STANDARD OPERATING PROCEDURE (SOP)

A Guideline for Small and Medium Enterprises (SMEs) On Ready-to-Cook (RtC) and Ready-to-Eat (RtE) Fisheries Product Processing For the Domestic Market

Submitted to: NABOLOK Parishad

Date: December, 2025

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Acknowledgement

The author is grateful and thankful to NABOLOK Parishad for assigning and supporting this important initiative, and for the valuable guidance and encouragement received throughout the process.

I express particular appreciation to the Palli Karma-Sahayak Foundation, which provided support and continuous coordination. I would also like to express deep gratitude to PKSF's development partners, namely, the International Fund for Agricultural Development (IFAD) and the Embassy of Denmark, whose financial and technical assistance made this assignment possible.

The author gratefully acknowledges the advice, cooperation, and technical inputs provided by the officials of DoF, especially those from the FIQC Wing, and the Quality Assurance Managers of the fish processing sector, whose practical insights significantly enriched the development of this work.

Special thanks are also extended to the RMTP Sub-Project, under whose initiative this SoP on RtC and RtE Fisheries Product Processing was prepared. Thanks are also conveyed to all concerned officers, technical experts, and stakeholders who are directly involved in the process of RtC and RtE production for their cooperation, valuable suggestions, and efforts toward improvement regarding enhanced quality and safety in Bangladesh's fisheries sector.

Sincerely

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Preface

This Standard Operating Procedure (SOP) is developed specifically to support Small and Medium Enterprises (SMEs) particularly emphasized small holders in the transition to producing high-quality, nationally compliant Ready-to-Cook (RtC) and Ready-to-Eat (RtE) fish products. These market segments offer substantially higher margins and greater stability, provided they meet rigorous national and global food safety and quality mandates.

Despite abundant resources, SMEs in the fisheries sector frequently face challenges related to compliance, traceability, and high costs associated with meeting regulatory frameworks, such as those governing food safety and hygiene. The development of RtC and RtE products introduces complexity-extending the value chain and increasing the potential points for quality failure if not properly managed.

This SOP serves as the essential blueprint to mitigate these risks. It systematically details the mandatory controls required at every step, from the hygienic sourcing of raw fish to the final temperature-controlled distribution of the packaged product. By adopting and rigorously implementing these standards, SMEs can assure local and international buyers of the safety, quality, and consistency of their processed fish products. The SoP will help the stakeholder to enrich their knowledge on quality and safety issues of fish and fisheries products.

This document is intended to be a practical, easily implementable reference tool for technical staff, quality assurance managers, and production personnel. Its primary goals are to:

1. Ensure Compliance: Standardize processing activities in line with national regulations and international requirements (including HACCP and relevant market-specific protocols).
2. Enhance Traceability: Institute robust record-keeping systems that allow for end-to-end tracking of ingredients, vital for managing quality issues and fulfilling export mandates.
3. Facilitate Market Access: Build confidence among high-value export markets by demonstrating consistent product quality and food safety controls, thereby fostering sustainable business growth

Acronyms

Acronym	Terms
BFSA	Bangladesh Food Safety Authority
BSTI	Bangladesh Standards and Testing Institution
CAPA	Corrective and Preventive Action
CCIR	Codex Committee on Fish and Fishery Products
CCP	Critical Control Point
CFR	Code of Federal Regulations
CFU	Colony Forming Unit
CIP	Clean-In-Place
COA	Certificate of Analysis
Codex	Codex Alimentarius Commission
COP	Clean-Out-of-Place
DoE	Department of Environment
DoF	Department of Fisheries
EU	European Union
FEFO	First Expired, First Out
FIFO	First In, First Out
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis and Critical Control Point
ISO	International Organization for Standardization
MoU	Memorandum of Understanding
MSDS	Material Safety Data Sheet
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Point
RtC	Ready-to-Cook
RtE	Ready-to-Eat
SOP	Standard Operating Procedure
SSHE	Sanitation, Safety, Health, and Environment
SSOP	Sanitation Standard Operating Procedures
TDS	Technical Data Sheet
TVC / TPC	Total Viable Count / Total Plate Count

Terms and Transitory

(Used in Quality Control, Marketing, and Processing of RtC and RtE Fisheries Products)

