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INTRODUCTION

INTRODUCTION

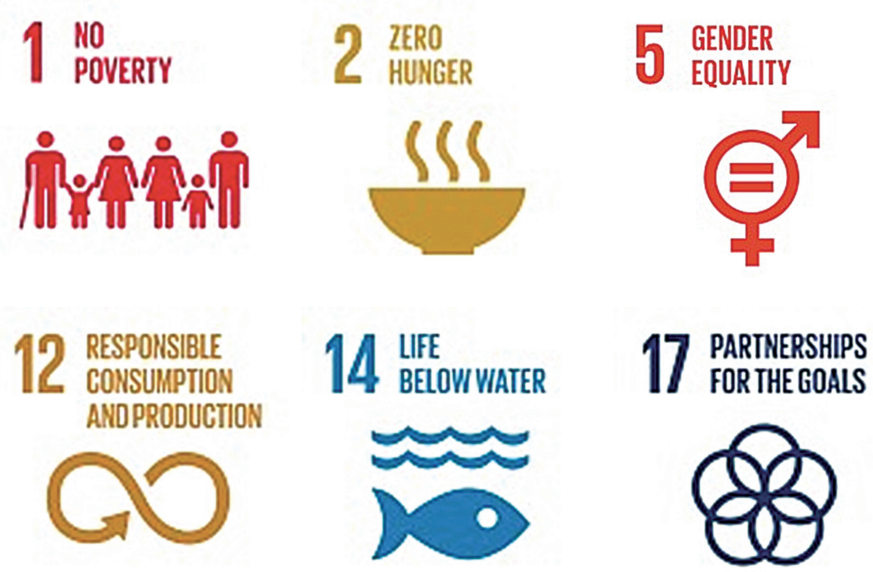
Fisheries and Aquaculture remains to be an important source of food, nutrition, income and livelihood to about 28 million fishers and fish farmers at the primary level and almost twice the number along the value chain. Fish is an affordable and good source of animal protein, a good option to reduce hunger and malnutrition in the country. Indian Fisheries sector evolved gradually over the years and became an important socio-economic attribute for the nation. India is the third-largest fish and aquaculture-producing country and accounts for about 16% of total inland and 5% of total global marine fish production* respectively.

India is among the top 5 fish exporting countries in the world at third place preluded by China & Indonesia. About 1.1% contribution is of fisheries sector in Indian Economy and about 6.72% contribution is in agriculture. In 2022-23, the country exported 1.73 million MT* of seafood worth US$ 8.09 billion which is all time high export by value.

The fish production in India has maintained with the total production reaching an all-time high of 175.45 lakh tonnes * during FY 2022-23, comprising 44.32 lakh tonnes marine and 131.13 lakh tonnes inland. State/UTs like Andhra Pradesh, West Bengal and Karnataka evolve to be the three major fish-producing states in India during 2022-23.

Disposition of fish catch covers activities such as marketing fresh, frozen, curing, canning, reduction etc.. Marketing of the fresh fish is the highest practiced activity. India has been facing a constant growth in disposition of fish catch during 2013-2023. Andhra Pradesh, West Bengal and Karnataka have highest disposition* of fish catch in 2022-23.

World fishery and aquaculture supply has experienced tremendous growth and is estimated to reach over 200 million tonnes by 2030. Since 2013, aquaculture has become the main source of the fish available for human consumption. Globally, fish accounts for about 17 percent of animal protein intake, and apparent per capita fish consumption is currently over 20 kg. A large share of fish production is exported, and fish and fish products are among the most widely traded food commodities in the



world. About 200 million people are employed in fisheries and aquaculture worldwide, in the primary and secondary sectors, with the majority of these in developing countries, including a large number of women employed mostly in processing activities.

With a world population expected to reach 9.8 billion by 2050, a sustainable fisheries and aquaculture sector will play a key role in ensuring food security as the increased demand will challenge fish production over coming decades. Food loss and waste occurs in most, if not all, supply chains. Reducing this loss and waste is becoming increasingly more important as demand for fish as food increases.

Given the many challenges of increasing fish supply to meet growing demand for food, reducing FLW will contribute to the objectives of at least six United Nations Sustainable Development Goals (SDG):

This reference handbook has been devoloped to share the information about Indian standards on Fish products, especially with the UG students of Universities , who are studying in the course - Bachelor of Science in Fisheries.. This handbook will help to bridge the gap in the curriculum relating to information on Indian standards and their importance. The students will benefit from the information and can also utilize the knowledge gained , in their field of work. The interesting field of standards awaits them to explore it.. The students are requested to visit our BIS website www.bis.gov.in, which is a treasure house of information to all stakeholders i.e Students, Academia, Professionals, Educational Institutions, Industry, R&D organizations, Regulators, Govt Departments, Testing Laboratories, Domain Experts and above all the common consumer.

Source of information:

* Handbook on Fisheries and Statistics 2023

FAO Report: Global fisheries and aquaculture production reaches a new record high

About Bureau of Indian Standard (BIS)

The erstwhile Indian Standards Institution (ISI) (now Bureau of Indian Standards) was established 0n 07 January 1947 with the objective of harmonious development of standardization activity in India. Over the years various methods, procedures, etc were established for carrying out standardization activities in a more effective and efficient manner. The Bureau of Indian Standards Act, 1986 and subsequently the BIS Act, 2016 positions BIS as the National Standards Body for the harmonious development of the activities of standardization and to establish, publish, review and promote Indian Standards, in relation to any goods, article, process, system or service by a process of consultation involving consumers, regulatory and other Government bodies, industry, testing laboratories or calibration laboratories, scientists, technologists, and members of the Committees of the Bureau through duly constituted committees. The standardization activities of BIS are carried out under the provisions of sections 10 and 11 of the BIS Act, 2016 and as prescribed under rules 22 to 30 of BIS Rules, 2018.

BIS as the National Standards Body and India a signatory to the WTO-TBT Agreement, the standards formulation activity of BIS is aligned with the 'Code of Good Practice for the Preparation, Adoption and Application of Standards' (see Article 4 and Annex 3 of WTO-TBT Agreement).

For formulation of Indian Standards, BIS functions through the technical committee structure comprising Sectional Committees under respective Division Councils set up for specific technologies and economic sectors. The Sectional Committees may be supported by Subcommittees, Panels and Working Groups which may be set up for dealing with specific group of subjects. The committee structure of BIS seeks to bring together all stakeholders' interest in relevant standardization areas, so that standards are developed keeping in view national interests and after taking into consideration all significant viewpoint through a process of consultation. Decisions in BIS technical committees are reached through a process of consensus.

As on date there 16 division councils, 383 sectional committees, - sub-committees and – panels who are actively involved in the standard formulation activity. It is also pertinent to mention that BIS is the founder member of International Organization for standardization (ISO) and follows International best practices for formulation of standards. BIS develops Indian Standards through a consultative mechanism in technical committees , comprising of various stake holders that have interest in the relevant subjects so that views of all are given due consideration and a consensus is evolved while formulating a standard. The stake holders can broadly be categorized as industry, consumers, technologies (R&D and scientific institutions), academia, govt organizations etc. The standard formulation process is based on principles of transparency, consensus, impartiality, effectiveness, relevance and coherence. So far BIS has published more than 22600 Indian Standards which are mainly product standards, test methods, code of practice, guidelines, terminology etc.

The Indian Standards can be downloaded from 'know your standards link' available on BIS website www.bis.gov.in.

Apart from standard formulation activity the other important activities are:

- Product Certification,

- Laboratory Services,
- Hallmarking,
- Compulsory Registration,
- Management System Certification,
- Research & Training and
- Standards Promotion and Consumer Engagement Activities.

The standards formulation activity in BIS is based on a consensus approach. BIS is also the founder member of ISO. The best standard formulation practices are being followed for development of standards. All possible stakeholders (e.g. Technical experts, Govt/State Govt Departments, Ministry, Regulators, Research Organizations, Academia and Industry Associations) are represented in the Section Committee which is responsible for formulation of Indian standards. The finalized drat standards are adopted after obtaining approval from the Division Council Chairman. After approval it is gazetted by BIS and the standard is established.

The Indian Standards on Fisheries, Fish products, Aquaculture etc are formulated by the **Fish, Fisheries and Aquaculture Sectional Committee, FAD 12**, chaired by the Deputy Director General (Fisheries), ICAR, New Delhi. The present chairman is Dr Joykrushna Jena, DDG, ICAR. The scope of the committee is given below:

Scope:

Standardization in the field of:

a) Fresh, processed and packaged fish; fisheries and aquaculture products and by-products (both edible and non-edible); fish feed and feed ingredients not covered by FAD 5

b) Fisheries and Aquaculture, including, but not limited to, terminology, technical specifications for equipment and for their operation, characterization of aquaculture sites and maintenance of appropriate physical, chemical, and biological conditions, environmental monitoring, data reporting, traceability, waste disposal and code of transport.

c) Physical, chemical, microbiological and organoleptic methods of test pertaining to this committee.

What are Standards

A standard is a document, established by a consensus of subject matter experts and approved by a recognized body that provides guidance on the design, use or performance of materials, products, processes, services, systems or persons.

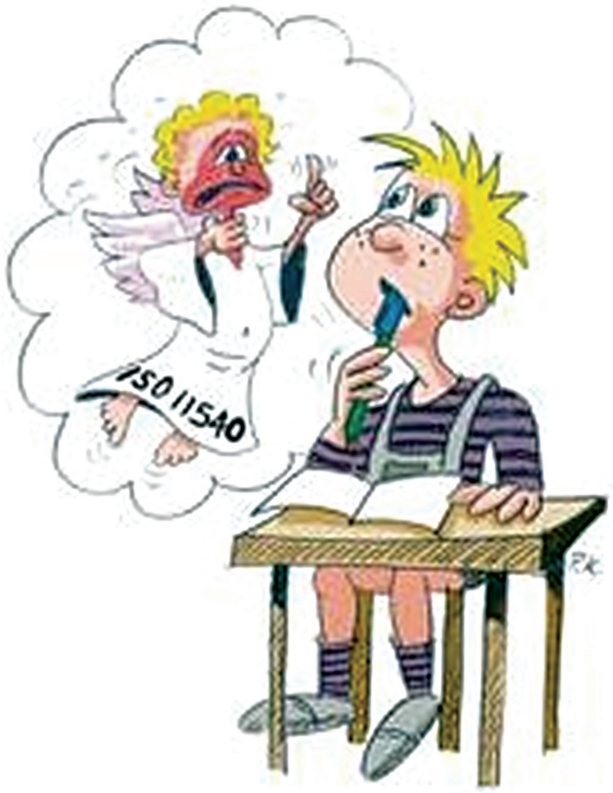
Standards can be developed by national, regional and international standards developing organizations and also by businesses or other organizations for their own internal use. They can also be developed by consortia of businesses to address a specific marketplace need, or by government departments to support regulations. This module is most concerned with standards produced by the international standards organizations, ISO and IEC, and their national members.

The formal definition from the International Organization for Standardization (ISO) and its sister organization, the International Electro-technical Commission (IEC) is:

A document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.

Whereas IEC's scope of work is specifically electrical and electro-technical standardization, ISO's work programme encompasses virtually all other areas except telecommunications which is covered by the International Telecommunication Union (ITU). However, a joint technical committee of ISO and IEC (JTC1)1 deals with information technology standardization.

Standards are voluntary agreements, developed within an open process that gives all stakeholders, including consumers, the opportunity to express their views and have those views considered. This contributes to their fairness and market relevance, and promotes confidence in their use.



CHAPTER I
DEFINITIONS

CHAPTER 1
DEFINITIONS

1.0 Blue Revolution

Blue Revolution also called as Neel or Nili Kranti Mission in India was launched in 1985-1990 during the 7th Five-Year Plan. The main objective is to develop, manage, and promote fisheries to double the farmers' income**. Hiralal Chaudhuri and Arun Krishnan** are regarded as the Father of Blue revolution in India. Chaudhuri was the architect of induced breeding and spawn production of the economically important carp Cirrhinus reba in captivity. Blue Revolution means **a remarkable increase in the production of fish and marine products**. It sees the emergence of aquaculture as one of the most important forms of agricultural activity. Aquaculture means all form of active culture of animals and plants living in marine, brackish and freshwater.

The Blue Revolution is part of the Government's efforts to promote fishing as an allied activity for farmers in order to double their incomes. It refers to an explosive growth in the aquaculture industry. As part of its efforts to raise seafood output and exports and promote sustainable aquaculture, the Government has constituted an independent Ministry for Fisheries. In the budget 2019-20, the government allocated an estimated 3,737 crore rupees for the newly carved out Ministry of Fisheries, Animal Husbandry and Dairying. The aquaculture industry has been growing at an average rate of 9% a year and India is one of the fastest growers.

In other words, the rapid increase in the production of fish and marine product through a package program is known as the Blue Revolution.

1.1 Outcomes :

The FFDA brought improvement in aquaculture by adopting new techniques of fish breeding, rearing, marketing and export. The Indian Fisheries Sector which produced only 60,000 tonnes of fish 50 years ago produces 4.7 million tonnes including 1.6 million tonnes from freshwater aquaculture today.

India recorded an average annual growth of 14.8% in production of fish and fish products in the last decade as compared to the global average of 7.5% in the same period. Fisheries, are in fact, India's single largest agricultural export with a growth rate of 6-10% in the last five years. In comparison, the growth rate of the farm sector in the same period is around 2.5%.

Fishing is the primary source of livelihood for several communities in India and the country is the world's second largest fish producer with exports worth more than 47,000 crore rupees.

Currently, the USA is the largest market for Indian seafood products with a share of 26.46% in terms of India's exports of marine products followed by South East Asian Countries- 25.71% and the European Union Nations- 20.08%. The fisheries and aquaculture production contribute around 1% to India's GDP and over 5% to the agricultural GDP.

1.2 Unutilized Potential: It is a matter of great concern that India is able to exploit only a fraction of the aquaculture potential available to it. India uses only about 40% of

the available ponds, tanks and other water bodies for freshwater aquaculture and 15% of total potential of brackish water resources.

2.0 Fisheries is an economic activity that involves harvesting fish or any aquatic organism from the wild (Capture Fisheries) or raising them in confinement (Culture Fisheries/ Aquaculture). It may be Traditional/ Small Scale Fisheries (SSF) for sustenance, or Large Scale/ Commercial Fisheries for profit.

2.1 Fish (in general) is a cold-blooded aquatic organism that breathes with gills and swims with fins; they are categorized as Finfish and Shellfish**.**

2.2 Finfish are cold-blooded aquatic vertebrates that have gills, fins with rays, and scales covering the body.

2.3 Shellfish are cold-blooded aquatic invertebrate that have gills, various types of locomotory organs and a shell/ exoskeleton covering the body. They include crustaceans and mollusc.

3.0 Good Manufacturing Practices (GMP)

Good manufacturing practices are mandatory operational procedures that are to be followed to ensure product of good quality. The regulatory agencies specify GMPs to be adopted in the manufacturing, processing, packing, transportation and storage of each type of food meant for human consumption. The regulations of GMPs may include sanitary aspects covering equipments and utensils, sanitary facilities and control, sanitary operations, processes and controls, and personnel.

4.0 FERMENTED FISH PRODUCTS

Fermented fish products are described as a way for preserving the fish that involves deliberate growth of fermentative microorganism. In most Southeast Asian countries, fish fermentation process involves addition of salt, followed by drying or reducing fully fermented products to liquid or paste. The fermentation products are extremely varied, they can take form of a liquid (fish sauce), paste (shrimp paste) or whole fish (fermented anchovy). During fermentation, salt is added at certain concentration to inhibit the growth of pathogenic organism as well as to encourage the growth of desired organism that breakdown muscle and develop flavor. The mixture is left to ferment till a desirable taste, color and flavor is matured before it is ready for consumption. In certain products, rice bran or roasted rice is added to the mixture to obtain a specific taste of flavor. The fermented fish products can be eaten with rice, cooked with vegetables, prepared with onion, chili and spices or used in other ways.

5.0 CANNED FISH PRODUCTS

Canned fish products are described as thermally processed fish in a hermetically sealed can containers. The fish is subjected to high temperature to destroy the pathogenic microorganisms. Canned fish products can be consumed directly or re-cooked before consumption.

6.0 POWDERED FISH PRODUCTS-

Powdered fish products are also known as floss, granulated/flaked products or fish concentrate. It is made from by-products of dried prawn or the mince from tuna, mackerel, lizard, sardine etc. The raw material is mixed with other ingredients to enhance the product taste. They can be served with bread or rice, used in soups or consumed as snack.

7.0 BOILED FISH PRODUCTS

Boiled products are generally described as salted and boiled fish products by most countries. They are produced either by cooking in boiling water or in steam. They can be eaten either plain, with chili paste or curry, or consumed with rice or porridge.

8.0 FISH MEAL

Fish meal is described as high-protein dried fish powder, used for animal feed and fertilizer. It utilizes trawl by-catch and processing waste from fish processing plants. Though claimed as low value product, there is a trend of producing high quality fish meal by using fresh raw material and improved processing method.

9.0 Hygiene

Hygiene is a set of practices performed to preserve health. According to the World Health Organization, "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases." Personal hygiene refers to maintaining the body's cleanliness.

10. What is HACCP

HACCP stands for Hazard Analysis and Critical Control Point System and is a food safety system that prevents food safety from being compromised. ISO 22000 is an international standard according to ISO standards and has been created to guarantee the safety of the global food chain. HACCP is a system which identifies, evaluates and controls hazards which are significant for food safety (Please ref **Clause 3.2 of IS 15000: 2013**)

11. What is Food Safety Management System:

A food safety management system, or FSMS, is a collection of operations for food companies to control potential food hazards and ensure the safety of public health. This program consists of different preventive and control measures with appropriate monitoring procedures as compliance with food safety rules. The standard IS/ISO 22000:2018, document specifies requirements for a food safety management system (FSMS) to enable an organization that is directly or indirectly involved in the food chain (Pl refer to **Cl 3.25 of IS/ISO 22000:2018**).

