical Details

Date	Shift	Analytical compliance%	Product blocked,If any	Remarks

G.Dispatch Details

Invoice No.	Date of Dispatch	Quanity Dispatched= Total produced-(Rejected+ Control samples+ Warehouse retained)	Dispatch Destination	Remarks

2.11 Product Recall record (Template)

S.No.	Date of Complaint	Nature of Complaint	Results of Investigation	Product / Batches & quantity recalled	Mode of Disposal

2.12 Product Recall- Mock Drill report (Template)

Date of Drill:
Starting Time of Drill:
Closing Time of Drill:
Overall Time taken:
Product name:
Area Covered:
Mode of communication used (Telephone/ Fax / e-mail):

Persons/Parties contacted:

S.No.	Service Point	Location	Name of person contacted	Telephone/ Fax / e-mail	Quantity of product lying in stock

Result of Physical Verification:

Remarks:

2.13 CHLORINATION REGISTER

Date: (Chlorination level in ppm)

Time	Foot Dip	Hand Dip	Process Water	Ice	Water for			Glaze water	Remarks
					Floor washing	Equipment washing	Utensils/Food contact Surfaces		

Entered by: Checked by: Verified by:

2.14 Equipment Breakdown Maintenance report (Template)

Date: **Period of Report:**

S.No.	Name / Code No. of the Machine / Equipment	Location	Nature of Breakdown	Details of repairs carried out	Breakdown Period	Work Done by	Remarks

2.15 List of Monitoring & Measuring Devices and Records of Calibration (Template)

S.No.	Name of Equipment	ID.No.	Location	Range	Least Count	Frequency of Calibration	In house calibration Done On	In house calibration Due On	Remarks	Sign

2.16 Preventive Maintenance Schedule (Template)

LIST OF MACHINERY AND EQUIPMENT FOR MAINTENANCE

S.No.	Name of Machine/ Equipment	Code/ Identification No.	Specification /Supplier	Location of place of the Machine/ Equipment	Frequency of check					Remarks
					Daily	Weekly	Monthly	Half Yearly	Yearly	

2.17 Preventive Maintenance Record (Template)

Machine/Equipment Name.:
Machine/Equipment No.:
Location:

S.No.	Maintenance Check Point	Frequency of check					Signature	Remarks
		Daily	Weekly	Monthly	Half Yearly	Yearly		

2.18 Fire extinguishers inspection record (Template)

Inspection date	Extinguisher No.	Type/Specification	Due date of re-filling	Actual date of re-filling	General condition	Signature

2.19 Pest Management Plan (Template)

Type of Pest	Mode of Control	Station (locations) monitored	Number designated	Frequency of Monitoring	Remarks

2.20 Pest Monitoring record (Template)

Date	Type of Pest	Mode of Control	Station (locations) monitored	Number designated	Frequency of Monitoring	Clean (ok/Not ok)	Remarks	Sign

2.21 Pest 'O' Flash Cleaning Report (Template)

Area & No.....

Date Checked	No. of Flies Found	No. of Other insects found	Working condition and cleanliness (S- Satisfactory, US- un Satisfactory)	Remarks/Corrective action, if any & Signature	Checked by Signature

2.22 Waste Disposal Record (Template)

S.No.	Amount of waste						Daily disposal (Yes/No)
	Chemica/ Hazardous waste	Food material waste	Package material waste	Other waste (Dry)	Other waste (Wet)	% of total waste	

2.23 Monitoring of personnel hygiene (Template)

Date:

S.No.	Employee Code	Employee name	Area of work	Hand wash, sanitize (and Gloves where necessary)	Clean & trimmed Nails	No open Wounds	No Jewellery	Covered Hair	Clean outer garments / protective clothing	Clean Shoes/ shoe covers	InfectiousDisease / Skin infection / Allergy, if any	No Tobacco/ Smoking / Chewing	Overall Hygiene Status upon examination (Yes/No)	Action needed on non-compliance	Re-examination status (Yes/No)
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															

Jewelllery *wrist watches, cufflinks, ear rings, glass bangles, stick bindis*

2.24 Visitor Record (Template)

Date of visit:	
Time of entry:	
Time of exit:	
Name of visitor:	
From (location):	
Whom to meet:	
Purpose of visit:	
Type of visitor:	*Please Tick:* *Type I (Critical areas: Internal processing areas)* *Type II (Outside processing areas)* *Type III (Office areas)*
Any Allergy/ Infectious disease declaration:	
Belongings description:	
Signature of visitor:	
Signature of Security in-charge:	
Signature of person visited:	

NB: Pls adhere to all the food safety and quality ; and company policies and rules during your visit

2.25 Product Information (Template)

S.No.	Description	Specifications
1	**Product Category/Name**	
2	**Composition (Raw materials, Ingredients, etc.)**	
3	**General & Specific product specification**	
4	**Legislative requirements, Customer requirements**	
5	**Storage**	
6	**Labeling**	
7	**Transportation**	
8	**Product Shelf-life**	
9	**Packaging material**	
10	**Hazardous for any group of customers**	
11	**Food Category**	
12	**INTENDED USE**	