Term	Definition	Context
Allergen	Substance capable of causing allergic reactions; must be declared on labeling	Harmful for consumers health
Audit / Verification	Systematic examination of HACCP, GMP, or SSOP implementation.	Done internally or by competent authority (e.g., DoF, BFSA).
Batch / Lot	Quantity of product produced under identical conditions for traceability.	
Batch / Lot Number	Unique identifier assigned to a group of products processed under similar conditions.	For traceability and recall management.
BFSA	Bangladesh Food Safety Authority.	National regulatory body for food safety and compliance.
BSTI	Bangladesh Standards and Testing Institution.	National standards authority approving food specifications.
CAPA (Corrective and Preventive Action)	Process for addressing non-conformities and preventing recurrence.	Required in internal audits and quality improvement.
CCP (Critical Control Point)	A step where control is essential to prevent or eliminate a food safety hazard.	Identified through HACCP analysis (e.g., cooking temperature, chilling).
CFU (Colony Forming Unit)	Measurement unit for viable bacterial cells.	Used in microbiological testing reports.
Chilled Product	Fish kept between 0°C to +4°C for short-term storage.	For fresh RtC items with short shelf life.
Chilling / Blast Freezing	Rapid temperature reduction to preserve product quality.	Critical control for RtE product storage (≤ –18°C).
CIP (Clean-In-Place)	Automated cleaning of internal surfaces of tanks and pipes without dismantling.	Common for RtE processing equipment sanitation.
COA (Certificate of Analysis)	Analytical report from a laboratory confirming compliance of raw material or finished product.	Required for export, particularly for EU markets.
Cold Chain	Continuous maintenance of temperature control from harvest to delivery.	Essential for ensuring quality and safety of RtC/RtE fish.
Cross Contamination	Transfer of contaminants from one material or area to another.	Controlled by zoning, hygiene, and SSOPs.
Disinfectant	Agent used to eliminate or reduce microorganisms on non-food contact surfaces.	
EU Regulation (EC) No. 852/2004	European Union regulation on food hygiene.	Basis for export approval and HACCP compliance in EU market.
FIFO (First In, First Out)	Inventory management principle ensuring oldest stock is used first.	Maintains product freshness and traceability.
FIQC	Fish Inspection and Quality Control	Competent Authority. Facilitate lab test and certification system

Term	Definition	Context
Food Contact Surface	Any surface that comes in direct contact with food or food ingredients.	Must be smooth, non-toxic, and easily cleanable.
Food Grade Material	Material approved for contact with food (stainless steel, HDPE).	Used for equipment, packaging, and utensils.
Frozen Product	Fish maintained at –18°C or below.	Ensures long-term preservation for export or storage.
Glazing	Coating frozen fish with a thin layer of potable water or ice.	Prevents dehydration and oxidation during frozen storage.
GMP (Good Manufacturing Practices)	Set of guidelines ensuring food safety and hygiene during production.	Foundation of food safety programs; verified during internal audit.
HACCP (Hazard Analysis and Critical Control Point)	A systematic approach to identifying, evaluating, and controlling food safety hazards.	Mandatory system for RtC/RtE production under BFSA/EU standards.
Labeling Compliance	Adherence to labeling laws including name, ingredients, date, origin, and allergen info.	Essential for domestic and export marketing.
Non-Conforming Product	Product not meeting established safety or quality criteria.	Must be identified, segregated, and managed under CAPA.
Organoleptic Evaluation	Sensory inspection based on appearance, odor, color, and texture.	Used in raw material receiving and finished product evaluation.
Packaging Integrity Test	Checking for leaks, seal strength, and contamination.	Ensures safe packaging for RtE items.
Potable Water	Water meeting drinking water standards suitable for food processing and ice production.	Water can drink without further treatment and free from pathogen, harmful chemicals and heavy metals
PPE (Personal Protective Equipment)	Protective clothing and gear worn by workers (gloves, apron, mask, boots).	Ensures hygiene and personal safety in the processing area.
Primary Processing	Initial steps such as washing, cutting, and gutting of fish.	Applies to both RtC and RtE product lines.
QCP (Quality Control Point)	Process step monitored to maintain product quality characteristics.	Non-safety quality aspects such as texture, flavor, or color.
RtC (Ready-to-Cook)	Semi-processed fish products requiring cooking before consumption (e.g., marinated, breaded, or portioned fish).	Used in labeling, product classification, and HACCP scope definition.
RtE (Ready-to-Eat)	Fully processed, cooked, and packaged fish products safe for direct consumption without further cooking.	Key product category requiring strict hygiene and temperature control.
Sanitizer	Chemical agent used to reduce microbial load on surfaces.	Must be food-grade and approved under BFSA or EU lists.
Secondary Processing	Value addition through cooking, marination, frying, or packaging.	Typically applied in RtE production.
Sensory Score Sheet	Form used to record organoleptic evaluation results.	Used in daily QC checks of fish freshness.

Term	Definition	Context
Shelf Life	The time period during which the product remains safe and retains desired quality.	Determined through stability and microbial testing.
SSOP (Sanitation Standard Operating Procedures)	Documented cleaning and sanitation steps for equipment and environment.	Ensures hygiene and control of cross-contamination.
Traceability	Ability to track a product through all stages of production, processing, and distribution.	Required under HACCP and EU export compliance.
TVC / TPC (Total Viable / Plate Count)	Total number of microorganisms in a sample, expressed as CFU/g or CFU/mL.	Indicator of microbial quality in raw material and final product.
Audit / Verification	Systematic and documented review of the effectiveness of the food safety management system.	
Ozone (O_3)	Natural disinfectant used for water and ice purification.	
Residual Chlorine	Remaining chlorine concentration after disinfection (0.2–0.5 mg/L).	