12. Food Chain:

According to IS/ISO 22000:2018, Food chain is defined as the sequence of the stages in the production, processing, distribution, storage and handling of a food and its ingredients, from primary production to consumption. (Pl refer to **Cl 3.20 of IS/ISO 22000:2018)**

13. Food safety:

According to IS/ISO 22000:2018, Food safety is an assurance that food will not cause an adverse health effect for the consumer when it is prepared and/ or consumed in accordance with its intended use. (Pl refer to **Cl 3.21 of IS/ISO 22000:2018**)

14. Food safety hazard:

According to IS/ISO 22000:2018, a biological, chemical or physical agent in food with

the potential to cause an adverse health effect, is known as Food Safety Hazard. (Pl refer to **Cl 3.22 of IS/ISO 22000:2018**)

15. Good Aquaculture Practices:

Practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food aquaculture products. (Please refer to **clause 2.1** of IS 17284)

16. Individual Producer:

A person/organization legally responsible for on farm production, who retains ownership of all the produce covered in the India GAqP licence. (Please refer to **clause 2.4** of IS 17284)

17. Record:

Document showing objective evidence of the tasks performed and results achieved. According to **Clause 4.4.2** of ISO 9001:2015, to the extent necessary, the organization shall:

a) Maintain documented information to support the operation of its processes;

b) Retain documented information to have confidence that the processes are being carried out as planned .

18. Self-inspection:

Internal inspection of the registered product carried out by the grower on his/her farm using control points and compliance criteria. (Please refer to **clause 2.7** of IS 17284)

19. Traceability:

The ability to trace the history, use or location of a product (that is, the origin of materials and parts, processes applied to the product, or its distribution and placement after delivery) by means of a record (Please refer to **clause 2.8** of IS 17284).

20. Farm:

A farm is an agricultural production unit or group of agricultural production units; covered by same operational procedures, farm management.

21. Standard Operating Procedure:

A written document which details an operation, analysis, or action whose mechanisms are prescribed thoroughly and which is commonly accepted as the method for performing certain routine or repetitive tasks. (Please refer to **clause 2.17** of IS 17284).

22. Major Requirement:

The mandatory requirement that shall be fully complied with. In case of non-compliance, it will seriously affect the quality of freshwater aquatic animal as well as safety for consumers. It means that the requirement shall be complied with relevant laws and regulations as well. (Please refer to **clause 2.18** of IS 17284).

22. Minor Requirement:

The requirement that shall be mostly complied with. In case of non-compliance, it will affect the health of freshwater aquatic animal or product quality.

(Please refer to **clause 2.19** of IS 17284).

CHAPTER II
FISH AND HEALTH BENEFITS

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FISH AND HEALTH BENEFITS

Fisheries and Aquaculture have been considered as an important means of poverty elevation and food security besides promoting health and well being. Fish continue to be one of the most traded food commodities worldwide. It contributes to around 17% of the global population's animal protein intake. Around 125-210 million tonnes of fish is projected to be required by 2050 to meet the annual per capita requirement of 15-20 kg.

Fish is often referred to as "Rich Food for Poor People" as it provides essential nourishment with both macronutrients and micronutrients. Fish contain low-fat high quality protein with omega-3 fatty acids and vitamins. Fish is rich in calcium and phosphorus and a great source of minerals, such as iron, zinc, iodine, magnesium, and potassium. On a fresh-weight basis, fish contains a good quantity of protein, about 18-20%, and all the eight essential amino acids including the sulphur-containing lysine, methionine, and cysteine.

In general, fish have less fat than red meats and the fat content ranges from 0.2% to 25%. However, fats from fatty fish species contain the polyunsaturated fatty acids (PUFAs) namely EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) which are essential for proper growth of children, proper brain development in unborn babies, reduced risk of preterm delivery and low birth weight. The fat also contributes to energy supplies and assists in the proper absorption of fat soluble vitamins namely A, D, E, and K.

Fish is a rich source of vitamins, particularly vitamins A and D from fatty species, as well as thiamine, riboflavin and niacin (vitamins B1 , B2 and B3). Vitamin D present in fish liver and oils is crucial for bone growth since it is essential for the absorption and metabolism of calcium. Fish is also called "Brain Food" as it helps in development and function of brain, and "Heart Food" as it contributes to lower risks of heart attacks and strokes. Consumption of fish reduces risk of autoimmune diseases, including Type-1 Diabetes, prevents and treats depression, protect from age-related brain deterioration, help prevent asthma in children, protect vision in old age by lowering risk of muscular degeneration, improves sleep quality, lowers risk of cancer, blood pressure, Alzheimer's disease etc. Fish is soft, easy to cook and more easily digested than meat so even young children can be fed fish, contributing to improved nutrient intake.

CHAPTER III
METHODS OF PRESERVATION

CHAPTER III

METHODS OF PRESERVATION

Preservation can be done, both for short and long duration

1.0 Preservation for short duration

1.1 Chilling

This is obtained by covering the fish with layers of ice. Ice is effective for short term preservation such as is needed to transport landed fish to nearby markets or to canning factories, etc. Here autolytic enzyme activities are checked by lowering the temperature.

2.0 Preservation for long time

When the preservation is required for a long period of time, the fishes are passed through the cleaning, gutting and conservation and storage.

2.1 Cleaning and gutting

During cleaning, the caught first are fish washed thoroughly in cold, clean water to remove bacteria, slime, blood, faeces, and mud, etc. from the body surface of the fish. It is being done under proper sanitary conditions. Large fishes are gutted (i.e. all the internal organs or viscera are removed) and the body cavity is washed.

2.2 Conservation and Storage

Conservation is necessary to keep the dead fish in fresh condition for quite a long time. This is achieved by employing any one of the methods like freezing, drying, salting, smoking and canning.

2.3 Freezing

Freezing means removal of heat from the body. To check the enzymal, bacterial action and putrefaction it is preferred to store the fish under lower temperatures. When fish is intended to be stored for a long period, quick freezing is preferred which inhibits bacterial action. During quick freezing every part of the product comes within the range of 0 c to -5C. Properly frozen fish at -20C retains its physical properties and nutritive values for a year or more and is almost as good as fresh fish. There are three ways effecting quick freezing:

a) Direct immersion of fish in the refrigerating medium,
b) Indirect contact with the refrigerant through plates
c) Forced convection of refrigerated air directed at heat transfer surfaces.

In general different methods of freezing are adapted through sharp freezer, air blast freezer, contact plate freezer, immersion freezing, liquid freon freezing, liquid nitrogen freezing, fluidized bed freezer, cryogenic freezing, etc. Among the various types of quick freezing plants installed in India the carrier air blast type is widely used. The air blast freezer is in the form of a tunnel and heat transfer is affected rapidly by the circulation of air. The temperature used ranges from 0 to -30 C and air velocity varies from 30 to 1050 meters/min.

2.4 Freeze drying

This is modified deep freezing, completely eliminating all chances of denaturation. The deep frozen fish at -20 C is then dried by direct sublimation of ice to water vapour with any melting into liquid water. This is achieved by exposing the frozen fish to 140 C in a vacuum chamber. The fish is then packed or canned in dried condition. The product is quite fresh looking in appearance, flavour, colour and quality.

3.0 Salting

Salting is a process where the common salt, sodium chloride, is used as a preservative which penetrates the tissues, thus checks the bacterial growth and inactivates the enzymes. Some of the factors involved in salting of fish which play an important role are purity of salt, quantify of salt used, method of salting and weather conditions like temperature, etc.

During the process the small fishes are directly salted without being cleaned. In the medium and large sized fish the head and viscera are removed and longitudinal cuts are made with the help of knives in the fleshy area of the body. Then the fish is washed and filled with salt for uniform penetration through flesh. Large fishes like sharks are cut into convenient sized pieces.

Generally, sardines, mackerels, seer fishes, cat fishes, sharks and prawns are used for salting.

Dry salting and wet salting and are the methods employed in salting of fish.

a) Dry salting

In this process the fish is first rubbed in salt and packed in layers in the tubs and cemented tanks. The salt is applied in between the layers of fishes in the proportion of 1:3 to 1:8 salt to fish. The proportion of salt to fish varies with the fish since the oily fish require more salt. At the end of 10 - 24 hours the fishes are removed from the tubs and washed in salt brine and dried in the sun for 2 or 3 days.

b) Wet salting

The cleaned fish are put in the previously prepared concentrated salt solution. It is stirred daily till it is properly picked. With large sized fishes, longitudinal slits are made in the flesh to allow penetration of salt. After pickling for 7-10days, the salty water that oozes out from the fish is allowed to drain off. This can be stored upto 3-4months.

4.0 Smoking

Smoking is one type of traditional drying salt-cured m ethod in preserving fish. In addition to facilitating preservation, the smoke contributes a pleasing flavor. Smoked fish products can be served fried or cooked w ith other ingredients such as chilli and tamarind. They are eaten w ith rice, salad or noodles. The type of fish used for smoked fish products are tuna (skipjack), milkfish, sardines, round scad, sharks, stingray, snakehead, swamp eel, catfish, Clupidae, etc.In this method, landed fish is cleaned and brined. It is then exposed to cold or hot smoke treatment. In cold smoking, first a temperature of 38 C is raised from a smokeless fire. After this heating, cold smoke at

a temperature below 28 C is allowed to circulate past the fish. In case of hot smoking, first a strong fire produces a temperature around 130 C.This is followed by smoking at a temperature of 40 C. The smoke has to be wet and dense. Good controls are necessary over density, temperature, humidity, speed of circulation, pattern of circulation and time of contact with fish of the smoke. The phenol content of the smoke acts as an antiseptic and it also imparts a characteristic colour and flavour. For making fire and smoke, only hard wood (Conifer wood, Saw dust etc.) are used.

5.0 Canning

Canning is a method of preservation in which spoilage can be averted by killing microorganisms through heat. Oily fish are the most suitable for canning. Salmon, tuna, sardine, herring, lobster, shrimp, etc. are canned. The raw material should be processed properly since it contains most dangerous Clostridium botulinum which should be destroyed. There are some other heat resistant bacteria like Clostridium sporogenes which can be eliminated at a temperature of 5 - 6 times more than Clostridium botulinum. It needs a temperature of 120 C for 4 minutes or at 115 C for 10 minutes to kill them in large numbers.

Canning is done by putting cleaned dressed and cut fish into a saline solution. The cans holding the fish and the saline are then double seamed under vacuum. Thereafter, sterilization of cans takes place at 121 C for 90min under steam pressure. Sterilization is followed by cooling of the cans under room temperature by running water.

6.0 Drying

Drying involves dehydration i.e. the removal of moisture contents of fish, so that the bacterial decomposition or enzymic autolysis does not occur. When moisture contents reduce upto 10%, the fishes are not spoiled provided they are stored in dry conditions. Fish drying is achieved either naturally or by artificial means. In natural drying the fishes after being caught are washed and dried in the sunshine. In artificial drying the killed fishes are cleaned, gutted and have their heads removed. They are then cut lengthwise to remove large parts of their spinal column, followed by washing and drying them mechanically.

CHAPTER IV

FOOD LOSS AND WASTE IN THE FISH VALUE CHAIN

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Food loss is “the decrease in quantity or quality of food”. In terms of fish, food is the fisheries and aquaculture products intended for human consumption that are ultimately not eaten by people or that have incurred a reduction of quality. A reduction in quality usually leads to a reduction in nutritional value, economic value or food safety issues. An important part of food loss is “food waste”, which refers to the discarding or alternative (non-food) use of food that was fit for human consumption - by choice or after the food has been left to spoil or expire as a result of negligence. This waste can happen at all parts of the value chain.

A **value chain** is the full range of activities that are required to bring a product or service from its conception to the final consumers. This includes activities such as design, production, marketing, distribution and support services. Value chains include local, regional and global markets. Key activities in a fisheries value chain can include fishing, aquaculture production, processing, transport, wholesale and retail marketing.

Food loss and food waste (FLW) occurs at all levels of the fisheries and aquaculture value chain. Understanding why and identifying where FLW happens is crucial in arming decision makers with information that can reduce and prevent it. Reducing FLW is becoming increasingly more important as demand for fish as food increases.

CAPTURE

AQUACULTURE

PROCESSING & STORAGE

WHOLESALE

TRANSPORT

RETAIL

CONSUMPTION

- **Processing** refers to mechanical or chemical operations performed on fish in order to transform or preserve them. Fish are processed in a variety of ways and in different working environments. Removing the entrails from fish (e.g. gutting or cleaning) is a simple processing technique designed to extend shelf life. Smoking, sun drying, and salting are common traditional processing methods associated with small-scale fisheries value chains and are often practiced using low cost technology and with minimal services and facilities. More sophisticated processing takes place in factory environments, which meet high international standards of hygiene and food safety. Fresh chilled, frozen and canned products

are all associated with high investment factory processing and international trade.

- Both low value and high value fish are processed. Low value fish are processed for both human consumption and for animal feed production. High value species from both capture fisheries and aquaculture are typically processed into fresh chilled or frozen products. By-products from processing such as frames, viscera, and skins are also processed into nutrient supplements, pharmaceutical products and fertilizer.
- Artisanally processed products are important for food security and nutrition, as they provide animal protein and nutrients to low income populations. Some traditionally processed products can also be of high value and desired by wealthy consumers.
- Artisanally processed dried, salted or smoked products are sold in domestic urban and rural markets, as well as sub-regional and international markets. These products are often transported long distances and marketed in areas far from where capture and processing take place. **Food loss and waste (FLW)** can occur if the product is damaged or stored for long periods under inadequate conditions, resulting in microbial contamination and insect infestation.
- Artisanal processing is associated with small-scale fisheries, and leverages methods such as sun drying, salting, fermenting, and smoking and frying, all of which enable fish to be preserved in locations where ice and refrigeration are non-existent or too expensive. These processes generally involve destroying spoilage bacteria and enzymes and creating conditions which unsuitable for microbial growth and proliferation. Many methods rely on the removal of moisture from the fish with or without some form of heat treatment, such as smoking or frying.
- **Drying** involves the evaporation of moisture from the surface of the fish and the migration of moisture from inside the fish to the surface. Drying is affected by the movement of air over the surface of the fish as well as the temperature and humidity of that air. Sun drying of fish, with or without the addition of salt, is practiced in many tropical countries, and is a low cost form of preservation.
- Products of artisanal fish processing (dried, salted and dried, smoked) often undergo a period of storage prior to being sold, distributed and consumed. Such storage typically takes place at the processing location and/or at a market.
- Product type, moisture content, design of storage facility, length of storage time, humidity, temperature and hygiene and sanitation practices can influence the likelihood of food loss and waste (FLW) during storage. Products can be stored for up to several months depending on these variables, particularly the type of product and its moisture content
- **Artisanal fish smoking** is a heat drying process. The heat is typically provided by an open wood fire, over which the fish are placed. The use of fire imparts a smoke flavour and affects the colour of the final products, which are usually light to dark brown. Various designs of traditional smoking kiln are used to house the fire and contain the fish.

- The smoking process and product characteristics are affected by the type of fuelwood used and the duration of the smoking process. The dryness or moisture content of final products varies. Fish which has been smoked for a long duration (2 to 3 days) will have a low moisture content of 10 to 15% and a potential shelf life of 6 to 9 months.
- Artisanal fish smoking is practiced in many tropical countries, particularly in Africa, and is a low cost form of preservation. Both marine and inland fish are smoked. Fish are either left whole, split or cut into pieces prior to smoking.

Cold Storage

The use of **"cold" handling and storage systems** as an investment to prevent perishable **food loss and waste (FLW)** is widely used in developed countries. It can be highly cost effective compared to continually increasing production to meet increasing demands for these foods.

The primary segments of an integrated cold chain include:

1. Packing and cooling fresh food products
2. Food processing (i.e. freezing of certain processed foods
3. Cold storage (short or long term warehousing of chilled or frozen foods)
4. Distribution (cold transport and temporary warehousing under temperature controlled conditions)
5. Marketing (refrigerated or freezer storage and displays at wholesale markets, retail markets and food service operations).

Cold storage is used to store a variety of already frozen fish and fish products and is a key component of wholesale, processed, export and retail value chain activities in many countries.

Freezing

Freezing preserves the storage life of foods by making them more inert and slowing down the detrimental reactions that promote food spoilage and limit quality shelf life. Freezing is one of the most important processing and preservation methods for fish. The main freezing methods used are blast freezing, plate freezing, immersion or spray freezing.

Advantages of freezing include:

1. flesh is changed very little and there is minimal loss of quality
2. fish can be stored for many months - for times when catches are scarce
3. large quantities of fish can be stored (assuming the cold storage capacity is available)
4. good quality fish can be transported under refrigerated conditions over long distances (e.g. export to areas where fresh fish are unavailable; fish caught in remote waters can be consumed at home)

Disadvantages of freezing include:

1. quality changes can occur if fish is not stored properly

2. can be expensive due to the power or fuel needed to operate the freezer
3. customers often have less regard for frozen fish
4. until it has thawed, it may be difficult to identify whether the fish has been abused

Consumption

Food consumption refers to the amount of food available for human consumption. Actual food consumption may be lower than the quantity of food available, depending on the magnitude of wastage and loss of food in the household (e.g. during storage or in preparation and cooking).

Food waste at the consumer level, including fish and fish products occurs in both industrialized and developing countries. In industrialized countries, an estimated 222 million tonnes of food is wasted per annum. By comparison, the annual food production of subSaharan Africa is only slightly larger, netting at 230 million tonnes.

Per capita food waste by consumers in Europe and North America is estimated to be 95-115 kg/year, while in sub-Saharan Africa and South/South-East Asia it is only 6-11 kg/year.