2.26 Customer/ Consumer Complaint Log (Template)

Complaint Number: _____

Date: _____ Time recorded: _____ ☐ am ☐ pm
Quality related: ☐ Food safety related: ☐

Customer Details
Customer Name: _____
Phone: _____
Address: _____ City: _____
State/Province: _____ Zip code: _____
Email: _____

Product Consumed
Product name: _____
Batch Code/Lot no.: _____
Package size: _____
Location purchased: _____
Date of purchase: _____ Date consumed: _____
How was the product stored? _____

Nature of Complaint

Foreign object	☐	Off/ Unsatisfactory Flavor	☐	Allergic	☐
Packaging	☐	Illness	☐	Others	☐

How many people consumed? _____ Ages? _____
Symptoms/Additional Problem Information: _____

Has the Customer
Seen a Doctor? Gone to Hospital?
Spoken to a public health? Contacted Regulatory Agency?

_____

Comments & follow up action
Feedback from client- Status or date finalized

2.27 Determination of Customer Satisfaction (Template)

We would like to know how well we are succeeding in meeting your needs. Following is the questionnaire about what you wanted from us. Answers will be treated with complete confidentiality. Please answer these questions using the scale (Please TICK that you choose).

('1' being the worst score; '5' being the best score)

S.No.	QUESTIONS	SCORE				
1	How well do we communicate with you?	1	2	3	4	5
2	Do we give you the information you need?	1	2	3	4	5
3	Do we answer your queries promptly?	1	2	3	4	5
4	Do we respond positively to your problems & suggestions?	1	2	3	4	5
5	Do you feel we have a concern for quality & food safety?	1	2	3	4	5
6	Do we deliver quality & safe products consistently and on time?	1	2	3	4	5
7	Do we anticipate your needs?	1	2	3	4	5
8	Have we increased your understanding of quality & food safety?	1	2	3	4	5
9	Do we work with you as a team?	1	2	3	4	5

Any other comments?

Name and Address

2.28 Training Calendar (Template)

S.No.	Topic of training	Month/Year: _____											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

2.29 Training Need Identification (Template)

Name of employee: **Date of Joining:**

Qualification:

Designation: **Department:**

Key Responsibilities:

Training(s) Required

1	**Managerial**	
2	**Technical**	
3	**On the Job**	
4	**General/Others**	

Suggested Training iinstitutions (applicable for external trainings):

Any other suggestions:

Signatue of Dept. Head:

Below topics of training to be determined, but not limited to:

1. *Food safety policy*
2. *Food safety objective and targets*
3. *Actual or potential significant environmental impacts and unacceptable risks of the work activities*
4. *Food Safety and hygiene related issues*
5. *Compliance to legal requirements*
6. *Roles and responsibilities of employees to ensure effective implementation of food safety*
7. *Operational Control procedures*
8. *Emergency Preparedness and response requirements*
9. *Potential effects of deviation from documented procedures*

2.30 Training Record (Template)

Date of Training:
Conducted By:
Subject of Training:
Brief summary of the subject:
Duration of Training:

S.No.	Name of person trained	Functional area	Remarks	Signature
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

2.31 Training Effectiveness record (Template)

Date of Training:
Subject of Training:
Brief summary of the subject:

S.No.	Name of person trained	Functional area	Pre-evaluation result	Post-evaluation result	Effectiveness status (Yes/No)	Comment on effectiveness	Signature of trainee
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Effectivess can be based on: Improvement in quality of work, Improvement in work output, Behavioural change, Overall usefulness of training, etc.

2.32 Internal Audit Plan (Template)

S.No.	Process Area	Month/Year: _____											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Store areas- Raw material, ingredients, chemicals, finished product												
2	Process Area												
3	Housekeeping, Cleaning & Personal Hygiene												
4	Preventive Maintenance												
5	Internal Laboratory												
6	Management functions												
7	Packaging & Dispatch area												
8	Documentation												
9	Human Resource & Training												
10	Others												

2.33 Internal Audit Schedule (Template)

Date of Audit:

Standard of Audit:

S.No.	Process Area	Auditee(s) & Functional Department	Auditor(s) & Functional Department	Date	Time
1	Store areas- Raw material, ingredients, chemicals, finished product				
2	Production/Manufacturing Area				
3	Housekeeping, Cleaning & Personal Hygiene				
4	Preventive Maintenance				
5	Internal Laboratory				
6	Management functions				
7	Packaging & Dispatch area				
8	Documentation				
9	Human Resource & Training				
10	Others				

2.34 Internal Audit Observation & Non- conformance report (Template)

Name of Manufacturing plant:
Date of Internal Audit:
Process Area Audited:
Auditor(s):
Auditee(s):

Areas Covered:

S.No.	Observation area	Compliance checkpoint	Status (Yes/No)	Non-Compliance details (if any in this area)	Corrective action planned	Responsibility	Traget date of completion	Actual completed on

2.35 Correction & Corrective Action report

Processing Area:
Date:
Inspected/Audited By:
Processing area incharge:

Non-conformance Observed	
Root cause analysis	
Correction Proposed	**Corrective Action Proposed**
Target Date:	Target Date:
Correction Review	**Corrective Action Review**
Date: Dept. Incharge	Date: Dept. Incharge