1 Introduction

Bangladesh is a leading global fish producer, leveraging its extensive water resources to achieve a total production of 50.18 lakh MT in FY 2023-24. This production is structurally dominated by aquaculture (Inland Culture), which contributes an overwhelming 59.34 percent (29.78 lakh MT).The remainder is sourced from Inland Capture (Open Water) fisheries, including rivers, beels, and floodplains (28.13%), and marine fisheries (12.53%).

This impressive output has secured national self-sufficiency in fish, which is the primary source of animal protein, accounting for approximately 60 percent of the total daily intake, with per capita consumption (67.80 gm/day) comfortably exceeding the target. The sector is critical to the national economy, contributing 2.53 percent to the national GDP and 22.26 percent to the overall agricultural GDP in FY 2023-24 (BBS 2024). Furthermore, the sector directly or indirectly sustains the livelihoods of over 21 million people (about 12% of the population), including 1.4 million women.

Importance Fish and Crustaceans in the Diet

It is typically eaten daily as the main animal protein accompaniment to the staple, boiled rice, along with vegetables. The consumption of fish and crustaceans is famously encapsulated in the phrase "Machee bhatee bangali" ("Fish and rice make a Bengali")

Preparation Styles

Bangladeshi cuisine uses diverse methods to prepare fish and crustaceans, primarily centered on intense, aromatic flavors, often leveraging mustard oil and fresh spices. *Besides there are many more recipes specially varies with region and season Consumers* increasingly prefer diversified fish dishes and innovative preparations. Gradually, innovators and researchers are collaborating with chefs to develop new fish-based products. Health-conscious consumers, in particular, prefer eating fisheries products with less carbohydrate due to dietary and health considerations.

2 Background:

Ready-to-Cook (RtC) and Ready-to-Eat (RtE) Fisheries Product Processing in Bangladesh, endowed with rich aquatic resources and a growing aquaculture sector, as mentioned above. But, the processing segment of the fisheries value chain remains largely traditional, with limited diversification beyond whole live, fresh, chilled and frozen both for domestic and export market. In recent years, the global and domestic demand for convenient, safe, and high-quality fish-based products has led to the emergence of Ready-to-Cook (RtC) and Ready-to-Eat (RtE) fisheries product processing as a promising sub-sector.

In Bangladesh, several small and medium enterprises (SMEs) have begun investing in modern processing facilities to produce RtC and RtE products for domestic supermarkets, restaurants, e-marketing and exploring export markets. However, the industry faces challenges in terms of infrastructure facilities in a small area with all compliant requirements, cold chain management, skilled manpower, quality assurance, and compliance issues with national and international food safety standards such as HACCP, ISO 22000.

The development of RtC and RtE fisheries processing facilities in Bangladesh thus represents a crucial step toward industrial modernization, employment generation, reduction of post-harvest losses, and greater competitiveness in both domestic and international markets.

2.1 Importance of RtC and RtE Fisheries Product Development and Marketing

The development and marketing of Ready-to-Cook (RtC) and Ready-to-Eat (RtE) fisheries products are now strategic necessity for the following reasons:

Diversification of Local Market, Exports & Higher Profit Margins: RtC/RtE products (e.g., fish balls, fish nuggets, fish cutlets, specialized marinated fillets) command a significantly higher price and profit margin in markets compared to basic fresh and frozen traditional commodities.

Meeting Urban Domestic Demand: Bangladesh is rapidly urbanizing. Modern, working-class households require convenient, time-saving, and safe meal solutions. RtC and RtE products perfectly meet this demand, allowing processors to capture a fast-growing segment of the domestic consumer market.

Utilization of Low-Value Fish/Catch: Value addition processing efficiently utilizes by-catch, smaller fish, and accessories from larger fish, converting otherwise low-value or seasonal catches into stable, high-value, processed products. This enhances overall resource utilization and reduces post-harvest loss, which can play a significant role in traditional fish and fisheries product supply chain.

Quality Control and Food Safety: Establishing a dedicated Standard Operating Procedure (SOP) for RtC/RtE production ensures that products moving through the value chain adhere to stringent national and international hygiene and quality standards (HACCP, ISO), boosting consumer confidence both domestically and in lucrative export destinations.

Ethnic market demand in abroad: Value added fisheries product has potentialities in the Bangladeshi community working abroad.

Therefore, the systematic development and adherence to a strong SOP for RtC/RtE products are crucial for support and supplying local market, maximizing foreign exchange earnings, ensuring food safety, reducing wastage, and sustaining the long-term economic viability of the entire Bangladeshi fisheries value chain

2.2 General differences between RtC and RtE products

RtC products are semi-processed fish products that require further cooking by the consumer before eating.

RtE products are fully processed and cooked fish products that are safe to eat without any further cooking.