Food waste, if left rotting in landfills, produces substantial quantities of methane, a gas with 25 times more global warming potential than carbon dioxide (CO_2). This does not include the fossil fuels used for the production of wasted food, which also has a direct impact on climate change.

CHAPTER V

STANDARDS AND ECONOMIC BENEFITS

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STANDARDS AND ECONOMIC BENEFITS

Standardization is the process of formulating and applying rules for an orderly approach to a specific activity for the benefit and with the cooperation of all concerned, and in particular for the promotion of optimum overall economy taking due account of functional conditions and safety requirements. It is based on the consolidated results of science, technology and experience. It determines not only the basis for the present but also for future development, while keeping pace with technological developments world over. The evolution of the concept of standardization has helped in codifying the existing knowledge and in bridging the international barriers on a continual basis, it being a dynamic activity.

The next question that comes to our mind is that if Standards denote quality, safety aspects but how do they contribute towards the economic development of a country ? This is a valid question. Then how can the contribution of the standards towards economic benefits can be assessed and understood ?

Some of the important economic benefits that are accrued by the industry, service organization due to implementation of standards are listed below:

- Standards help to Improve process efficiency by reducing in- process rejections and maintain the level of product quality with lower rejections, hence lower production costs
- They help to Save resources and optimize outcomes in research and development
- Standards Optimize information transfer through unified specifications and harmonized information capture
- If you are a purchaser then standards help to ensure high-quality supplies and also helps in rating of vendors
- One of the important benefits of implementation of standards is that they help to Optimize production processes
- By implementing standards, the manufacturer and supplier have understanding of quality of goods being supplied and helps to avoid misunderstandings and litigations about quality of goods supplied.
- Standards help to Increase the level of customer confidence and loyalty
- Test methods and calibration standards help to Calibrate equipments and keep it in good working order, thereby assuring precise results during testing.
- They help to Increase the conformance rate of raw materials received from suppliers
- Standards help to Reduce the number of incidents causing health and safety issues
- Implementation of standards leads to Reduction of waste, energy consumption,

emissions and product defects.

- The standards help a firm in assessment and Improving risk management in its operations
- Standards are used by the R&D unit to ensure that manufacturing processes are compatible with, and regularly upgraded to, new technology, driving a more efficient manufacturing process.
- The standards help to Specify product requirements precisely on the basis of standards
- Compliance to standards helps to boost consumer confidence
- Increase the accuracy of product descriptions and technical documentation ? Reduce costs for re-work and replacement as a consequence of deficient quality ? Standards ensure product safety.
- Reduce waste and scrap and improve environmental performance

In fact standards are now being formulated keeping in view consumer requirements, sustainability, Circularity, Environmental safety etc. The ultimate aim is formulate a standard which is useful to the society and helps to maintain a quality eco-system . It is commonly thought that ensuring compliance to the standards makes a product expensive. Well, It is not so. Standards provide incremental benefits. Compliance to standards leads to standardization and optimization of the processes, reduces waste and reductions and enhances productivity. These factors lower the cost of production to a great extent. Standards also promote the concept of Recycle, Repair, Reuse, Refurbish etc in order to reduce waste generation and promote circularity.

CHAPTER VI

INDIAN STANDARDS ON FISH FEED

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INDIAN STANDARDS ON FISH FEED

With the Fish farming, captive fishing and Aquaculture being preferred by farmers, it is imperative that production and use of quality fish feed is essential part of the farming. BIS has formulated several Indian Standards on Fish feed which if followed will help in improving productivity and better quality of fish breeds. It is important that for the production of good quality fish at minimum cost, the fishes are properly fed so as to meet their nutritional requirements. To keep pace with the development of aquaculture, the manufacture of fish feeds and their marketing has also commenced in the country. There are six Indian standards published on Fish feed, which will be useful to manufacturers and Farmers practicing Aquaculture. The brief details are given below:

a) The Indian Standard -**IS 16150 (Part 1): 2023, Fish Feed- Specification, Part-1 Carp Feed,** prescribes the requirements and the methods of sampling and test for Indian major carp (Catla catla, Labeo rohita and Cirrihina mrigala) feeds. These feed requirements are intended for carps ,cultured in earthen pond with considerable natural productivity .The nutrient requirements are given for six different physiological stages (carp larval feed, carp nursery feed, Carp starter feed, Carp grower feed, carp finisher feed and carp brood stock feed) as per the practice followed in the farming and the feed types available. The nutrient requirement from larvae to brood stock has been considered and the total package of feeds to cater to the needs for the whole life cycle has been considered. In the **clause 4.1 and 4.1.1** of the standard the requirements for Description and Ingredients, respectively are specified. In the **clause 4.2** Physical Characteristics, the requirements of feed size is specified. The feed size is based on the physiological stages and also the nutritional requirements desired each stage. For e.g in the case of Carp Larvae the feed hall be in powder or granules form of size less than equal to 500µ. For nursery feed it will in the form of crumbles or pellets of size 500-1500 µ and similarly for grower the feed will be in the form of pellets of 3 to 5 mm diameter and for finisher it will be in the form of pellets of size 4 to 6 mm diameter. The requirement for water stability has also been specified at **Clause 4.2.2** of the standard. The water stability is essential as the granules and pellets are thrown in the water must float for some time so that the fish can consume it. If it gets dissolved rapidly then it will not be available to the fish. The test method for Water stability of the feed is mentioned in Annex-C of the standard. Besides above the Carp feed shall also confirm to the requirements mentioned in the **Table -1** of the standard i.e Moisture, Crude protein, Crude fat, Crude fibre, Acid insoluble Ash and Gross energy. The methods of test for these requirements are also mentioned in the table. The requirement for Antibiotics and additives is mentioned in **Clause 4.4** of the standard. The Packing and Marking clause are mentioned in **Clause 5.1 and 5.2** of the standard. The material for packing shall be Polythene lined bags/ jute bags/ laminated paper bags/ HDPE bags/ PP bags. The mouth of each bag shall either be machine stitched or rolled over and hand stitched.

2) The Indian Standard **-IS 16150 (Part 2): 2014, Fish Feed- Specification, Part-2 Catfish Feed,** prescribes the requirements and the methods of sampling and test for Indian Catfish. As per Clause 3 of the standard, the Feed shall be of following four Types:

a) **Catfish Larval Feed (CLF)** — feed to be fed to catfish larvae up to 15th day/20 mm length.

b) **Catfish Fry Feed (CFF)** — feed to be fed to catfish from 16-90 days/21-70 mm length.

c) **Catfish Grow-out Feed (CGF)** — feed to be fed to catfish from 4th month to harvesting.

d) **Catfish Brood Feed (CBF)** — feed to be fed to brood catfish before 4 months of onset of breeding.

In the **clause 4.1** of the standard the requirements for Description and Ingredients, as per Annex-B, respectively are specified. The requirement for Antibiotics and additives is mentioned in **Clause 4.3** of the standard. The list of pharmacologically prohibited active substances that are not to be used in Catfish feed are mentioned under this clause. Besides above the Catfish feed shall also confirm to the requirements mentioned in the Table -1 of the standard i.e Moisture, Crude protein, Crude fat, Crude fibre, Acid insoluble Ash and Gross energy. The methods of test for these requirements are also mentioned in the table.

In the **clause 4.5-**Physical Characteristics, the requirements of feed size is specified. For e.g in the case of Catfish Larvae the feed hall be in powder or granules form of size less than equal to 100 µ. For Fry feed it will in the form of crumbles or pellets of size 0.25 to 1 mm and similarly for growout the feed will be in the form of pellets of 1 to 2 mm diameter and for finisher it will be in the form of pellets of size 4 to 6 mm diameter. The requirement for water stability has also been specified at **Clause 4.5.2** of the standard. The test method is mentioned in Annex-D of the standard. The Packing and Marking clause are mentioned in **Clause 5.1 and 5.2** of the standard. The material for packing shall be plain or polyethylene-lined jute or laminated paper bags.. The mouth of each bag shall either be machine stitched or rolled over and hand stitched. **3) The Indian Standard -IS 16150 (Part 3) : 2023, Fish Feed- Specification , Part-3 MARINE SHRIMP**

Feed, prescribes the requirements and the methods of sampling and test for Marine Shrimp (Penaeus monodon, Penaeus indicus and Penaeus vannamei) , feeds for their Growout. As per Clause 3 of the standard the Marine shrimp feed shall be of the following types: a) Starter Grade — feed to be fed to post larvae of Penaeid shrimp in grow-out ponds until they attain a mass of about 7.0 g;

b) Grower Grade — feed to be fed to growing shrimp of about 7.0 g until they attain a mass of about 20 g; and

c) Finisher Grade — feed to be fed to growing shrimp of above 20 g mass..

In the **Clause 4.1** of the standard the requirements for Description and Ingredients, as per Annex-B, respectively are specified. At **Clause 4.2** in the Physical characteristics, Feed form and size are specified for Starter grade, Granules of size 0.4 mm to 1.4.mm and for Grower grade, pellets of size 1.4.to 2.2mm is specified. The requirement for water stability has also been specified at **Clause 4.2.2** of the standard. The test method is mentioned in Annex-C of the standard. Besides above the Marine shrimp feed shall also confirm to the requirements mentioned in the Table -1,2 & 3 of the standard i.e

Moisture, Crude protein , Crude fat , Crude fibre , Acid insoluble Ash , Gross energy and Phosphorus content (Pl refer **Clause 4.3** of the standard). The methods of test for these requirements are also mentioned in the table. The requirement for Antibiotics and additives is mentioned in **Clause 4.4** of the standard. The Packing and Marking clause are mentioned in **Clause 5.1 and 5.2** of the standard. The material for packing shall be Polythene lined bags/ jute bags/ laminated paper bags/ HDPE bags/ PP bags. The mouth of each bag shall either be machine stitched or rolled over and hand stitched.

4) The Indian Standard **-IS 16150 (Part 4): 2023, Fish Feed- Specification, Part-4 FRESHWATER PRAWN** feed**,** prescribes the requirements and the methods of sampling and test for Fresh water Prawn feed. As per Clause 3 of the standard, the Feed shall be of following types:

a) **Starter grade feed I** : A feed is to be fed from PL-1 to PL-20 in prawn hatchery; - **Starter grade feed II** : A feed to be fed to the prawn from PL-20 (1 day of culture) to 30 days of culture (DOC) till it attains 2 g to 3 g size during this period; and 3) Starter grade III : A feed to be fed to the prawn 31 DOC to 60 DOC in grow-out pond culture until they attain a mass of about 5 g to 6 g.

b) **Grower grade** : A feed to be fed to growing prawn of about 5.0 g until they attain a mass of about 20 g.

c) **Finisher grade** : A feed to be fed to growing prawn of above 20 g mass.

d) **Brood-stock diet** : A feed to be fed to the adult prawn which is used for breeding purpose (50 g to 100 g) This feed is to be fed for a period 45 days to 60 days just before the commencement of breeding season.

In the **Clause 4.1** of the standard the requirements for Description and Ingredients, as per Annex-B, respectively are specified. In **Clause 4.2**, regarding Physical characteristics, Feed form and size are specified for Starter grade feed1, Crumbles of size 0.1 mm to 0.3 mm diameter, for Feed II crumbles or pellets of size 0.4 mm to 0.7 mm diameter and for Feed II crumbles or pellets of size 0.8 to 1.0 mm diameter. For Grower grade & Finisher grade the size of pellets shall be of 1.1 to 2.5mm is specified. The requirement for water stability has also been specified at **Clause 4.2.2** of the standard. The test method is mentioned in Annex-C of the standard. Besides above the Fresh water Prawn feed shall also confirm to the requirements mentioned in the Table -1 of the standard i.e Moisture, Crude protein , Crude fat , Crude fibre , Phosphorus content, Acid insoluble Ash and Gross energy (Pl refer **Clause 4.3** of the standard). The methods of test for these requirements are also mentioned in the table. The requirement for Antibiotics and additives is mentioned in **Clause 4.4** of the standard. The Packing and Marking clause are mentioned in **Clause 5.1 and 5.2** of the standard. The material for packing shall be Polythene lined bags/ jute bags/ laminated paper bags/ HDPE bags/ PP bags. The mouth of each bag shall either be machine stitched or rolled over and hand stitched.

5) The Indian Standard **-IS 16150 (Part 5): 2023, Fish Feed- Specification, Part-5 PARPANGASIUS Feed, prescribes** the requirements and the methods of sampling and test for the Pangasius (farmed fish of Pangasidae family, primarily, Pangasianodon hypophthalmus) feeds for their grow-out culture. As per Clause 3 of the standard, thee Pangasius feeds shall be of the following types:

a) **Nursery Feed** — Feed to be fed to the fry of Pangasius fish in tanks or ponds until they reach asize of 5 g.

b) **Starter Feed** — Feed to be fed to fingerlings of Pangasius fish in ponds until they attain a mass of about 50 g.

c) **Grower Feed** — Feed to be fed to growing Pangasius fish of about 50 g until they attain a mass of about 500 g.

d) **Finisher Feed** — Feed to be fed to growing Pangasius fish above 500 g till harvest.

In the **Clause 4.1** of the standard the requirements for Description and Ingredients, as per Annex-B, respectively are specified. At **Clause 4.2** ,in the Physical characteristics, Feed form and size are specified for Nursery feed, in the form of powder, granules or pellets shall be of size 0.2 mm to 1..2 mm diameter, for Starter, Grower and Finisher Feed ,shall be pellets of size in the range 1.2 to 2 mm, 2-4.5 mm and 4 to 8 mm diameter respectively. The requirement for water stability has also been specified at **Clause 4.2.2** of the standard. The test method is mentioned in Annex-C of the standard. Besides above the PARPANGASIUS fish feed shall also confirm to the requirements mentioned in the Table -1 of the standard i.e Moisture, Crude protein , Crude fat , Crude fibre , Acid insoluble Ash and Gross energy (Pl refer **Clause 4.3** of the standard). The methods of test for these requirements are also mentioned in the table. The requirement for Antibiotics and additives is mentioned in **Clause 4.4** of the standard. The Packing and Marking clause are mentioned in **Clause 5.1 and 5.2** of the standard. The material for packing shall be Polythene lined bags/ jute bags/ laminated paper bags/ HDPE bags/ PP bags. The mouth of each bag shall either be machine stitched or rolled over and hand stitched.

6) The Indian Standard **-IS 16150 (Part 6) : 2023, Fish Feed- Specification, Part-6 MARINE CARNIVOROUS FISH** feed**,** prescribes the requirements and the methods of sampling and test for Marine carnivorous fish (Lates calcarifer, Rachycentron canadum, Trachinotus blochii and Trachinotus mookalee) feeds. As per Clause 3 of the standard, the Marine Carnivorous Feed shall be of following four Types:

a) **Marine Carnivorous Fish Fry Feed (MCFFF)** — for fish fry in hapas/tank/cage from 0.01 g to 0.5 g size.

b) **Marine Carnivorous Fish Nursery Feed (MCFNF)** — for fingerlings in tanks/ hapas/cages or ponds from 0.5 g until they reach a size of 10 gm.

c) **Marine Carnivorous Fish Starter Feed (MCFSF)** — for fingerlings in ponds/ tank/ cage from 10 g to until they attain a mass about 50g.

d) **Marine Carnivorous Fish Grower Feed (MCFGF)** — for juveniles in ponds/tank/ cage from 50 g to until harvest.

e) **Marine Carnivorous Fish Brood Feed (MCFBF)** — for adult fish meant for breeding purpose.

In the **Clause 4.1** of the standard the requirements for Description and Ingredients, as per Annex-B, respectively are specified. At **Clause 4.2** ,in the Physical characteristics, Feed form and size are specified for MCFFF, in the form of micro particles, crumbles or pellets of size 0.3 mm to 0.8 mm diameter, for MCFNF ,shall be pellets/Crumbles/

spheres of size 0.8 to 2.5 mm, . For MCFSF the feed shall be Pellets/crumbles/sphere of size 2.5 to 4.0 mm, for MCFGF the feed shall be in the form of pellets of size 4.0 to 8.0 mm and for MCFBF, the 8.0 to 14.0 mm in diameter respectively. The requirement for water stability of pellets has also been specified at **Clause 4.2.2** of the standard. The test method is mentioned in Annex-C of the standard. Besides above the Marine carnivorous fish feed shall also confirm to the requirements mentioned in the Table - 1 of the standard i.e Moisture, Crude protein , Crude fat , Crude fibre, Acid insoluble Ash and Gross energy (Pl refer **Clause 4.3** of the standard). The methods of test for these requirements are also mentioned in the table. The requirement for Antibiotics and additives is mentioned in **Clause 4.4** of the standard. The Packing and Marking clause are mentioned in **Clause 5.1 and 5.2** of the standard. The material for packing shall be Polythene lined bags/ jute bags/ laminated paper bags/ HDPE bags/ PP bags. The mouth of each bag shall either be machine stitched or rolled over and hand stitched.

N.B: To download the Indian Standard free of cost please access the Know Your Standards link-

https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standard s/isdetails

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CHAPTER VII

INDIAN STANDARDS ON GOOD AQUACULTURE PRACTICES GAQP

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Introduction:

As a part of Blue revolution Govt of India has promoted several farmers/Fisheries welfare schemes for promoting fisheries in the country. One of the methods to ensure good quality fish is to grow them in captivity by adopting Good Aqua culture Practices (GAqP). These practices are a set of operational standards for optimizing aquaculture production. They are systematic methods which are adopted for ensuring a good quality harvest, and a safe product. The practices are also ensure safety of the environment. These practices also help the farmer to earn a better price for his catch.

As per the Indian Standards, Good Aquaculture Practices is defined as - Practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food aquaculture products(Pl see **Cl 2.1** of IS 17281)

Good aquaculture practices for pre-harvest and harvest focus on maximizing the quality of the product and minimizing stress on the animal. Prior to harvest, feed should be withheld for a predetermined number of days to allow for gut evacuation.

In order to promote and assist Aquaculture in the country and in order to complement the Blue revolution, BIS has developed a series of Indian Standards on Good Aqua culture practices. These standards have been developed envisaging focused approach for implementing good aquaculture practices, traceability etc, through appropriate infrastructure, record keeping and monitoring to reap following broad benefits:

a) Development of basic infrastructure at the field level,

b) Build up culture for good aquaculture practices by the farmers,

c) Uniform approach across farms regardless of their sizes

d) Increased awareness among the producers as well as the consumers about the need for consumption of good quality and safe food,

e) Traceability through complete integration of food chain,

f) Improvement in the environment,

g) Worker safety and welfare, and

h) Reputation in the international market as a producer of good quality and safe produce.

j) Overcoming the Technical Barriers to Trade (TBTs).

A series of Indian Standards on Good Aquaculture Practices have been developed by BIS. The brief details are listed below:

a) Indian Standard on **Requirements for Good Aquaculture Practices — INDIA GAqP Shrimp Hatchery and growout farms-IS 17281:2019**.

The scope of the standard covers the compliance criteria necessary to be followed by the producers (individual producers and/or members of a producer group) of shrimp hatchery and grow out farms. The standard has a list of terminology for as Good Aquaculture practices, Producer group, Hazard, Inspection, Record, Traceability, Producer group, Field, Farm, Environment, Certification, Standard Operating Procedure(SOP), Major Requirement and Minor Requirement.(For details please see **Cl 2.1 to 2.17** of IS 17281).

The standard also specifies the Control points and compliance criteria required to be followed by the applicant producer (individual for independent verification of the aquaculture practices that have gone into the production of the produce. The requirements are mentioned in **Table 1** of the standard. The criteria which have been marked Major are to be complied with as they have a direct effect on the quality and safety of the produce, hence are to be complied with .the criteria marked Minor also have a bearing on the quality and provide an advantage for assessment of GAqP.(Please see **Cl 3.2** of the standard). In the table 1 of the standard the Requirements and compliance level have been specified in A-1 to A-8 of Table-1, for Hatchery and Seed production, Brood stock management, Hatchery inputs, Storage of fresh feed, equipment and other material. Besides above, the requirements and compliance levels for Training, Transport and traceability are specified.

For the Brackish water Shrimp Farming — Grow Out (Refer A-2 of Table -1), The requirements and compliance level for Farm registration, Bio- security measures, Pond preparation, Seed quality, Soil and Water management, Feed management, Health management, Use of Antibiotics, effluent management, Harvest, Traceability, Recall/ Withdrawal have been specified.

The BIS INDIA GAQP CERTIFICATION, requirements have been specified in the **Cl 4** of the standard.

b) Indian Standard on **Requirements for Good Aquaculture Practices — INDIA GAqP Striped Catfish (PANGASIANODON HYPOPHTHALMUS)- IS 17282:2019**.— This Indian Standard covers the control points and compliance criteria necessary to be followed by the producers (individual producers and/or members of producers (individual producers and/or members of a a producer group) of Pangasianodon hypophthalmus (striped catfish). This standard applies to the good aquaculture practices (GAP) to be followed at all stages of the production of this catfish in freshwater pond including practices followed for stocking, pond management, harvesting and post-harvest handlings prior to transportation to market.

Catfish — The fish without scale and bearing barbels.

The standard has a list of terminology for as Good Aquaculture practices, Producer group, Hazard, Inspection ,Record, Traceability, Producer group, Field, Farm, Environment, Certification, Standard Operating Procedure(SOP), Major Requirement and Minor Requirement.(For details please see **Cl 2.1 to 2.17** of IS 17282).

The standard also specifies the Control points and compliance criteria required to be followed by the applicant producer (individual for independent verification of the

aquaculture practices that have gone into the production of the produce. The requirements are mentioned in Table 1 of the standard. The criteria which have been marked Major are to be complied with as they have a direct effect on the quality and safety of the produce, hence are to be complied with .the criteria marked Minor also have a bearing on the quality and provide an advantage for assessment of GAqP.(Please see **Cl 3.2** of the standard). In the table 1 of the standard the Requirements and compliance level have been specified in I Table-1, for LOCATION AND LAYOUT OF FISH FARM, SITE RECORD AND TRACEABILITY, the requirements and compliance levels for criteria such as Identification and Traceability arm location, Farm layout, Vicinity of production area to potential risk source and access to the farm are specified.

Besides above for the criteria for Soil and Water Management Grower Record ,Culture Species and System, Seed Sourcing, Stocking, Post stocking Pond Management, Post Harvest Management, Building Equipment and Other Infrastructure, Hygienic Conditions in the Farm, Personnel Hygiene and Welfare, Training to Farm Personnel and Record Keeping are specified in **Cl 2.0 to 14.0** in Table 1, respectively.

The BIS INDIA GAQP CERTIFICATION, requirements have been specified in the Cl 4 of the standard.

c) Indian Standard on **Requirements for Good Aquaculture Practices — INDIA GAqP CARPS —IS 17283:2019**.

This Indian Standard covers the control points and compliance criteria necessary to be followed by the producers (individual producers and/or members of a producer group) of freshwater carps. This standard applies to the good aquaculture practices (GAqP) to be followed at all stages of the production of carps in freshwater pond including practices followed for stocking, pond management, harvesting and postharvest handlings prior to transportation to market.

The standard has a list of terminology for as Good Aquaculture practices, Producer group, Hazard, Inspection ,Record, Traceability, Producer group, Field, Farm, Environment, Certification, Standard Operating Procedure(SOP), Major Requirement and Minor Requirement.(For details please see **Cl 2.1 to 2.17** of IS 17283).

The standard also specifies the Control points and compliance criteria required to be followed by the applicant producer (individual for independent verification of the aquaculture practices that have gone into the production of the produce. The requirements are mentioned in Table 1 of the standard. The criteria which have been marked Major are to be complied with as they have a direct effect on the quality and safety of the produce, hence are to be complied with .the criteria marked Minor also have a bearing on the quality and provide an advantage for assessment of GAqP.(Please see **Cl 3.2** of the standard). In the table 1 of the standard the Requirements and compliance level have been specified in I Table-1, for LOCATION AND LAYOUT OF FISH FARM, SITE RECORD AND TRACEABILITY, the requirements and compliance levels for criteria such as Identification and Traceability arm location, Farm layout, Vicinity of production area to potential risk source and access to the farm are specified.

Besides above for the criteria relating to Soil and Water Management Grower Record, Culture Species and System, Seeds, Stocking, Nursery and Rearing, Grow out Culture practices, Post Stocking Pond Management, Post-Harvest Management, Building

Equipment and Other Infrastructure, Hygienic Conditions in the Farm, Personnel Hygiene and Welfare, Training to Farm Personnel and Record Keeping are specified in **Cl 2.0 to 13.0** in Table 1, respectively.

The BIS INDIA GAQP CERTIFICATION, requirements have been specified in the **Cl 4** of the standard.

d) Indian Standard on Requirements for Good Aquaculture Practices — INDIA GAqP for Fresh Prawn Culture—IS 17284:2019.

This Indian Standard covers the control points and compliance criteria necessary to be followed by the producers (individual producers and/or members of a producer group) of freshwater prawn (also called SCAMPI by farming community). This standard applies to the good aquaculture practices (GAqP) to be followed at all stages of the production of prawns in freshwater pond including practices followed for stocking, pond management, harvesting and post-harvest handlings prior to transportation of market.

The standard has a list of terminology for as Good Aquaculture practices, Producer group, Hazard, Inspection ,Record, Traceability, Producer group, Field, Farm, Environment, Certification, Waste, Standard Operating Procedure(SOP), Major Requirement and Minor Requirement.(For details please see **Cl 2.1 to 2.19** of IS 17284).

The standard also specifies the Control points and compliance criteria required to be followed by the applicant producer (individual for independent verification of the aquaculture practices that have gone into the production of the produce. The requirements are mentioned in Table 1 of the standard. The criteria which have been marked Major are to be complied with as they have a direct effect on the quality and safety of the produce, hence are to be complied with .the criteria marked Minor also have a bearing on the quality and provide an advantage for assessment of GAqP.(Please see **Cl 3.2** of the standard). In the **table 1** of the standard the Requirements and compliance level have been specified in I **Table-1**, for LOCATION AND LAYOUT OF FISH FARM, SITE RECORD AND TRACEABILITY, the requirements and compliance levels for criteria such as Identification and Traceability arm location, Farm layout, Vicinity of production area to potential risk source and access to the farm are specified.

Besides above for the criteria for Soil and Water Management Grower Record, Culture Species and System, Seeds, Stocking, Nursery, Pond Environment Management, Growout Culture Practices, Stocking, Post Stocking Pond Management, Farm Hygiene, PostHarvest Management and Record Keeping are specified in **Cl 2.0 to 10.0** in **Table 1**, respectively.

The BIS INDIA GAQP CERTIFICATION, requirements have been specified in the Cl 4 of the standard.

e) Indian Standard on **Requirements for Good Aquaculture Practices — INDIA GAqP for Cage Culture.**

This Indian Standard provides good aquaculture practices for cage culture in freshwater, cages, site and species selection, seed, feed and health management, safety measure, market, post-harvest facilities-**IS 17285:2019.**

The sequence of procedures carried out for cage culture in freshwater is given under this **clause2.0** of the standard. This includes Site Selection, Type of Cages, Cag Materials and their procurement, Fabrication of the Cage Frame, Floating the Cage Frame have been defined in **clause 2.1 to 2.5** of the standard. In the Table 1 for the type of Cages i.e Fixed and Floating, the Water Depth, Special feature, Advantage and Disadvantage are specified. It may be noted that the Floating type cages are User friendly and are able to withstand adverse environmental conditions.

In Table 2, Cage Material the different types of material such as Bamboo.GI/MS pipe, Floats, Sinkers, Anchors, Netlonhapas , Netlon ropes are specified. Similarly in Table 3, Requirements for Modular Cages for Raising fry to Fingerling, and Fingerling to Marketable Size Fish are specified.. In Table 4 Material Specification for Frame Fabrication for Bamboo and GI/MS pipe, their requirements, Advantage and Disadvantage are specified. Table 5 Fish Seed Specification, the requirements for Aspects such as Stocking Size, Seed Quality, Seed Price and Stocking Strategy are specified. The details of Species wise Stocking Density for Cages are mentioned in Table 6. In the Table 7, the Aspect and requirements for Fish feeding Parameters are specified.

It is also mentioned that the cage culture varies from species to species of Fish. The Rate of Feeding for P. hypophthalmus (from Fry to Fingerlings) is specified in Table 8. The Specifications of Net Cage for Tilapia Culture, is specified in Table 9. Under Table 10, Stock Management of Tilapia is specified which includes the requirements for Cage Size, Mesh Size, Body weight, Stocking density and Nursery. In Table 11 Feeding Chart for Tilapia, both for Nursery rearing and Grow -out rearing are specified. In Table 12 Type and Number of Net Cages required for Sea Bass Culture is specified. Cage Mesh Size and Biomass Capacity for different sizes of Sea Bass and Feeding Chart of Sea Bass are specified in Table 13 and 14 respectively. The standard provides information on Fish Health Monitoring (Clause **2.9 of the standard)** and Removal and Release procedure for Fingerlings and Growers (Clause 2.10 of the standard)

N.B: To download the Indian Standard free of cost please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ Is details

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CHAPTER VIII

INDIAN STANDARDS ON FISH PRODUCTS

CHAPTER VIII

INDIAN STANDARDS ON FISH PRODUCTS

BIS has formulated several Indian standards on Fish products. Some of the important standards are listed below :

1. IS 7313 : 1974- Glossary of important fish species of india

Brief description of the standard:

This standard includes zoological names, common English names and local names of some commercially important fresh water and marine fish species of India.

With a view to facilitating uniform interpretation of various commercially important inland and marine fish species of India, this Indian Standard has been formulated.

It is intended that adoption of the Indian Standard glossary would facilitate the interstate and international trade in fresh and processed fish and avoid disputes arising from misinterpretation of various species of fish based on their common and local names

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ Is details

2. IS 10059: 1981- Specification for edible fish powder

Scope of the standard:

This standard prescribes requirements and methods of sampling and test for edible fish powder.

Brief description:

Edible fish powder is prepared for human consumption by a hygienic process that does not involve solvent extraction. Edible fish powder contains all the nutritional ingredients like protein, vitamins and minerals, and has the organoleptic qualities, like taste and flavour, of dry fish. It is completely free from toxic organic solvents and added chemicals.

Being an animal protein, the quality of fish protein is high and the lysine level is particularly good. Its use even in small quantities would serve to boost the protein quality of cereal-based diets wherever feasible. Use could also be thought of in the formulation of convalescent and formulated foods, either by food, manufacturers or in the home.

A recommended method for the preparation of edible fish powder is given in Appendix A. of the standard.

The standard prescribes the requirements for:

i) Moisture percent by mass,
ii) Crude protein content (N x6’25), on dry basis, percent by mass,
iii) Total available lysine, g/ 100 g of protein,
iv) Fat content, on dry basis, percent by mass,
v) Ash percent
vi) Acid insoluble as, on dry basis

vii) Fluoride mg/kg viii) Mercury mg/kg

ix) Lead mg/kg

For test methods please refer to IS 9808:1981

Bacteriological requirements:

i) Total bacterial count,

ii) E. Coli and pathogenic organisms including salmonella

For test methods for E.coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

3. IS 10760 : 1983 -Specification for mussels canned in oil

Scope of the standard:

1. This standard prescribes the requirements and the methods of sampling and test for mussels canned in oil.

1.1.1 For the purpose of this standard the term 'mussels' shall apply to the following commercial species:

a) Perna indica Brown mussel

b) Perna viridus Green mussel

Brief description:

Mussels an important soft shell fish are considered a delicacy in a number of western countries and, therefore, offer a considerable export potential. In order to ensure quality and wholesomeness of the finished product various physical, chemical, microbiological and hygenic requirements have been prescribed in this standard.

The standard prescribes the requirements for:

i) Arsenic, ppm,

ii) Lead, ppm,

iii) Copper, ppm,

iv) Zinc, ppm,

v) Tin, ppm,

vi) Mercury, ppm,

vii) Microbiological activity

For test methods please refer to IS 1263 : 2020

- Microbiological activity test please refer annex H of IS 9808:1981

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

4. IS 10763 : 1983 - Specification for frozen minced fish meat

Scope of the standard:

This standard prescribes the requirements and method of sampling and test for frozen minced fish meat.

Brief description:

With the increased catch of inexpensive varieties of fish, their utilization deserves utmost attention. Possibilities exist of separating out meat from these fish and freezing it in consumer packs of various mass, so that it could form as a base material for various preparations. This standard is being formulated to provide guidelines for quality control to the trade and to meet the consumer demand for wholesome fish muscle.

The standard prescribes the requirements for:

i) Colour of minced fish meat
ii) Texture of the minced meat
iii) Odour
iv) Flavour
v) Bone content

Microbiological requirements:

i) Total bacterial count, per g of fish meat, Max
ii) Escherichia Coli
iii) Salmonella
iv) Coagulase positive staphylococci

For test methods for E.coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

5. IS 11427: 2001 - Fish and fishery products - Sampling (First Revision)

Scope of the standard:

This standard prescribes the scale of sampling and criteria for conformity for fish and fishery products packed in containers to decide the conformity or otherwise of various consignments offered

Brief description:

India has a large export trade in fish and fisheries products. There is ample scope for further increase of export as well as internal trade of fish and fisheries products if proper quality control measures are taken.

This standard, first published in 1985 is intended to introduce uniform methods of sampling to be adopted by various agencies for fish and fisheries products. This revision has been undertaken to update the sampling requirements to help in exercising proper quality control of fish and fisheries products.

For the purpose of sampling, fish and fishery products have been broadly classified into following groups:

a) Canned fish,
b) Fresh fish,
c) Frozen fish,
d) Dry-salted and dried fish, and
e) Fish oils.

For each of these groups, a suitable sampling plan has been recommended.

This standard is applicable only to fish and fishery products belonging to the above five categories packed in containers.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

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6. IS 14514 : 1998 Clammeat - Frozen – Specification

Scope of the standard:

This standard prescribes requirements and method of sampling and test for frozen clam meat.

Brief description:

Molluscs play a significant role in the economy of fishermen and other people living in coastal areas. Among the molluscs, clam is an important shell fish utilised for food. The common edible species of clams are Villorita and Meretrix.

Frozen clam meat is prepared by quick freezing raw or cooked meat obtained from fresh depurated live clams of edible species.

The standard prescribes the requirements for:

1. **Microbiological:**

   i) Total bacterial count
   ii) E.coli,
   iii) Coagulase positive, Staphylococci
   iv) Salmonella,
   v) Shigella,
   vi) Vibrio cholerae

2. **Heavy metals**:

   a) Mercury,
   b) Zinc,

c) Copper,
d) Arsenic,
e) Lead,
f) Tin,
g) Cadmium

For test methods please refer to IS 2237 : 1997 and

For test methods for E.coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023 For test methods for Faecal Streptococci please refer to IS 5887 (Part 2) : 1976

For test methods for Shigella please refer to IS 16429 : 2018

For test methods for Vibrio cholerae please refer to IS 5887 (Part 5/Sec 1) : 2023

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

7. IS 14516 : 1998 Cured fish and fishery products - Processing and storage - Code of practice

Scope of the standard:

This code provides the technological guidelines and essential requirements of hygiene for processing, handling and storage of cured fish and fishery products.

NOTE - This code applies to sun-dried, salted and dried fish and fishery products.