There are difference in aspects, at: - Processing Level, Consumer Preparation, Food Safety Requirement, Processing Area Hygiene, Temperature Control, Items, Packaging Materials, Microbiological Standard, level declaration, Microbiological Standard, Markets.

(Details in Annexure-VI)

2.3 Need of a "Standard Operating Procedure (SOP)" for RtC and RtE Fisheries Product Processing

The development of Ready-to-Cook (RtC) and Ready-to-Eat (RtE) fisheries products in Bangladesh requires a structured and standardized approach to ensure product quality, safety, and compliance with both national and international regulations. A Standard Operating Procedure (SOP) serves as a critical management and operational tool for achieving these objectives for both large industries and SMEs. However, most small and medium enterprises (SMEs) involved in fish processing which is currently lacking standardized systems on hygiene, quality control, and process documentation. This results is inconsistent with product quality, higher risk of contamination, and non-compliance with food safety requirements. In view of the expanding domestic market and increasing participation of SMEs in Ready-to-Eat (RtE) and Ready-to-Cook (RtC) fisheries product processing, stakeholders have expressed a strong need for a comprehensive guideline on the 'Standard Operating Procedure (SOP) for RtC and RtE Fisheries Products"

Generally a SOP provides clear, step-by-step guidance on every stage of RtC and RtE processing- from raw material handling, preparation, cooking, packaging, labeling, and storage to transportation and marketing. It ensures that all personnel involve in the processing follow uniform methods, minimizing errors and variations that could compromise product integrity or safety. Moreover, SOPs are essential for establishing and maintaining HACCP plans, Good Manufacturing Practices (GMP), and Sanitation Standard Operating Procedures (SSOPs) - all of which are mandatory under national regulations and export certifications.

In the context of Bangladesh, a well-developed SOP helps:

a. Standardize production practices across SME processing units.
b. Ensure compliance with the Department of Fisheries (DoF), BFSA and BSTI food safety regulations.
c. Facilitate audit readiness for national and international certification (ISO, HACCP).
d. Enhance worker training, accountability, and operational efficiency.
e. Build consumer trust through consistent quality and safe products.
f. Support value addition, export diversification, and industrial competitiveness.

Therefore, developing and institutionalizing SOPs for RtC and RtE fisheries is a strategic necessity for Bangladesh's sustainable fisheries industry growth, aligning with the country's Blue Economy and export diversification goals.

3 Requirements of establishing a Small RtC and RtE Processing Centers.

Prior to establishing RtC and RtE, the requirements based on legislation and good practices should be planned and documented for better operation of the center

3.1 Steps of Regulatory Compliance Checklist

Step 1: Legal Establishment & Basic Business Setup

Step	Requirement	Responsible Authority	Key Documents / Actions	Output
1	Company registration	Registrar of Joint Stock Companies (RJSC)	Memorandum & Articles of Association, Form IX, name clearance	Certificate of Incorporation

2	Trade License	City Corporation / Municipality / Union Parishad	Application, factory layout, owner NID, holding tax receipt	Trade License
3	TIN & VAT registration	National Board of Revenue (NBR)	Online TIN application; VAT registration if turnover exceeds threshold	TIN Certificate / VAT registration (business turn over dependent)
4	Factory Registration / License	Department of Inspection for Factories & Establishments (DIFE)	Application with building safety, fire safety, layout plan	Factory License (*if required*)
5	Fire & Building Safety Clearance	Local Fire Service & Civil Defense / Municipality	Fire safety plan, extinguishers, emergency exits	Fire Safety Certificate

Step 2: Site & Environmental Clearances

Step	Requirement	Authority	Key Documents	Output
1.	Site layout & zoning clearance	Local Authority / City Corporation	Plant layout showing raw, processing, and finished product flow	Approval for land use
2.	Environmental Clearance Certificate (ECC)	Department of Environment (DoE)	EIA/IEE, Effluent Treatment Plan (ETP), waste management plan	ECC Certificate
3.	Water & waste system approval	DoE / Local Water Authority	Water source analysis, drainage layout	Water quality clearance

Phase 3: Food Business Licensing & Standards

Step	Requirement	Authority	Key Documents / Submissions	Output
1.	Food Business Operator Registration	Bangladesh Food Safety Authority (BFSA)	Application, company license copies, layout plan, FSMS summary	BFSA Food Business Registration Number
2.	Fish Processing Plant License *(for fish/seafood)*	Fish Inspection & Quality Control (FIQC), Department of Fisheries	Application, plant layout, sanitation plan, HACCP manual draft, equipment list, lab test report (water, surface)	FIQC Plant License
3.	Product Standard Certification (if applicable)	Bangladesh Standards & Testing Institution (BSTI)	Product specification, test report, label design, fee	BSTI Certificate (BDS standard compliance)