Brief description:

Salting fish and drying in the sun is one of the oldest, easiest and cheapest methods of preservation techniques developed by human being. For several years, salting fish remained unchanged as the major preservation method. With the development of modern methods of food preservation, such as freezing and canning, and with the greater facilities for transportation of fresh fish in refrigerated vehicles, the salting and drying processes have lost their previous importance. Still these traditional techniques continue to enjoy popular appeal since they are low cost technologies easily adoptable in rural conditions. However, thousands of tons of salted fish are lost every year all around the world, and the major portion of these products are poor both in quality and nutritive value.

The standard prescribes the requirements for:

i) Dried prawns/shrimps
ii) Dried white baits
iii) Dried Bombay duck
iv) Laminated Bombay duck

v) Dry salted threadfin (DAPA)
vi) Dry salted jew fish (GHOL)
vii) Dry salted cat fish
viii) Dry salted leather jacket
ix) Dry salted horse mackerel
x) Dry salted mackerel
xi) Dry salted seer fish
xii) Dry salted shark
xiii) Dried shark fins Fish maws
xiv) Dry salted surni (TUNA)
xv) Dry salted dhoma,

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

8. IS 14890: 2001 Sardines - Fresh, frozen and canned – Specification

Scope of Standard:

This standard prescribes the requirements and methods of sampling and test for fresh, frozen and canned sardine.The term sardine shall apply to the following species:

Sardinella longiceps
S. gibbosa
S.flmbriata
S. albella
S. siren
Dussumiera acuta
D. hasseltii

Brief Description:

Sardine (Sardinella sp), is a commercially important fish of India.

The standard prescribes the requirements for:

i) Total bacterial
ii) Escherichia coli
iii) Faecal Streptococci
iv) Coagulase positive Staphylococci
v) Salmonella/Arizona,
vi) Shigella,
vii) Vibrio cholerae,
viii) Listeria monocytogenes
ix) Formaldehyde,
x) Heavy Metals:
    a) Mercury,
    b) Copper,

c) Zinc,
d) Arsenic,
e) Lead,
f) Tin

For test methods for E.coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023

For test methods for Faecal Streptococci please refer to IS 5887 (Part 2) : 1976

For test methods for Shigella please refer to IS 16429 : 2018

For test methods for Vibrio cholerae please refer to IS 5887 (Part 5/Sec 1) : 2023

For test methods for Listeria monocytogenes please refer to IS 14988 (Part 1) : 20

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

9. IS 14891 : 2001 Mackerel - Fresh, frozen and canned – Specification

Scope of Standard:

This standard prescribes the requirements and methods of sampling and test for fresh, frozen and canned mackerel.

The term mackerel shall apply to the Rastrelliger kanagurta species.

Brief Description:

Mackerel (Rastrelliger sp.), is an important fish of the west coast of India.

Earlier. the requirements of mackerel were covered under separate standards, namely, IS 2420:1985 'Speculation for mackerel, canned in oil': IS 3849:1976 'Specification for mackerel, canned in brine (first revision); IS 6032:1971 'Specification for mackerel, fresh'; IS 6033:1971 'Specification for mackerel, frozen' and IS9312 :1979 'Specification for mackerel, canned in curry'. While reviewing these standards, it was decided to revise these standards, amalgamating them into one comprehensive standard, to make it user friendly. Consequently, this standard will supersede 1S2420, IS 3849, IS 6032, IS 6033 andIS9312. The requirements for canned mackerel have been harmonized with Codex Standard for Canned mackerel and jack mackerel (Codex Stan 119-19X1)

The standard prescribes the requirements for:

i) Total bacterial
ii) Escherichia coli
iii) Faecal Streptococci
iv) Coagulase positive Staphylococci
v) Salmonella/Arizona,
vi) Shigella,

vii) Vibrio cholerae,

viii) Listeria monocytogenes

ix) Formaldehyde,

x) Indole,

xi) Heavy Metals:

a) Mercury,

b) Copper,

c) Zinc,

d) Arsenic,

e) Lead,

f) Tin

For test methods for E.coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023

For test methods for Faecal Streptococci please refer to IS 5887 (Part 2) : 1976

For test methods for Shigella please refer to IS 16429 : 2018

For test methods for Vibrio cholerae please refer to IS 5887 (Part 5/Sec 1) : 2023

For test methods for Listeria monocytogenes please refer to IS 14988 (Part 1) : 20

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

10. IS 14892 : 2000 - Threadfin - Fresh and frozen – Specification

Scope of Standard:

1.1 This standard prescribes the requirements and the method of sampling and test for fresh threadtln and frozen eviscerated threadfin.

1.1.1 The term threadfin shall apply to the following species:

Eleutheronema tetradactyium

Polydactyius indicus Polynemus heptadactylus

Brief Description:

Threadfin (Indian tussle fish), commonly known as DARA, is an important fish of the Maharashtra and Gujarat coasts and is mostly sold as fresh and frozen fish.

Earlier, the requirements of threadfin were covered under separate standards, namely, IS 4781:1978 'Specification for threadfin, fresh (first revision)' and IS 4796:1977 'Specification for threadfin, frozen (first revision)'. While reviewing these standards, it was decided to revise these standards, amalgamating them into one comprehensive standard, to make it user friendly. Consequently, this standard will supersede IS 4781 and IS 4796.

The standard prescribes the requirements for:

I) Total bacterial
II) Escherichia coli
III) Faecal Streptococci
IV) Coagulase positive Staphylococci
V) Salmonella/Arizona,
VI) Shigella,
VII) Vibrio cholerae,
VIII) Listeria monocytogenes
IX) Formaldehyde, X) Indole,
XI) Heavy Metals:
  a) Mercury,
  b) Copper,
  c) Zinc,
  d) Arsenic,
  e) Lead,
  f) Tin

For test methods for E.coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023

For test methods for Faecal Streptococci please refer to IS 5887 (Part 2) : 1976

For test methods for Shigella please refer to IS 16429 : 2018

For test methods for Vibrio cholerae please refer to IS 5887 (Part 5/Sec 1) : 2023

For test methods for Listeria monocytogenes please refer to IS 14988 (Part 1) : 20

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

11. IS 14949 : 2001 - Accelerated freeze dried prawns (Shrimps) – Specification

Scope of Standard:

This standard prescribes the requirements and the methods of sampling and test for accelerated freeze dried prawns. The accelerated freeze dried prawns shall be of any edible species.

Brief Description:

Accelerated freeze dried prawns (shrimps) are being exported from the country. A need was felt to prepare the Indian Standard to provide quality parameters for guidance of the processors and purchasers.

The standard prescribes the requirements for:

- Total bacterial
- Escherichia coli
- Faecal Streptococci
- Coagulase positive Staphylococci
- Salmonella/Arizona,
- Shigella,
- Vibrio cholerae,
- Listeria monocytogenes
- Formaldehyde,
- Indole,
- Moisture
- Heavy Metals:
    1. Mercury,
    2. Copper,
    3. Zinc,
    4. Arsenic,
    5. Lead,
    6. Tin

For test methods for E.coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023

For test methods for Faecal Streptococci please refer to IS 5887 (Part 2) : 1976

For test methods for Shigella please refer to IS 16429 : 2018

For test methods for Vibrio cholerae please refer to IS 5887 (Part 5/Sec 1) : 2023

For test methods for Listeria monocytogenes please refer to IS 14988 (Part 1) : 20

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

12. IS 14950 : 2001 - Fish - Dried and Dry - Salted – Specification

Scope of Standard:

This standard prescribes the requirements and the methods of sampling and test for various types of dried and dry-salted fish.

Brief Description:

(DARA) and dry-salted jewfish (GHOL) (first revision)', IS 3851:1966 'Dry-salted catfish', IS 3852:1985 'Dry-salted leather jackets (CHORINEMUS sp) (first revision)', IS 3853: 1985 'Dry-salted horse mackerels (CARANX sp) (first revision)', IS 4302:1985 'Dry-salted mackerel (first revision)', IS 5198:1985 'Dry salted seer fish (first revision)',

IS 5199:1985 'Dry-salted shark (first revision)', IS 5471 : 1969 'Dried shark fins', IS 5472:1985 'Fish maws (first revision)', IS 5736:1985 'Dry-salted SURAI (TUNA) (first revision)' and IS 8836: 1985 'Dry-salted DHONIA (first revision)'. While reviewing these, it was decided to amalgamate these in one comprehensive standard to make it user friendly. Consequently this new standard would supersede above mentioned standards. Besides amalgamating the standards, requirements for microbiological and heavy metal limits, have also been added.

The standard prescribes the requirements for:

i) Moisture,
ii) Sodium chloride
iii) Acid insoluble ash

Microbiological and Heavy Metal requirements:

- Total plate
- Escherichia coli
- Coagulase positive Staphylococci
- Salmonella,
- Heavy Metals: 1) Zinc,
  2) Copper,
  3) Arsenic,
  4) Lead,
  5) Tin

For test methods for E.coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

13. IS 16150 (Part 1) : 2023 - Fish feed - Specification Part 1 Carp feed

Scope of Standard:

This standard (Part 1) prescribes the requirements and the methods of sampling and test for Indian major carp (Catla catla, Labeo rohita and Cirrihina mrigala) feeds.

These feed requirements are intended for carps cultured in earthen pond with considerable natural productivity and the feeds recommended are of supplementary nature only.

Brief Description:

Aquaculture is making a rapid progress within the country. A large number of aquaculture farms have been established where aquaculture has been undertaken on

scientific lines. It is important that for the production of good quality fish at minimum cost, the fishes are properly fed so as to meet their nutritional requirements. To keep pace with the development of aquaculture, the manufacture of fish feeds and their marketing has also commenced in the country.

This standard was first published in 2014 with a view to enable the manufacturers to prepare fish feeds of known quality. This first revision is being brought about to address changes in feed manufacturing practices and regulatory requirements. In this revision, the nutrient requirements are given for six different physiological stages (carp larval feed, carp nursery feed, Carp starter feed, Carp grower feed, carp finisher feed and carp brood stock feed) as per the practice followed in the farming and the feed types available. The nutrient requirement from larvae to brood stock has been considered and the total package of feeds to cater to the needs for the whole life cycle has been considered. Accordingly the feed size and form has been revised. Similarly, the nutrient contents and aflatoxin B1 limits have been revised based on national and global best practices. The requirement on usage of antibiotics has been modified to prohibit their usage altogether. In addition, some new ingredients and additives are included for use in carp feed formulations It is expected that this standard would be of assistance to the rapidly developing aquaculture and fish feed manufacturing industry.

This is one among the series of Indian Standards formulated to ensure availability of feeds of suitable quality for fish.

The standard prescribes the requirements for:

i) Moisture
ii) Crude Protein
iii) Crude fat
iv) Crude fibre,
v) Acid insoluble ash,
vi) Gross energy

For test methods please refer to IS/ISO 6496, IS/ISO 6865, IS/ISO 5983 Part 1 & 2, IS/ISO 6492, IS 14826

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

14. IS 16150 (Part 2) : 2014-Fish feed - Specification: Part 2 catfish feed

Scope of Standard:

This standard (Part 2) prescribes the requirements and the methods of sampling and test for catfish (Clarias batrachus) feeds.

Brief Description:

Aquaculture is making a rapid progress within the country. A large number of aquaculture farms have been established where aquaculture has been undertaken on scientific lines. It is important that for the production of good quality fish at minimum cost, the fishes are properly fed so as to meet their nutritional requirements. To keep pace with the development of aquaculture, the manufacture of fish feeds and their

marketing has also commenced in the country. Therefore, with a view to enable the manufacturers to prepare fish feeds of known quality, this standard has been prepared. It is expected that this standard would be of assistance to the rapidly developing aquaculture and fish feed manufacturing industry.

The standard prescribes the requirements for:

i) Moisture
ii) Crude Protein
iii) Crude fat
iv) Crude fibre,
v) Acid insoluble ash,
vi) Gross energy

For test methods please refer to IS 7874 (Part1)

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

15. IS 18102 : 2023- Fermented Fish — Sheedal or Ngari — Specification

Scope of Standard:

This Standard prescribes the requirements and methods of sampling and test for Sheedal/Ngari produced by means of fermentation of small variety of fish. Sheedal/Ngari shall be prepared from the following species:

a) Puntius spp; and
b) Setipinna phasa.

Brief Description:

Sheedal is a salt-free fermented fish product indigenous to the Northeast sector of India. Sheedal is very popular due to its strong flavor, and the product is usually prepared from salt-free dried Puntius sp. or Setipinna phasa. It has several local names, and is popularly called “seedal”, “sepaa”, “hidal”, “verma”, and “sheedal” in Tripura, Assam, Mizoram, Arunachal Pradesh and Nagaland. In particular, Assam and Tripura are the major producers of Sheedal amongst the Northeast states of India. In Manipur, Sheedal is named as Ngari and both are produced in the same manner. According to the Tripura’s indigenous Kokborok dialect, it is called Berma. Presently, the production of Sheedal is confined to particular districts of the states of Assam (Nagaon, Dhubri, Goal para, and Kachar districts), Manipur (Imphal city), and Tripura (West Tripura district). Sheedal is usually produced in the months of November–February. The technology of Sheedal production is very old and is believed to have come into existence at least before the British Era in the Northeastern states of India.

There is a huge demand for Sheedal in all the rural and urban markets of the northeast India and product of substandard quality are coming to markets. Presently different qualities of Sheedal/Ngari are available in the market and as there is no standard specification exists, it is difficult to control the quality. The main causes for poor quality product are; utilization of unsold dry fish for Sheedal production and early

fermentation; use of insect infested/old raw material (i.e., dried Puntius spp. and S. phasa); mixing of old, insect infested and cheap varieties of dried marine fish (cutting as the size of Puntius fish) along with dried Puntius spp. and S. phasa; use of colouring material during fermentation; use of vegetable oil during fermentation etc.

The lower acidic pH of Sheedal usually does not allow growth of pathogenic bacteria, but the Sheedal available in the markets are mostly of pH more than 7.0 and these may be contaminated with pathogenic bacteria.

Gradually Sheedal is gaining popularity outside the northeast India and has potential to be exported to the Southeast Asian countries in properly packaged condition. Hygienic production and defined quality parameters of the fermented fish like Sheedal/Ngari with assured safety is essentially required for promotion of the product in unexplored markets.

The standard prescribes the requirements for:

i) Moisture,
ii) Crude Protein
iii) wet weight basis
iv) Sodium Chloride,
v) Lead,
vi) Cadmium,
vii) Arsenic,
viii) Mercury,
ix) Chromium

Microbiological Requirements:

i) Yeast and mould
ii) Coagulase positive Staphylococci
iii) Escherichia coli
iv) Salmonella
v) Clostridium botulinum

For test methods please refer to IS 16069 (Part2), IS 5887 (Part 8/Sec 1), IS 16067 (Part 1), IS 5887 (Part 3/Sec1), ISO/TS 17919, IS 5887(Part 4)

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

16. IS 2168 : 1971 Specification for pomfret canned in oil

Scope of Standard:

This standard prescribes the requirements and the methods of sampling and test for white (Stromateus cinerus), silver (Pampus argenteus) and brown (Parastromateus niger) pomfrets canned in oil.

Brief Description:

Pomfret is usually canned in oil. In order to ensure the quality and wholesomeness of the finished product, various physical, chemical, microbiological and hygienic requirements have been prescribed in this standard. The formulation of this standard was undertaken at the instance of the Development Council for Food Processing Industries.

This standard was first published in 1962. The various provisions of that standard have been under the review of the Sectional Committee from time to time and the present revision was taken up with a view to modifying the earlier requirements in the light of experience gained both by processors and users.

This revision incorporates a number of important modifications, namely: (a) head-space in cans has been deleted; (b) drained weight of the contents has been specified in terms of the net water capacity of the can, the method for which has been prescribed; and (c) activity has been simplified.

The standard prescribes the requirements for:

Requirement for the **Finished Product** :

1 The contents of the can on opening shall not display any appreciable disintegration and the oil shall be clear

2. The percentage of detached portions of fish, calculated on the basis of the drained weight, shall not exceed 5 percent based on the average of 5 cans.

3. The canned pomfret shall be of pleasant flavour characteristic of well-canned pomfret. It shall be free from scorched, bitter, foreign or other objectionable flavour. It shall have no colour other than the characteristic colour of well-preserved pomfret.

4. It shall be free from any foreign material and from grittiness and the material shall be free from any type of poisonous and deleterious substances.

5. The can shall give a negative pressure when punctured. If round cans are used, the vacuum shall be not less than 100 mm,

6. Drained Weight of the Contents - The drained weight of the contents in each can shall be not less than 65 percent by weight of the water capacity of the can.

Microbiological and Heavy Metal requirements:

- Arsenic,
- Lead,
- Copper,
- Zinc
- Tin
- Microbiological activity

For test method please refer to Appendix A to G of IS 2168:1971

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

17. IS 2236 : 1968 - Specification for prawns/shrimp canned in brine

Scope of the Standard:

This standard prescribes the requirements and the methods of sampling and test for prawns/ shrimp canned in brine.

Brief Description:

Canned prawns is an important export commodity of this country. There is ample scope for the development of the external as well as the internal trade in this commodity if proper quality control measures are taken.

In the process of canning prawns, the fresh material is first peeled; removing the heads, shells and viscera or the ' venis '. The material is then cleaned thoroughly with water and the slime is removed.

It is then blanched, graded for size and filled in cans with brine and the cans are exhausted and sealed. The sealed cans are processed by heating to ensure thorough cooking and sterilization of the material.

The standard prescribes the requirements for:

i) Vacuum of the can
ii) Head space of the can
iii) Drained weight of the contents of the can,
iv) Sodium chloride in brine,
v) Acidity of brine as citric acid (anhydrous),
vi) Arsenic, vii) Lead,
viii) Copper,
ix) Zinc,
x) Tin,
xi) Bacteriological requirements

For test method please refer to Appendix A to H of IS 2168:1971

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

18. IS 2237 : 1997 Prawns (Shrimps) - Frozen - Specification

Scope of Standard:

This standard prescribes the requirements and the methods of sampling and test for frozen prawns (shrimps). The frozen prawns (shrimps) shall be of any edible species.

Brief Description:

Fish is one of the most perishable of all foods and needs proper care from the time it is caught until it is served or processed. Lowering the temperature of fish by a prompt and efficient chilling procedure is fundamental for preservation of fish freshness. The quality of frozen fishery products is influenced by many different considerations. Among the most important are composition of fish, pre-freezing, handling and transport, method

of freezing employed and the environment to which the frozen product is subjected during storage and handling. Of principal concern here is the temperature and humidity of the cold storage area and the protective packaging or glazing afforded the product.

Frozen prawns constitute an important export commodity of India. This standard was first published in 1962 and underwent first revision in 1971 and second revision in 1985. This revision, incorporates among other the following changes:

i) Existing microbiological requirements have been modified along with incorporation of new microbiological requirements along with their methods of tests;

ii) For safeguarding the health of consumers. maximum permissible limits for heavy metals have been prescribed, along with their methods of tests; and

iii) Editorial changes includes updating of referred standards.

The standard prescribes the requirements for:

- Total bacterial
- Escherichia coli
- Faecal Streptococci
- Coagulase positive Staphylococci
- Salmonella
- Shigella,
- Vibrio cholerae,
- Listeria monocytogenes
- Formaldehyde,
- Indole,
- Heavy Metals:
    1) Mercury,
    2) Copper,
    3) Zinc,
    4) Arsenic,
    5) Lead,
    6) Tin

For test methods please refer to IS 5887 (Part 3) : 1999 and Appendix A to L of IS 2237:1997.

For test methods for E.coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023

For test methods for Faecal Streptococci please refer to IS 5887 (Part 2) : 1976

For test methods for Shigella please refer to IS 16429 : 2018

For test methods for Vibrio cholerae please refer to IS 5887 (Part 5/Sec 1) : 2023

For test methods for Listeria monocytogenes please refer to IS 14988 (Part 1) : 2020

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

19. IS 3892 : 1975 Specification for frozen lobster tails (First Revision)

Scope of Standard:

This standard prescribes the requirements and the method of sampling and test for tails of all the species of the genera Panulirus, T'hunnus and Peurulus.

Brief Description:

Quick frozen lobster tails constitute one of the important marine products exported from our country. There is considerable scope for developing our exports further if the quality of the products is maintained continuously at a higher level.

This standard was first published in 1966. In the present revision almost all the requirements have been modified and elaborated mainly based on the survey undertaken and information supplied by the Export Inspection Agency, Cochin.

The standard prescribes the requirements for:

GRADES AND TYPES

a) **Grades** - Unless otherwise agreed to between the purchaser and the vendor, the material shall be of the following seven grades:

Grade Designation	Mass / Individual Piece
Super Jumbo	Above 340 g Jumbo
	285 to 340 s
Large	225 to 284 g
Medium	170 to 224 g
Small	115 to 169 g
Extra Small	50 to 114 g
Tiny	Below 50 g

b) **Types** - Fresh frozen lobster tails shall be of two types, depending upon the colour of the meat, namely, (a)-snow-white to white, and (b) light pink to pink

Microbiological Requirements:

- Total bacterial
- Escherichia coli
- Coagulase positive Staphylococci
- Salmonella

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for E.coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/is details

20. IS 4304 : 1976 Specification for tuna canned in oil

Scope of Standard:

This standard prescribes the requirements and the methods of sampling and test for tuna canned in oil.

Brief Description:

Canned tuna promises a vast scope for the development of the internal trade of this commodity. Besides, there is also good international market for canned tuna, If proper quality control measures are taken. The formulation of this Indian Standard has been considered necessary in order to help in exercising proper quality control.

The standard prescribes the requirements for:

For the purpose of this standard, the following definitions shall apply.

i) Large Chunks - Large pieces of pre-cooked tuna taken from fillets of healthy fish.

ii) Medium Chunks - Medium pieces of pre-cooked tuna taken from fillets of healthy fish.

iii) Flakes - Small pieces of pre-cooked tuna which do not fall under the category of large or medium chunks.

Chemical & Microbiological Requirements:

i) Arsenic,
ii) Lead,
iii) Copper,
iv) Zinc,
v) Tin,
vi) Microbiological activity

For test methods for Chemical & Microbiological Requirements please refer Appendix B, C, D, E, F, G of IS 2168:1971

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/is details

21. IS 4780 : 1978 Specification for pomfret, fresh

Scope of Standard:

This standard prescribes the requirements and the methods of sampling and test for whole fresh pomfret of the following species:

Pampus argenteus	Silver pomfret
P. chinensis	White pomfret
Parastromateus niger	Black or brown pomfret

Brief Description:

Pomfret is a commercially important fish of the Maharashtra, Gujarat and Andhra coasts. After landing, the fish is iced and transported to processing and consuming centres. Most of the fish is marketed fresh and frozen. The formulation of this standard has been felt necessary with a view to making available fresh pomfret of desired quality to the consumers. The standard is also intended to serve as a guide for selecting raw materials for frozen pomfrets.

The standard prescribes the requirements for:

i) Colour of the fish
ii) Appearance of eyes
iii) Gills
iv) Appearance of skin
v) Colour of fish
vi) Meat and stomach portion
vii) Odour
viii) Flavour on cooking

Microbiological Requirements:

- Total bacterial
- Escherichia coli
- Coagulase positive Staphylococci
- Salmonella

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Escherichia coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/is details

22. IS 4793 : 1997 Whole pomfret - Frozen - Specification (Second Revision)

Scope of Standard:

This standard prescribes the requirements and the methods of sampling and test for whole frozen pomfret of the following species:

Pampus argenteus	Silver pomfret
Pampus chinensis	White pomfret
Parastromateus niger	Brown or black pomfret

Brief Description:

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Fish and Fisheries Products Sectional Committee had been approved by the Food and Agriculture Division Council. Fish is one of the most perishable of all foods and needs proper care from the time it is caught until it is served or processed. Lowering the temperature of fish by a prompt and efficient chilling procedure is fundamental for preservation of fish freshness. The quality of frozen fishery products is influenced by many different considerations. Among the most important are composition of fish, prc-freezing handling and transport, method of freezing employed and the environment to which the frozen product is subjected during storage and handling. Of principal concern here is the temperature and humidity of the cold storage area and the protective packaging or glazing afforded the product.

Pomfret belonging to family Stromatidue, is a high prized fish of India occurring on the East as well as West coast of the country.

This standard was first issued in 1968 and revised in 1977. The present revision incorporates the following modifications:

i) Requirement of E.coli has been modified, and

Requirement of Histamine along with its method of test has been incorporated

The standard prescribes the requirements for:

GRADES

Whole frozen pornfrets shall bc of the following three grades:

Grade	MASS, g	
	Silver and White Pomfret	Brown or Black Pomfret
Large	Above 500	Above 1000
Medium	251 to 500	701 to 1000
Small	150 to 250	400 to 700

Microbiological Requirements:

- Total bacterial
- Escherichia coli
- Salmonella
- Coagulase positive Staphylococci
- Histamine Content

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Escherichia coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023

For test methods for Histamine content please refer Annex B of IS 4793 : 1997

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/is details

23. IS 5734 : 1970 - Specification for sardine oil

Scope of Standard:

This standard prescribes the requirements and the methods of sampling and test for sardine oil.

Brief Description:

Sardine oil is an important fisheries product obtained from oil-sardine (Sardinella longiceps) fish. Recently a few modern oil plants have come into operation and more are expected to come up in future. With the increase in the price of vegetable oil, the demand for sardine oil as an industrial raw material for certain industries, is rising and is expected to rise more in future. It is, therefore, imperative that the quality of indigenously produced oil should be controlled so as to bring about expansion of its market as availability of sardine oil of desired quality will boost its demand. It is felt that the formulation of this standard would help in exercising quality control of sardine oil.

The standard prescribes the requirements for:

i) Free fatty acid as percent oleic acid
ii) Moisture,
iii) Iodine value
iv) Saponification value
v) Unsaponifiable matter
vi) Refractive index

For test methods please refer to IS 548 (Part 1/Sec 1) : 2021

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/is details

24. IS 6122 : 1997 - Seer fish (Scomberomorus Sp.) - Frozen - Specification

Scope

This standard prescribes the requirements and the methods of sampling and test for frozen seer fish (Scomberomonts sp.).

Foreword

Fish is one of the most perishable of all foods and needs proper care from the t/me it is caught until it is served or processed. Lowering the temperature of fish by a prompt and efficient chilling procedure is fundamental for preservation of fish freshness. The quality of frozen fishery products is influenced by many different considerations. Among the most important are composition of fish, pre-freezing handling and transport, method of freezing employed and the environment to which the frozen product is subjected during storage and handling. Of principal concern here, is the temperature and humidity of the cold storage area and the protective packaging or glazing afforded the product.

Seer fish (SURMAI) belonging to the family Scombridae (Scomberomorus sp.) is considered to be one of the highly esteemed food fishes of the country. In addition to exports, good demand for this fish in cities far away from the coast line necessitates preservation of the fish by freezing.

This standard was published in 1971. This revision incorporates among others, the following changes:

i) Requirements of Vibrio cholerae and Staphylococcus have been prescribed along with modification of existing microbiological requirements.

ii) Requirement of histamine has been prescribed.

iii) Editorial changes including updating of referred standards.

The standard prescribes the requirements for:

1) The material shall be prepared and processed as given in Annex A, under hygienic conditions as prescribed in IS 4303 (Part 1).

2) The material used shall be fresh, clean, wholesome and free from defects (see IS 6123). The frozen seer fish, on thawing, shall be in sound, intact and undamaged conditions. The product shall be free from any foreign matter.

Microbiological Requirements:

- Total bacterial
- Escherichia coli
- Coagulase positive Staphylococci
- Salmonella
- Vibrio Cholerae
- Histamine Content

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Escherichia coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023

For test methods for Histamine content please refer Annex B of IS 4793 : 1997

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/is details

25. IS 6123 : 1971 Seer fish (Scomberomorus Spp.), fresh

Scope of Standard:

This standard prescribes the requirements and the methods of sampling and test for seer fish (Scomberomorus spp.), fresh.

The term 'seer fish' shall apply to the following commercial species:

a) Scomberomorus guttatum,
b) Scomberomorus commersonii,
c) Scomberomorus lineotatus, and
d) Scomberomorus kuhillii.

Brief Description:

Seer fish, locally known as SURIMAZ, is landed in considerable quantities throughout our coast line. It is considered as one of the highly esteemed food fishes and has a very good demand in the fresh state for internal consumption. The formulation of this standard has been felt necessary with a view to making available fresh seer fish of desired quality and helping in selecting raw material for freezing and canning purposes.

The standard prescribes the requirements for:

1. Colour of the fish
2. Appearance of eyes
3. Gills
4. Appearance of skin
5. Colour of flesh
6. Meat and stomach portion
7. Odour
8. Flavour on cooking
9. Texture on cooking

Microbiological Requirements:

- Total bacterial
- Escherichia coli
- Salmonella

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Escherichia coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/is details

26. IS 7143 : 1973 Specification for crab meat canned in brine

Scope of Standard:

This standard prescribes requirements and methods of sampling and test for crab meat canned in brine. The term crab shall apply to the edible species of the genera Scylla and Protunus.

Brief Description:

Canning of crab meat has been started in the country on a moderate scale for export as well as internal consumption. It is hoped that the formulation of an Indian Standard on the subject would help in defining the quality of canned crab meat in a better way and would help in processing and canning of good quality crab meat in the country under hygienic conditions.

Crab meat is obtained from fresh crabs, the crabs are washed, cooked and deshelled and crab meat after blanching is canned.

The standard prescribes the requirements for:

i) Vacuum in can
ii) Sodium chloride in brine,
iii) Acidity of brine as citric acid (anhydrous)
iv) Bacteriological requirements
v) Acid insoluble ash

Limits of Metallic Impurities:

a) Arsenic
b) Lead
c) Copper
d) Zinc
e) Tin

For test methods please refer Appendix B, C, D, E & F of IS 2168 : 1971.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/is details

27. IS 7582 : 1975 Specification for crab meat, solid packed

Scope of Standard:

This standard prescribes the requirements and method of sampling and test for solid packed crab meat, obtained from the edible species of the genera scylla and protunus

Brief Description:

Canning of crab meat, solid packed, has been started in the country on a moderate scale for export as well as for internal consumption. It is hoped that the formulation of an Indian Standard on the subject would help in defining the quality of canned crab meat in a better way and would help in processing and canning of good quality crab meat in the country under hygienic conditions.

Crab meat is obtained from fresh crabs. The crabs are washed, cooked and deshelled and crab meat after blanching is solid packed in cans.

The standard prescribes the requirements for:

i) Vacuum of can
ii) Acid insoluble ash,
iii) Bacteriological requirements

Limits of Metallic Impurities:

a) Arsenic
b) Lead
c) Copper
d) Zinc
e) Tin

For test methods please refer Appendix B, C, D, E & F of IS 2168 : 1971.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/is details

28. IS 8076 : 2000 Frozen cuttle fish and squid - Specification (First Revision)

Scope of Standard:

This standard prescribes the requirements and the methods of sampling and test for frozen cuttle fish and squids.

The term 'cuttle fish' would apply to the following and other allied genera

a) Sepia, and
b) Sepiella.

The term squids shall apply to the following and other allied genera:

a) Loligo,
b) Loliolus,
c) Sepioteuthis, and
d) Symplectoteuthis.

Brief Description:

Cuttle fish and squid are important cephalopods with a high export potential and are also consumed by the people of the coastal region. Cuttle fish can be processed and packed as cuttle fish whole, cuttle fish fillets, cuttle fish rolled pack, cuttle fish fillets with tentacles, cuttle fish tentacles and cuttle fish fins. Squid can be packed as squid whole, squid tube, squid cylinder, squid fillets, squid rolled pack, squid tentacles and squid tins. They may also be available in other value-added forms as desired by the buyer.

This Indian Standard was formulated in 1976 to assist the industry in exercising proper quality control for export of the product. In this revision, the text has been updated and different types of packs have been included. Requirements have been incorporated for heavy metal contaminants.

The standard prescribes the requirements for:

- Total bacterial
- Escherichia coli
- Faecal Streptococci
- Coagulase positive Staphylococci
- Salmonella/Arizona
- Shigella,
- Vibrio cholerae,
- Listeria monocytogenes
- Heavy Metals:
    a) Mercury,
    b) Copper,
    c) Zinc,
    d) Arsenic,
    e) Lead,
    f) Tin
    g) Cadmium

For test methods please refer to IS 5887 (Part 3) : 1999 and Appendix B, C, D, E, F & L of IS 2237:1997.

For test methods for E.coli please refer to IS 5402 (Part 1 & 2) : 2021

For test methods for salmonella please refer IS 5887 (Part 3) : 1999

For test methods for total bacteria count please refer to IS 5402 (Part 1) : 2021

For test methods for Coagulase positive Staphylococci please refer to IS 5887 (Part 8/Sec 1) : 2023

For test methods for Faecal Streptococci please refer to IS 5887 (Part 2) : 1976

For test methods for Shigella please refer to IS 16429 : 2018

For test methods for Vibrio cholerae please refer to IS 5887 (Part 5/Sec 1) : 2023

For test methods for Listeria monocytogenes please refer to IS 14988 (Part 1) : 2020

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

29. IS 4303 (Part 1) : 1975 - Code of hygienic conditions for fish industry: Part 1 pre processing stage (First Revision)

Scope of Standard:

This standard (Part I) prescribes the hygienic requirements for fish holds, handling of fish on hoard and transport of fish from fishing vessel to the processing site.

Brief Description:

In order to ensure that fish and fisheries products reach the consumer in as fresh and clean a state as possible, it is necessary to maintain in certain conditions which will prevent the product from incidental contamination due to unhygienic conditions, improper handling', etc. This code has been formulated to assist the industry in supplying safe, sound and wholesome fish and fisheries products to the consumer. 'The code prescribes the broad principles which when followed would help in achieving the aforesaid objectives.

The standard prescribes the requirements for:

Boxed Stowage - 'The stowage of fish on board of the vessel in boxes.

Bulk Stowage - The Blass stowage of fish in pounds on board the vessel (see 2.8).

Chilling - The process of cooling fish to a temperature approaching that of melting ice.

Fillet - A slice of fish of irregular size' and shape removed from the carcass by cuts made to the backbone.

Fish - Any or the cold-blooded aquatic vertebrate animals, Pisces, Elasmobracks and Crustacea (see IS: 7313-1974).

Fresh Fish - Freshly caught fish which have received no preserving treatment, or which have been preserved only be chilling.

Gutted Fish - Fish from which the guts have been removed.

Pounds or Pens - Areas in the fish hold and on deck, divided off by stanchions and portable board structures for the storage of fish.

Shelf Stowage - The stowage of fish in single layers, on shelves on hoard of the vessel.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

30. IS 4303 (Part 2) : 1975 - Code of hygienic conditions for fish industry:

Part 2 canning stage

Scope of Standard:

This standard (Part II) prescribes the hygienic conditions required for establishing and maintaining a fish canning unit.

Brief Description:

Consumers have neither the available knowledge nor the means of determining the hygienic quality of the food they purchase. For this" they rely on the various industries that prepare and handle foods. Unless the factory producing the food is governed by a strict hygiene code in respect of layout, plant and personnel) the quality of the food produced is not considered safe.

The standard prescribes the requirements for:

Bleeders - Very small vents through which steam escapes throughout the entire heat process. Bleeding provides a circulation of steam within the retort (see 2.19) and ensures the elimination of any air that enters the retort with the steam.

Buckle - A sealed and heat-processed metal container of fish that has become permanently distorted by internal pressure during the heat processing or cooling or as a result of the formation of gas in the container.