Phase 4: Food Safety System Setup

Step	Activity	Description / Requirements	Output
1.	Develop GMP (Good Manufacturing Practices)	Include hygiene zoning, cleaning schedule, equipment design	GMP Manual & Checklist
2.	Develop SSOP (Sanitation Standard Operating Procedure)	Procedures for cleaning, disinfection, water quality, waste management	SSOP Manual
3.	Develop HACCP Plan	Conduct hazard analysis, identify CCPs, validation and corrective action	HACCP Manual & Monitoring Forms

4.	Staff training & health checks	Basic hygiene, HACCP awareness, first aid, medical tests	Training log, Medical fitness certificates
5.	Laboratory tie-up	MoU with accredited lab for microbiological & chemical tests	Laboratory Service Agreement

Phase 5: Infrastructure & Equipment Validation

Step	Requirement	Description	Record / Output
1.	Facility zoning & layout	Separate raw, processing, cooked, packaging, and storage areas	Approved Layout Drawing
2.	Temperature & humidity control	Install temperature loggers, chiller/freezer calibration	Calibration Records
3.	Potable water supply	Test for coliforms, TDS, turbidity (monthly)	Water Test Certificates
4.	Effluent & solid waste management	Proper ETP, waste segregation, fish offal disposal	ETP operation log, Waste disposal log

Phase 6: Labeling, Packaging & Product Approval

Step	Requirement	Authority / Reference	Key Points
1.	Food labeling compliance	BFSA / BSTI	Product name, batch, expiry, ingredients, allergens, nutrition, storage & cooking instructions
2.	Food contact materials (packaging)	BFSA draft Food Contact Regulation	Must be “food grade” and tested safe
3.	Product shelf-life validation	Internal or external lab	Microbial and sensory test reports to justify expiry date

Phase 7: Testing, Monitoring & Inspection

Step	Activity	Frequency	Responsible Body	Record
1.	Raw material testing	Each batch or monthly composite	Internal QA / Accredited Lab	Test reports
2.	Product microbiological testing	Weekly (RtE) / Bi-weekly (RtC)	QA / Lab	Microbial test report
3.	Surface swab & environment test	Monthly (RtE)	QA / Lab	Hygiene monitoring log
4.	FIQC or BFSA inspection	As per schedule / random	Government inspector	Inspection report & CAPA

Phase 8: Documentation & Record Management (HACCP requirement).

Step	Documents to Maintain	Frequency of Update
1.	HACCP records (CCP logs, corrective actions)	Daily
2.	Cleaning & sanitation log	Daily
3.	Temperature log (chiller/freezer)	Daily
4.	Pest control record	Monthly
5.	Training & medical record	Quarterly
6.	Product traceability / recall file	As required
7.	Lab test reports & certificates	Each batch

Phase 9: Ongoing Compliance & Renewal

Step	Activity	Renewal Frequency
1.	Trade License	Yearly

2.	Factory License (DIFE)	Yearly
3.	Environmental Clearance Certificate (DoE)	Yearly / Bi-yearly
4.	BFSA & FIQC License	1–2 years

3.2 Food-safety systems & technical requirements

1. **RtE (Ready-to-Eat) specific requirements**

- Strict separation of raw vs ready areas, controlled processing environment for post-process contamination control.
- Thermal processing, retort/pasteurization or equivalent validated kill-steps for pathogens (depending on product).
- Validation & verification records for thermal processes, cooling, packaging integrity and shelf-life.
- Intensive microbiological monitoring (salmonella, Listeria, total plate counts etc.) and environmental monitoring programs.

2. **RtC (Ready-to-Cook) specific requirements**

- Emphasis on cold chain integrity (temperature control) and clear consumer instructions (cooking instructions, storage).
- Less-demanding post-process controls than RtE but require cross-contamination controls, labelling (raw vs pre-cooked), and temperature monitoring/records.

3.3 Common technical/engineering facilities/items

- Designated zones: receiving, pre-processing, processing, packaging, cold storage, finished goods.
- Adequate hot & cold water, potable water supply test reports, potable water certification.
- Effluent treatment / sewage control; proper waste disposal for offal and organics.
- Product contact materials must be food-grade (BFSA guidance forthcoming / draft food contact regulation).

3.4 Testing, inspection & certification system

- FIQC inspections & export health certificates for exports; FIQC performs plant inspections and sample testing for residues, heavy metals, histamine (fish), microbial parameters.
- BSTI / BFSA sampling & market surveillance — BFSA and BSTI may require product sampling and testing against standards.
- Maintain a relationship with an accredited laboratory for microbiological, chemical and residue testing (needed for both domestic compliance and export requirements).

3.5 Personnel & hygiene (government expectations)

- Medical fitness certificates / periodic health checks for food handlers (often required for processing licenses and exports).
- Documented training records in GMP, HACCP/CCP awareness and SSOPs.
- Clearly posted hygiene rules, PPE, hand washing stations, and restricted access to critical zones.