Canned Fish or Shellfish - Fish or shellfish packed in containers which have been hermetically sealed.

Chilling - The process of cooling fish or shellfish to a temperature approaching that of melting ice.

Clean Sea Water - Sea water which meets the same microbiological standards as potable water and is free from objectionable substances.

Cleaning - The process of removal of objectionable matter.

Come-Up Time - The time required to bring a loaded retort to the specified processing temperature. Come-up time is not included in heat processing time.

Contamination - Direct or indirect transmission of objectionable matters to the fish or shellfish.

Fish - Any of the cold-blooded aquatic vertebrate animals commonly included in classes Pisces, Elasmobranchs and Crustaceans. Aquatic mammals, invertebrate animals and amphibians are not included.

Flipper - A sealed and heat-processed container for fish which is normal in appearance but which, if given a sharp jolt, may have its cover or bottom bulged outward. A light inward pressure may cause the cover or bottom to spring back into its normal flat or slightly concave position.

Fresh Fish or Shellfish - Freshly caught fish or shellfish which have received no preserving treatment or which have been preserved only by chilling.

Headspace - The space left in a container for canned fish to allow for the expansion of the contents during heat processing.

Heat Process -The treatment of sealed containers for fish with sufficient heat to destroy or inactivate all micro-organisms that grow at any temperature at which the product is likely to be held and which cause spoilage or might be harmful. A particular heat process is usually described as the length of time the particular product should be exposed to a specified temperature to accomplish the purpose.

Heat-Processing Time - The time of the specified processing temperature to which the scaled containers for fish are exposed.

Hermetically Sealed - Completely scaled and impermeable to air.

Leaker - A sealed and heat-processed container for fish which has a defect that allows the passage of water, gas or micro-organisms.

Papelled Container - A scaled and heat-processed cylindrical metal container for fish, the body wall of which has partly collapsed due to lack of sufficient rigidity to support the vacuum within or has been subjected to excessive external pressure during cooling.

Potable Water - Fresh water fit for human consumption. (Pl see IS 10500)

Retort - A pressure vessel designed for heat processing or fish packed in hermetically-sealed containers either by saturated steam or by heated water with superimposed air pressure,

Sanitization - The application of hygienically satisfactory chemical agents and processes to clean surfaces with the intention to destroy microorganisms,

Saturated Steam - Pure steam in equilibrium with water at the same temperature. Under these conditions the temperature of the steam is entirely dependent on its pressure.

Shellfish - Those species of molluscs and crustaceans including cephalopods that arc usually used for food.

Shelling - The process of removing shell from molluscs or crustaceans either mechanically or manually.

Springer - A scaled and heat-processed metal container for fish which has one building end. If this end is pushed into place the other end buldges.

Stanch-Burn - A quality fault in canned fish resulting from inadequate cooling after the heat process. This usually occurs in products which have been either stacked closely or encased while still warm.

Swell- A sealed and heat-processed metal container for fish which has both ends buldged by internal gas pressure.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

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CHAPTER IX

BIS CODES ON FOOD SAFETY & HYGEINIC PRACTICES

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BIS CODES ON FOOD SAFETY & HYGEINIC PRACTICES

BIS has formulated several standards on hygienic practices. These standards are very useful to the food industry as they help to maintain a very high level of hygienic conditions inside the manufacturing premises. These standards and code of hygienic practices ensure food safety. Some of them can also be used as prerequisite programmes for food safety management systems where ever applicable.

Some of the important standards on hygienic practices which will be useful for the fish processing industries are listed below for reference.

1. IS 14134 : 1994 - Code for hygienic practices for units for processing and handling of quick frozen foods

Scope of Standard:

This code prescribes hygienic conditions and practices required for establishing and maintaining units for processing and handling of quick frozen food products.

Brief Introduction:

Customers do not have the available knowledge or means of determining the hygienic quality of the food they purchase. For this, they rely on the hygienic standards of various industries that prepare and handle foods. Unless the factory producing the food is governed by a strict hygienic code in respect of layout, plant and personnel, the quality of food produced cannot be considered as safe. This code is an adjunct to IS 2491 : 1972 Code for hygienic conditions for food processing units (First revision)' and it covers requirements specific to the units for processing and handling of quick frozen foods.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ Is details

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2. IS 15176 : 2002 - Food hygiene - Microbiological risk assessment - Principles and guidelines for the conduct

Scope of Standard:

This Indian Standard covers the general principles for microbiological risk assessment and guidelines for application.

Brief Description:

Risks from microbiological hazards are of immediate and serious concern to human health. Microbiological risk analysis is a process consisting of three components: risk assessment, risk management and risk communication, which has the overall objective to ensure public health protection. This Indian Standard deals with risk assessment which is a key element in assuring that sound science is used to establish standards, guidelines and other recommendations for food safety to enhance consumer protection and facilitate international trade. The microbiological risk assessment process should

include quantitative information to the greatest extent possible in the estimation of risk. A microbiological risk assessment should be conducted using a structured approach.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

3. IS 16021 : 2012 - Good manufacturing practices (GMP) - Requirements for organizations in the food processing sector

Scope of Standard:

This standard specifies the requirements for good manufacturing practices, regardless of their size to implement systems that would consistently contribute to producing safe and quality products. All requirements of this standard are generic and intended to be applicable to organizations belonging to the food processing sector.

Food processing sector includes the food processors, suppliers of equipment, raw materials, ingredients, packing materials, processing aids, pesticides, fertilizers and cleaning chemicals. However, it does not include primary production, transportation, storage and retail.

This standard specifies requirements to enable an organization,

a) to plan, implement, operate, maintain and update Good Manufacturing Practices, aimed at providing quality products that, according to their intended use are safe for the consumer;

b) to demonstrate compliance with good hygiene practices and applicable statutory and regulatory requirements;

c) to effectively communicate food safety and quality issues to suppliers, customers and relevant interested parties in the food chain;

d) to facilitate the organization towards achievement of the stated food safety and quality policy and objectives;

e) to demonstrate such conformity to relevant interested parties; and

f) to seek certification or registration of its Good Manufacturing Practices by an external organization or make a self assessment of conformity to this Indian Standard.

NOTE — Examples of food safety management system are good agricultural practices, good aquaculture practices, good animal husbandry practices, good hygiene practices, good manufacturing practices, good retail practices, hazard analysis and critical control points and food safety management systems.

Brief Description:

Food processing sector includes the food processors, suppliers of equipment, raw materials, ingredients, packing materials, processing aids, pesticides, fertilizers and cleaning chemicals. However, it does not include primary production, transportation, storage and retail.

The good manufacturing practices (GMP) — Requirements for organization in the food processing sector, has been developed to assist organizations to implement and operate effective manufacturing practices, to produce and process products as per specifications and reduce the risk of contamination. The design, documentation and implementation of an organization's GMP system is influenced by the specific needs of the products provided and the processes employed. This standard does not aim to imply uniformity in structure of the GMP systems or uniformity in documentation.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

4. IS 17453 : 2020 - Food Safety and Hygiene - Code of Practice for Food Businesses during Epidemic/Pandemic Situations with Specific Reference to COVID-19

Scope of Standard:

1.1 This standard covers the essential food safety, respiratory hygiene, personnel hygiene and social distancing practices that should be followed by any food business operator during COVID-19 pandemic. These guidelines are in addition to the Schedule 4 of Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011 and good hygiene practices outlined in general principles of food hygiene as outlined in IS 2491 to achieve the goal of ensuring that food is safe and suitable for human consumption and the operation of the food businesses does not facilitate transmission/spread of COVID-19 pandemic.

1.2 This standard may also serve as a guidance document for a food business operator during other epidemics/ pandemics with similar mode of transmission as COVID-19.

Brief Description:

The world is facing an unprecedented threat from the COVID-19 pandemic caused by the SARS-CoV-2 virus (referred to as the COVID-19 virus). Since the beginning of the year 2020, the disease has rapidly spread to all parts of the globe and India is no exception. COVID-19 is a respiratory infection with symptoms ranging from common cold to Severe Acute Respiratory Syndrome (SARS). While there is no evidence or any reported case of the disease being linked to transmission through food, it is important for food businesses to take adequate precautions to ensure that the operation of the food businesses does not facilitate spread of COVID-19 pandemic either through human to human transmission during food handling (from close contact with food handler or customer) or through droplet (from COVID-19 infected person) contamination of the surfaces/or through enclosed air in the food premises. Keeping all workers in the food production and supply chains healthy and safe is critical to surviving the current pandemic and this requires contribution of all stakeholders along the food chain. In this direction, BIS was asked by the Ministry of Consumer Affairs and Public Distribution, Government of India, to formulate a guidance document for the food industry laying down the essential food safety practices, personnel hygiene and social distancing measures to protect the food handlers from contracting COVID-19 as well as to prevent transmission of the virus so as to ensure an uninterrupted food supply chain.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ Is details

5. IS 2491 : 2013 - Food hygiene - General principles - Code of practice

Scope of Standard:

This standard covers the essential principles of food hygiene applicable throughout the food chain (including primary production through to the final consumer) to achieve the goal of ensuring that food is safe and suitable for human consumption.

Brief Description:

People have the right to expect the food they eat to be safe and suitable for consumption. Foodborne illness and foodborne injury are, at best unpleasant, and at worst, can be fatal. There are also other consequences, such as damage to trade and tourism, which may lead to loss of earnings, unemployment and litigation. Food spoilage is wasteful, costly and can adversely affect trade and consumer confidence. International food trade and foreign travel are increasing, bringing important social and economic benefits. But this also makes the spread of illness around the world easier. Eating habits too, have undergone major change in many countries over the last three decades and new food production, preparation and distribution techniques have developed to reflect this. Effective hygiene control, therefore, is vital to avoid the adverse human health and economic consequences of foodborne illness, foodborne injury and food spoilage. Everyone, including farmers and growers, manufacturers and processors, food handlers and consumers has a responsibility to assure that food is safe and suitable for consumption. Keeping in view the above, this standard was first published in 1963 and revised in 1972 and 1998. In the second revision, the text was updated and aligned with the Recommended International Code of Practice — General Principles of Food Hygiene [CAC/RCP-11969), Rev. 3-1997] published by the Joint FAO/WHO Food Standards Programme, Codex Alimentarius Commission, Rome. The title was also aligned with the Codex Code of Practice. In this revision, the text has been updated and aligned with the latest revision of the Recommended International Code of Practice — General Principles of Food Hygiene [CAC/RCP 1-1969, Rev.4- 2003]. This standard lays a firm foundation for ensuring food hygiene and should be used in conjunction with each specific code of hygienic practice, where appropriate and IS 14595 : 1998 'Food hygiene — Microbiological criteria — Principles for establishment and application'. The standard follows the food chain from primary production through to final consumption, highlighting the key hygiene controls at each stage. It recommends a HACCP or FSMS based approach wherever possible to enhance food safety. The government, that is the regulatory authorities, can consider the contents of the standard and decide how they can encourage the implementation of this standard to protect consumers adequately from illness or injury caused by food and provide assurance to the consumers that the food is suitable for human consumption. Similarly, industry should apply the hygienic practices set out in this standard to provide food which is safe and suitable for consumption and ensure that the consumers gave clear and easily understood information, by way of labelling and other appropriate means, to enable them to protect their food from contamination and growth/survival of food borne pathogens by storing, handling and preparing it correctly. By adopting this standard the industry can also maintain confidence in internationally traded food. There may be situations where some of the specific requirements contained in this standard are not applicable. In all such cases, the user shall take a decision on the basis of the assessment as to what is necessary and appropriate on the grounds of the safety and

suitability of food for consumption.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

6. IS 7688 (Part 3) : 1976- Code of practice for labelling of prepackaged foods: Part 3 nutritional labelling

Scope of Standard:

This standard (Part III) lays down guidelines on nutritional labelling of various kinds of pre-packaged nutritive foods.

Brief Description:

Food labelling is an essential component in all food processing industries, The purpose is to tell the consumer, in correct manner, about the contents of the food inside the package or container. 'The consumers want to know what a package contains to make sure that they are not paying for an unknown quality and quantity of the food in the package. This leads to the necessity of enumerating on the label the ingredients, net contents, and other essential points about the food in the package. It is also equally important that the declarations and claims made on the label are true and reflect the product packed.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

7. IS 7799 : 1975 - Code for preservation of vitamins in foodstuffs

Scope of Standard:

This standard prescribes conditions and practices of handling, transport, processing, packaging and storage of foodstuffs for preservation of vitamins contained or inherently present in them.

Brief Description:

Vitamins are organic compounds present in small amounts in natural foodstuffs and are essential for health. They are broadly classified Pinto, two groups, namely, fat soluble and water soluble. Vitamins A, D, E and K are fat soluble while the vitamins B complex and C are water soluble. These vitamins are affected by the various processes to which foodstuffs are subjected from the time of harvesting until they are consumed. Loss of vitamins during handling, transport and processing is generally a result of their sensitivity to oxygen, light, heat and the PH of the medium during processing. Any method of preparation that disturbs the natural cell organization, such as peeling, chopping, cutting, etc, tends to increase the losses. Presence of some of the trace elements like iron and copper may also catalyse the loss of vitamins.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

CHAPTER X

INDIAN STANDARDS ON FISHING VESSELS

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The standards on Fishing equipment, vessels etc have been formulated by the BIS-Transport Engineering Department i.e. Inland, Harbour Crafts And Fishing Vessels Sectional Committee**,** TED 18.Some of the important standards are listed below for ready reference :

1.IS 9860(Part-1):1981- SPECIFICATION FOR FISHING HOOKS PART I BARBED HOOKS:

Scope : This standard covers material, types, size, dimensions and testing load requirements of barbed hooks used for Fishing Purposes.

Brief Description:

This standard specifies the requirements of material, Dimensions, Types of Fishing Hooks, designation and Marking Requirements. Terminology for fishing hooks is defined in **Clause 2**. of the standard. The following types are fishing hooks are specified at **Clause 4.1** of the standard:

a) Single straight flat hooks (Table I).

b) Single straight ringed hooks (Table 2).

c) Single kirbed flat hooks (Table 3),

d) Single kirbed ringed hooks (Table 4)

e) Double round hooks (Table 5),

f) Treble hooks (Table 6), and

g) Single kirbed turned down ringed hooks (Table 7).

As per Clause 6, Designation - the Fishing hooks shall be designated by its type, size, wire diameter, length and number of Indian standard.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

2. IS: 9496 (Part I) – 1980- SPECIFICATION FOR FISHING FLOATS PART I ALUMINIUM ALLOY AND GLASS FLOATS.

SCOPE: This standard (Part I) prescribes shape and performance requirements of hollow spherical floats made of aluminium alloy or glass for fishing net.

Brief Description:

The floats are one of the accessories of the fishing net and are buoyant objects. With the introduction of new materials, many types of floats are available. Though hollow and sponge floats of plastic material and metal floats are now increasingly used in place of cork and glass floats, the glass floats are still in service, to a great extent. Buoyancy of the floats changes with the sizes and mass in the case of hollow floats and

with the size and density in the case of the sponge plastic. Therefore, the size alone is not the sole indication of the buoyancy of a float. Further, since the hydrodynamic behaviour of the float changes with the trawling speed, it is important to consider this aspect in deciding the characteristics of these floats. This standard covering fishing floats is being issued in parts. This is the first part and covers floats made of aluminium alloy or glass.

The standard specifies the requirement of material (Cl 3.1), Requirements of Fishing Floats (Cl 3, 2, Table1), Manufacture (Cl 4), Testing (Cl 5) and Designation (Cl 6).

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

3. IS 10199 - 1982 Indian Standard ACCEPTANCE TESTS AND TRIALS FOR FISHING VESSELS

Scope: This standard covers tests and trials for fishing vessels of 15 m length overall (L.O.A.) and above to ensure their operational efficacy and their acceptance by the owners. It may be used as a guideline for vessels below 15 m length overall.

Brief Description:

The standard specifies the requirements for test and trials to be undertaken before any fishing vessel is accepted for operation. These Tests and Trials are very important to ensure operational efficacy of the fishing vessels before the same are accepted by their owners. The trials to be undertaken are:

a) Tank model tests, b) Shop test, c) Floating trials, d) Bollard pull test, e) Stability test, f) Sea trials, g) Speed trials, and h) Fishing trials. (Pl refer to Clause 2 of the standard).

The Sea Trails are conducted after successful completion of deck trials, to try out its main and auxiliary machinery, in relation to the type of the hull and the stern gear installed. (Please refer to Clause 2.6 of the standard). After this the vessel are subjected to the speed trials in a condition as close to that defined in 2.5.1(b). (Please refer to Clause 2.6 of the standard). Then Fishing Trials are carried out to ensure that the vessel has the capability to undertake the fishing operation for which it is designed.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

4.IS 10227:1997- Indian Standard FISHING VESSELS - TRAWL WINCHES-

Specification-

Scope: This Indian Standard specifies requirements and characteristics of single-drum and double-drum trawl winches with electric, electro-hydraulic, hydraulic diesel or externally powered drive. 1.2 The winches are used for hauling-in, paying-out and holding the trawl rope while fishing by means of trawling fishing gear. 1.3 When equipped with additional auxiliary drums, they may also be used for auxiliary operations when hauling-in, paying-out and emptying the trawl net.

Brief Description: In the standard under Cl 3, definitions for Design Torque, 3.2 Double-drum

Trawl Winch ,Drum Load, Nominal Size, Nominal Speed of Trawl Rope , Nominal Trawl Rope Winding Diameter , Paying-out Speed of Trawl Rope , Single-drum Trawl Winch and Winch side are mentioned. The specific requirements for DESIGN AND OPERATION, are specified in clause 4 of the standard. The Performance tests and Acceptance are specified under Cl 5 and Cl 6 of the standard respectively. The Designation indicators for Trawl Winches is given under Cl 7 of the standard which includes, Denomination, IS NO, Type of Winch, Nominal size, Side of Winch, Drum arrangement, Number and position of auxiliary drum, Number and position of warping ends and Information on Motive power (e.g. Voltage and frequency of electric current, or hydraulic fluid pressure and flow rate).

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

5.IS 10530:1983- GUIDELINES FOR SELECTION OF FISH HOLD INSULATION

Scope: This standard gives guidelines for selection of insulation materials and insulation practices to be used in fish holds.

Brief description: Fish begin to spoil immediately after death. Efficient methods of preservation on board fishing vessels are necessary in order to land fish of good quality and permit long voyages. Since the rate of spoilage is largely dependent on temperature, increased by the increase in temperature, refrigeration of the catch is common practice. Fresh water ice has played and continues to play a major role in the chilling of fish on board because it has several advantages over other form of refrigeration. It involves no complication in the design and operation of the fish hold or storage space. It is important to remember that ice is still to be used against all surfaces to protect fish from incoming heat even when the fish holds are insulated.

Thermal insulation is achieved with a material having a high resistance to heat flow. It can be installed between the hull and the lining and over other surfaces to retard the flow of heat into the fish hold. The Factors affecting the selection of Insulation have been specified in **Cl 2** of the standard. The usual ways for heat to enter the fish hold are described. The recommended materials for fish hold lining are waterproof, timber, galvanized iron sheets, marine aluminium and glass reinforced plastics.

(Please refer to **Cl 2.2** of the standard). The presence of water, Leakage of water in the hold area and other factors influencing the selection of insulation material have been specified. The details of insulation material, amount to be used and properties of insulation materials are specified in **cl 3** and **Table 1** of the standard. In the table for each insulation material the requirements for Density, Thermal resistance, Compressive strength and Permeability to Water vapour are specified.

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

6. IS 14762:1999-FISHING VESSELS - SELECTION OF PROPELLER SHAFTS FOR MECHANIZED FISHING BOATS -GUIDELINES.

Scope: This standard gives guidelines for selection of propeller shaft diameter and length in relation to engine power and boat sizes.

Brief Description: Proper matching of engine, propeller and propeller shaft is very important for operational efficiency of mechanised fishing boats. The objective of this Standard is to provide guidelines for proper selection of propeller shafts taking into account all the relevant parameters. The factors affecting selection of Propeller Shafts has been specified in **Clause 4** of the standard. These are Intermediate Shaft, Boat Size and Type, Engine Power and Couplings. The **Table 1** of the standard specifies the requirements of Construction material, Displacement, Approximate Speed and minimum Power Requirements for each Boat Size and Type. The Various types of stern tube assembly with different bearings combination and type of lubrication is indicated in **Table 2** of the standard.

It is important to take every care while installing the marine engine in the boat and align the propeller shaft with marine gearbox output shaft. However, individual shaft size requirement is to be worked out based on the information of engine HP,RPM, reduction ratio of gearbox, propeller thrust length, type of duty and economy subject to the condition that these meet the relevant rules and regulations laid down by the Statutory Authorities/ Classification societies. (Please refer to **Clause 4.5** of the standard).

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

7. IS 14919:2001- INLAND VESSELS — RAFT-TYPE LIFE-SAVING APPARATUS — GENERAL REQUIREMENTS.

Scope: This Indian standard specifies the purpose, materials and main technical requirements for rigid (non-inflatable) raft-type life-saving apparatus which may be supplied with inland ships. Raft type life-saving apparatus made from light alloy and fibre reinforced plastic materials as shown in Fig. 1 and Fig. 2 have been covered in this standard.

Brief Description: The adoption of the operational and technical requirements for raft-type life-saving apparatus specified in this standard will promote the determination of the basis of their optimum design on the one hand and the establishment of a single view point in respect of providing ships with this kind of life-saving appliance on the other hand. Besides the requirements covered in this standard, the raft-type life-saving apparatus for the inland ships shall comply with the provisions of the International Convention for the Safety of Life at Sea (SOLAS), 1974 or latest.

Definition of Raft-type Life-saving Apparatus- A buoyant apparatus, hereinafter called simply 'apparatus', (other than lifeboats, inflatable Life rafts, lifebuoys and lifejackets) designed to support a specified number of persons who are in the water and of such construction that it retains its shape and properties during the whole of its service life.

The Table 1 of the standard indicates the Classification of Life-Saving Apparatus, which is based on The apparatus are divided into groups depending on the number of persons supported, the materials from which they may be manufactured and the means which ensure their buoyancy. The Operational and Technical requirements are specified under **clause 4** of the standard. The apparatus casing shall be manufactured from materials which shall be resistant of oil and oil products. The total mass of an apparatus

designed for manual dropping shall not exceed 150 kg. Each apparatus shall be fitted with a line securely becketed round the outside and a device for mooring and towing .The apparatus shall be effective and stable when floating either side up and under all possible loading conditions. The surface of the apparatus shall be painted safety yellow.

The sequence and the methods of acceptance tests for measurements, mass, strength and waterabsorption shall be as agreed to between the manufacturer and the purchaser. (Please refer to **Clause 5** of the standard).

The designation of the raft-type life-saving apparatus contains an indication of the purpose of the apparatus(life-saving), an indication of the material of which it is made, the number of persons supported and a reference to this standard. (Please see **clause 6** of the standard).

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

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CHAPTER XI

INDIAN STANDARDS ON TEXTILE MATERIALS FOR MARINE/ FISHING PURPOSES

CHAPTER-14

INDIAN STANDARDS ON TEXTILE MATERIALS FOR MARINE/FISHING PURPOSES

The Indian Standard on Textile Materials for Marine/Fishing Purposes is formulated by the TXD 18 Sectional Committee of the Textiles department. The scope of the sectional committee is given below for ready reference:

a) To formulate Indian Standards for terminology, methods of test and specifications and for textile materials and accessories used for fishing/aquaculture purposes. b) To formulate guidelines for fishing gear.

Some of the important standards formulated by the department are listed below:

1. IS 4402: 2020- Fishing nets - Netting - Basic terms and definitions (third revision)

Scope: This document gives the principal terms relating to netting for fishing nets, together with their definitions or, in some cases, the method of expressing dimensions.

Some of important basic terms and definitions mentioned in the standard which is an identical adoption of international standard ISO 1107:2017 are given below:

a) **Netting-**meshed structure of indefinite shape and size composed of one yarn or of one or more systems of yarns interlaced or joined, or obtained by other means, for example by stamping or cutting from sheet material or by extrusion (Ref **Cl 3.1.1** of the standard).

b) **YARN**- all types of yarns suitable for the manufacture of netting (Ref **Cl 3.1.2** of the standard).

c) **Netting twine**-product of one twisting operation embracing two or more single yarns or monofilaments (Ref **Cl 3.1.2.1** of the standard).

d) **Braided netting cord**-product of braiding or plaiting netting yarns and/or netting twines (Ref **Cl 3.1.2.3** of the standard).

e) **Mesh**-design formed opening, surrounded by netting material. (Ref **Cl 3.2.1** of the standard). The shapes of mesh are Diamond mesh- where a mesh composed of four sides of the same length, a square mesh is a diamond mesh, in which adjacent sides are at right angles. A hexagonal mesh, is composed of six sides, out of which the length of one pair of opposite sides can be different from that of the other four sides, in case of an irregular hexagon.

d) **Mesh Length-** <knotted netting> distance between the centres of two opposite knots in the same mesh when fully extended in the N-direction(Pl refer to **Fig 1** of the standard).

e) **Knotless Netting-** netting constructed by joining together the filaments in the twines to form meshes without external knots (Ref **Cl 3.5.1** of the standard).

f) **Size of Netting**- number of meshes long (ML) in the T-direction and the number of meshes deep (MD) in the N-direction multiplied together, or the number of meshes in one direction and the length indicated in a recognized unit, for example metres, of the other direction, the netting being fully extended while the measurement is made (Ref **Cl 3.6.1** of the standard).

g) **Average mesh length**-with the netting fully extended in either the N-direction for knotted netting or the direction of the longest axis of the mesh for knotless netting, the depth or length of the netting in metres divided by the number of meshes deep or meshes long, respectively (Ref **Cl 3.7.1** of the standard)

h) **Average mesh side length**-with the netting fully extended in either the N-direction for knotted netting or the direction of the longest axis of the mesh for knotless netting, the depth or length of the netting in metres divided by the numbers of the half meshes deep (MD:2) or half meshes long (ML:2).

N.B: To download the Indian Standard please access the Know Your Standards link- https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/indian_standards/ is details

2. IS 5508(Part-1):2020- GUIDE FOR FISHING GEAR (PART 1)- GENERAL (First

Revision).

Scope: This guide (Part 1) specifies the principal construction details of various types of nets like trawl, gillnet, seines, etc, for fishing. The constructional details for fabricating a particular type of net has been given in the form of drawing and data sheet. Each such drawing and data sheet is complete enough for the fabrication of a particular type of net and as such forms a distinct part of the guide. The method of representation followed on the data sheets and on the drawings has been detailed out. When a set of drawings and data sheets consisting of several parts falls into a natural group, it is followed by an explanatory note given in the form of an appendix giving the terminology and other related details applicable to that group..

Brief Description: The idea behind compiling a guide for fishing gear designs was that the construction of a specific fishing design would be of particular value in a country like India where the fisheries is a big industry It would provide assistance in selecting the suitable gear, the criteria in respect of dimensions and facilitate in placing complete and correct orders for the construction of gear. Besides, it would also be of tremendous value to fisheries training centres.

It is also expected that the guide would be most useful in serving as a link between the fishermen and the gear technologists. Hitherto, there was no common denominator by which fishing gear could be specified and consequently, no adequate means of comparing the various types of gear. To achieve this purpose of intelligent communication in respect of gear construction between gear technologists and net makers, the gear drawings in the guide has to, a) be clearly understandable,

b) provide information on the main dimensions by direct reading of. numbers from the drawings, and

c) allow direct comparison of shape between different gears of the same type. This has been achieved by using a minimum of words in the drawings; by making the drawings of all trawl nets on a 1: 2 presentation of the mesh hanging and by providing a prominent scale indicator on all drawings.

It has to be noted that not all the drawings are complete to the last detail, but sufficient detail has been given in all cases for anyone initiated into the general principles and practices of net making, to construct anyone of them. The intention is to provide more than a construction manual. The guide has been got up in a form whereby one net or gear may readily be compared with another as to its size, shape and strength.

Both drawings and data sheets are used to present the information, the former to give an impression of the size and shape of the gear as well as certain constructional details, the latter to convey certain information that cannot easily or tidily be shown in the drawings. Some of the information on the drawings and data sheets is duplicated, but it is believed that this will save the reader and user of the guide the time and effort in quickly comparing nets with one another as well as in rapidly grasping their constructions.

For Netting Panels, the various panels in the drawings are specified in capital letters using subscript numerical where necessary. The panel letters are cross-referenced with the data sheets. Mesh sizes have been indicated by symbol Ê% in the appropriate pane. The Material, upper edge/Lower edge, Depth, Baiting rate and hanging are specified (Pl refer **clause 2.1** of the standard). For Lines. Ropes (**Clause 2.2**) the various ropes and lines are designated in lower case letters. These letters are crossreferenced with drawings.

The Design for Trawls is indicated in **Cl 4**, According to construction, trawls could be classified as twoseam, four-seam, six-seam, et , according to the number of seams with which it is constructed. The Terminology relating to Trawl Nets is given in Annex-A of the standard. The definitions of terms related to webbings such as Wings, Jibs, Dogear, Bosum, Quarter, Square, Flapper, Apron are indicated at **A4** of the annexure. The definitions of terms related to Ropes and Lines is indicated in **A-5** of the annexure. The definition of terms related accessories such as Beam, Tickler chain, Otter boards, Towing ropes, weights etc are indicated in Annex-6 of the annexure.

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3. IS 6348:2021- FISHING NETS — HANGING OF NETTING — BASIC TERMS AND DEFINITIONS (First Revision)

SCOPE: This standard prescribes principal terms pertaining to hanging of netting for fishing nets together with their definitions.

Brief Description: This standard is one of the series of India standards on methods of test of fishing gear materials. This standard was first published in 1971. It has been revised to align it with latest trade practices and ISO 1531: 1973 Fishing nets — Hanging of netting — Basic terms and definitions.

Under **Clause 3**, Definitions the following is indicated:

a) **Mounting** — The attachment of netting to a supporting rope or frame. (Cl **3.1**)

NOTE — The netting direction, N or T (see IS 4402), in relation to the rope used for mounting, shall be stated precisely.

b) **Hanging** — The mounting of netting according to a specific relationship between the length of that part of the final rope or frame on which the netting is mounted (see 2.3) and the length of the netting. (**Cl 3.2**)

c) **Length of Rope** — The length of the section of the rope or frame between the extreme points of mounting of the netting. (Cl **3.3**)

- For the calculation of the hanging ratio length of netting means that dimension of the netting to be mounted which is parallel to the final rope or frame, measured when the netting is fully extended in one or other of the directions mentioned in Note under 2.1, prior to being hung.

d) **Hanging Ratio (E)** — The ratio between the length of final rope and the length of netting shall be calculated as follows: (Pl see **Cl 3.5**)

E = length of rope length of netting
Length of netting.

e) **Hanging Coefficient** — Normally expressed as a decimal fraction of the expression.(**Cl 3.6**) length of line stretched mesh length of netting

f) **Take-Up (H)** — The reciprocal of the hanging coefficient expressed as a percentage and

calculated as follows: (Pl see **Cl 3.7**)

H= length of netting ,l—length of rope, l x100
Length of netting, L

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4. IS 14190:2023- TEXTILES — COMBINATION WIRE ROPES FOR FISHING PURPOSES — SPECIFICATION (First Revision)

SCOPE This standard specifies the requirements for the rope made from a combination of wire and fibre of ordinary lay for deep sea trawling purposes. In the standard the rope constructions and range of sizes included are Construction 6x8(8/f),Round strand, Steel or Fibre core, size 12 to 21 mm to Construction-6 × 24 (15/9/f), size 18 to 26 mm.

Brief description:

This standard was first published in 1995. This revision has been made in the light of experience gained since its publication and to incorporate the following major changes: a) Requirement for identification of material has been incorporated; b) Requirement for 'Conditioning of test specimens and atmospheric conditions for testing' have been

incorporated; c) Packing clause has been incorporated; d) Marking clause has been modified; and e) References to Indian standards have been update

The requirements for conditioning of test specimens have been specified in **Cl 3** of the standard. A temp of 27 C ±2C and RH of 65±2% have been indicated. The sample is to be conditioned for 24 h. The requirements for material has been specifies under **Cl 5** of the standard. Use of GI wire conforming to IS 1835 and Polypropylene fibrillated 2 mm to 3 mm diameter or flat tape single strand soft twisted are specified. The central or main core of the rope shall be of a size sufficient to give full support to the strands and shall be of steel wire or fibre construction as specified by the buyer. The Breaking Load and Mass for 6 × 8 (8/f) Construction are given in Table 1 of the standard. For all the constructions mentioned in the standard are covered in Table1 to 6. The joints in the wires are to be avoided as far as possible and the completed rope shall be free from visible defects, loose, wires, open strands or other irregularities (Please see **cl 8.3 and 8.4** of the standard). The tests to be performed are Breaking load test on ropes to ensure safety of the product. The wire shall be tested for Tensile strength and Torsion test.(Pl see **Cl 9.2**). The sampling and Criteria of conformity has been specified in **Cl 10** of the standard. In the Packing clause it is mentioned that the rope shall be suitably protected to avoid damage in transit and corrosion. Ropes of ordinary lay may be supplied in coils or reels as required by the purchaser (pl see **Cl 11**)

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5. IS 14287:2023- TEXTILES — POLYPROPYLENE MULTIFILAMENT NETTING TWINES — SPECIFICATION (First Revision)

SCOPE: This standard prescribes the constructional details and other requirements of polypropylene multifilament netting twines used in the manufacture of fishing nets.

Brief description: Twines are the basic material for making a fishing net. The twines are made of mono, twisted multi-filaments, twisted yarn, braided or wire rope/braided.

This standard was first published in 1995. This revision has been made in the light of experience gained since its publication and to incorporate the following major changes:

a) Requirement for identification of material has been incorporated;

b) Requirement for 'Conditioning of test specimens and atmospheric conditions for testing' have been incorporated;

c) All amendments have been incorporated;

d) Marking clause has been modified; and

e) References to Indian standards have been updated

The requirements for conditioning of test specimens have been specified in **Cl 3** of the standard. A temp of 27 C ±2C and RH of 65±2% have been indicated. The sample is to be conditioned for 24 h.. The requirements of Polypropylene Multifilament Netting Twines is indicated in Table of the standard. For each Runnage, the Construction details, twists per turn, Min. Breaking Load and Min Elongation at Break are specified.

The criteria of conformity of a lot is mentioned in **Cl 7.5** of the standard. The Packing requirements is mentioned under **Cl 8** and it is mentioned that The Twines shall be made into hanks or cheeses as required by the buyer.

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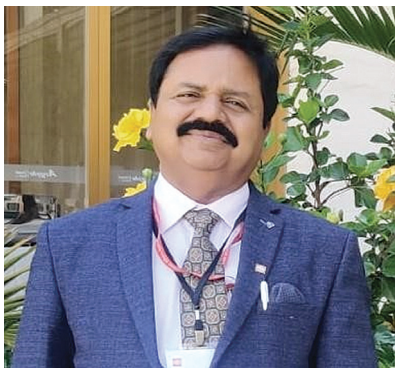
About the Author



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This reference handbook is expected to help the students and academia to explore the world of standards, thereby promoting their interest in standards formulation activity and also help to understand importance of standards in the field of Fisheries, Good Aquaculture practices and Fish products.