3.6 Labelling & packaging norms

- Labels must comply with BFSA/BSTI market rules: product name, ingredients, net weight, manufacture & expiry dates, storage & cooking instructions (for RtC), manufacturer details, and batch/lot code, nutrition / allergen declarations as applicable (for RtE).
- Use of food contact materials should follow BFSA food contact guidance / future FCM regulation (ensure "food grade" materials).

Key Differences and Complementary Roles of BSTI & FIQC Rules (Packaging and Labelling)

It will help SMEs understand how **BSTI** and **FIQC** rules work together for fish product packaging, labelling, and compliance.

Aspect	BSTI – Packaged Commodity Rules 2021	FIQC – Fish Inspection & Quality Control Rules 1997 (Amended 2008)
Main Focus	Packaging and labelling rules, correct weight, product certification, and consumer information	Inspection and quality control of fish and fish products to ensure safety and standards
Scope	Applies to **all packaged products**, including food items sold in the market	Applies **only to fish and fish products** from processing to distribution
Who it Applies To	Products sold in the **domestic market** for consumer protection	Fish processing, manufacturing, quality control, and export-related activities
Labelling Requirements	Clear and detailed labelling is **mandatory** (net weight, expiry date, manufacturer, country of origin, etc.)	Requires correct labelling, but many details **refer to or follow other standards**, including BSTI

3.7 Records and papers to be kept available at processing site.

Minimum set (kept and available at site):

- Company & license copies (RJSC, trade license, FIQC license, BFSA/BSTI certificates). HACCP plan / FSMS (ISO 22000) and CCP monitoring logs.
- SSOPs and GMP checklists, staff training records & medical certificates.
- Receiving & supplier records, raw material test certificates, supplier HACCP statements.
- Process validation, retort records, time/temperature logs, and calibration records.
- Cleaning & sanitation logs, pest control, water test results, effluent records.
- Traceability & recall plan, lot coding and finished goods testing records.

FSMS (ISO 22000) refers to a Food Safety Management System based on the ISO 22000 international standard. The standard integrates principles of Hazard Analysis and Critical Control Points (HACCP) with other key elements like prerequisite programs and management system principles

3.8 Personnel Hygiene and Training

RtE products are consumed without further cooking, even minimal contamination from handlers or environment can result in serious foodborne illness or product rejection in market. Therefore, strict personal hygiene and continuous staff training are mandatory to ensure safe, hygienic, and high-quality products that comply with national and international food safety standards.

3.8.1 Personnel Hygiene Requirements

I. General Health and Cleanliness

- All workers must undergo pre-employment and periodic medical examinations to ensure they are free from infectious diseases (e.g., skin infections, respiratory or gastrointestinal illness).
- A "Fit for Work" health certificate must be maintained and updated annually.
- Any employee suffering from wounds, sores, or illness must report immediately and be excluded from food handling duties until recovery.

II. Personal Cleanliness and Grooming

a. Workers shall maintain high standards of personal cleanliness:
   - Clean hands, short nails, no nail polish or jewelry.
   - Hairnets, masks, gloves, and aprons must be worn at all times within processing areas.

b. Hand washing with soap and sanitizer is required:
   - Before starting work,
   - After breaks, restroom use, or handling waste, and
   - After handling raw materials and before touching cooked or RtE products.
   - Only designated wash stations with soap, sanitizer, and disposable towels shall be used.

III. Protective Clothing

a. Personnel must wear color-coded protective clothing appropriate to processing zones:
   - *Blue / Green*: Clean processing areas (RtE lines)
   - *Grey / White*: Raw material or dirty zones

b. Aprons, gloves, boots, and masks must be washed and disinfected daily and replaced when damaged.

c. Outdoor clothing, personal items, or jewelry are not permitted inside food areas.

IV. Behavior and Conduct

- Smoking, eating, chewing, spitting, or use of tobacco are strictly prohibited inside processing and storage zones.
- No personal items (phones, pens, watches) should be carried in food-handling zones.
- Visitors must follow hygiene entry procedures, including wearing protective clothing and signing entry logs.

3.8.2 Training and Competency Development

Ensure all employees are competent, aware, and responsible for maintaining hygiene, food safety, and quality in every stage of RtC and RtE processing.

Training must cover:

a. Basic food safety and hygiene principles (GHP, GMP, SSOP).
b. Cross-contamination prevention between raw and cooked areas.
c. Proper cleaning and sanitation procedures (CIP/COP).
d. Allergen control and safe chemical handling.
e. Personal hygiene and behavior standards.
f. Waste management, pest control, and environmental hygiene.
g. Emergency response and first aid procedures.
h. Awareness of HACCP principles and CCP monitoring for responsible personnel.

4 Conceptual Layout and Facilities for a Small-Scale Fisheries Processing Center

(Designed according to local context, government norms (DoF, BFSA, BSTI, DoE), and small–medium enterprise feasibility)

All facilities listed under items 1, 2, and 3 are prerequisites as per the requirements of the competent authority and FIQC regulations for establishing a food processing plant. Currently, there is no separate regulatory framework specifically for Ready-to-Cook (RtC) and Ready-to-Eat (RtE) fish processing; however, such operations may be aligned with provisions applicable to "Fisheries Service and Packing Centers" schedule of FIQC Rule.

For a SME Fisheries Product Processing Center, the required facilities may follow the standard layout of existing approved fisheries processing plants, but on a smaller scale. The internal spaces should be properly partitioned to prevent cross-contamination between processing areas.

The facilities may be arranged in two distinct sections —

- **Zone 1 and Zone 2 (processing and handling) under one shed, and**
- **Zone 3 (non-processing or support area) in a separate shed or designated area.**

The main processing zones (1 and 2) are the most sensitive and must be maintained under strict hygiene and biosecurity controls in accordance with FIQC legislative requirements.
All facility designs and layouts must be reviewed, validated, and approved by the Department of Fisheries (DoF) and FIQC prior to operation and construction.

4.1 Non Processing Zone (Out Door)

These areas handle the initial raw product, personnel entry, and utilities and must be physically separated which includes:-
Entrance; with Foot Bath, Hand Washing, Sanitization facilities
A. Control room
B. Raw Material Receiving, Screening and Weighing area
Point of entry for raw fish/shrimp. Must have separate access from the final product exit.
C. Personnel Entry and Washing
Main entry point for staff. Must lead directly to C (Change Room) and D (Hygiene Station).
D. Change/Dressing Rooms
Separate male/female areas for changing into sanitary factory attire.
E. Hygiene Stations (Airlock)
Located just before the processing hall. Includes: Foot-operated hand washing sinks, soap/disinfectant supply, and a footbath for sole disinfection and flow to E
F. Waste/Offal Area from Non-processing zone
Designated area for collecting and storing waste (heads, guts, shells) in covered containers prior to removal.
G. Utilities/Engine Room

Area for the generator, water treatment, and mechanical systems. Must not open directly into the processing area.

4.2 Indoor Finished Product Processing Zones

(Entrance from E. Hygiene Stations (Airlock) for entrance to main processing zone.)
These areas must adhere to the highest hygienic standards (smooth floors/walls, non-absorbent equipment) and maintain the cold chain.
H. Preparation/Washing /cleaning of raw material
Initial cleaning, washing, and ice application. Must have sloped, well-draining floors.
I. Cutting/Dressing/Processing/Filleting Hall
Main work floor for semi-processing (cutting, filleting, peeling, de-veining). Requires SS/corrosion-resistant equipment and adequate lighting.
J. Primary Packing/Value-Adding
Area for final trimming, weighing, and packing into primary containers (e.g., bagging, tray packing for "Ready to Cook" products). Must prevent cross-contamination (especially from raw to finished product).
K. Cooking, Heating Area
L. Freezing/Glazing
Area for rapid freezing (blast freezer) and applying a protective ice glaze
M. Packaging, labeling, Coding (QR/Bar)
N. Cold Storage/Freezer
Storage of finished, packaged product at −18∘C to −25∘C or lower.. Dispatch/Loading Dock
Final exit point for the finished product. Should have separate access from the receiving area
O. Waste disposal from processing Zone:
A separate well protected area to keep free from animals, birds with vigorous monitoring on waste disposal.

4.3 Outdoor Utility and Accommodations:

a. Office and general store
b. Power Room
c. Water pumps with Filters
d. E fluent treatment facilities
e. Wash- Toilet
f. Dining
g. Kitchen,
h. Transport parking
i. Labor rest room j. health, day care & rest room for women workers etc.

4.4 Sketch Plan for a Small-Scale RtC or RtE Fisheries Processing Center

Based on the criteria outlined in Sections 4.1 to 4.3, a draft layout sketch has been prepared. Entrepreneurs may, in collaboration with qualified engineers and in consultation with DoF–FIQC personnel, develop an alternative layout according to the available land, facilities, and support services.

A Typical Process Flow Diagram for RtC and RtE Fisheries Processing Centers

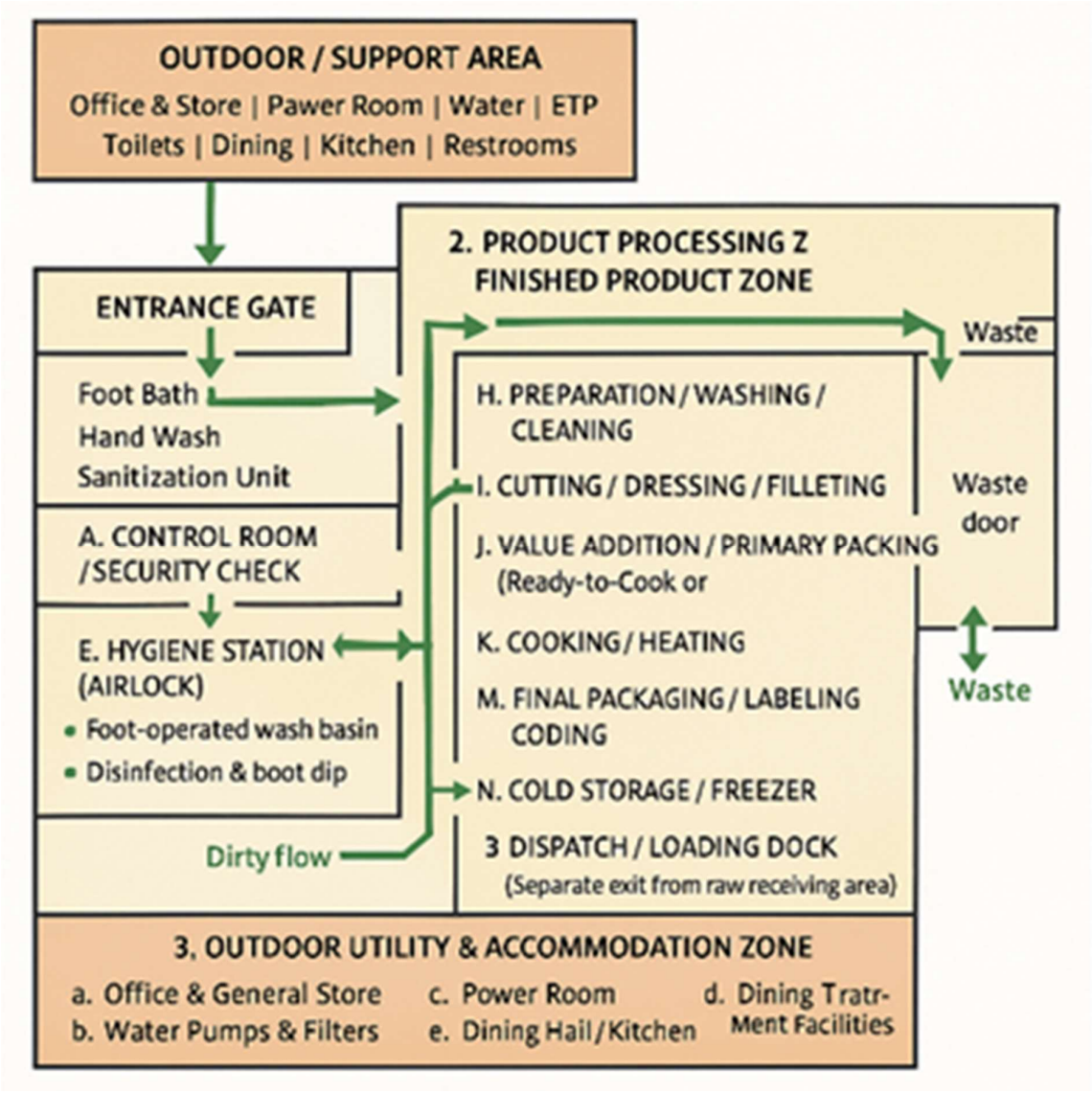


Figure : Sketch diagram of a typical RtC & RtE processing plant

4.5 A Text-based work flow diagrams for small processing center with CCPs.

Ensuring the safe, high-quality, and regulatory-compliant production of Ready-to-Cook (RTC) and Ready-to-Eat (RTE) fish products is mandatory for all businesses. Compliance with the prevailing regulations of relevant authorities must be achieved through strict hygiene practices, continuous monitoring of Critical Control Points (CCPs) under the HACCP system, and standardization of processing procedures. Small and Medium-sized Enterprise (SME) entrepreneurs should possess a clear understanding of these requirements and manage their production systems accordingly. Detailed CCP monitoring is enclosed - **Annexure-XI**

Workflow Diagram for RtC and RtE product processing

[Raw Fish Procurement]
▼
[Receiving & Inspection] —> [Reject if Spoiled/Damaged]
▼
[Washing & Cleaning] —> [HACCP CCP-1: Contamination Check]
▼
[Filleting/Cutting/Marinating]
▼
[Cooking/Blanching/Freezing] —> [HACCP CCP-2: Temperature Control]
▼
[Packaging] —> [HACCP CCP-3: Sealing & Labeling Check]
▼
[Cold Storage/Blast Freezing] —> [HACCP CCP-4: Storage Temp Monitoring]|
▼
[Distribution/Dispatch] ⟶ [HACCP CCP-5: Check labeling, packing condition, temp]
▼
[Customer Delivery]

Figure: 1flow of activities

HACCP Flowchart

Flowchart based on facilities development at RtC and RtE fish product processing centers

Raw Fish Procurement — Approved supplier, documented origin

↓

Receiving & Inspection — Quality check; reject spoiled or damaged fish

↓

CCP□1 Washing & Cleaning — Contamination control (hygiene, clean water, debris removal)

↓

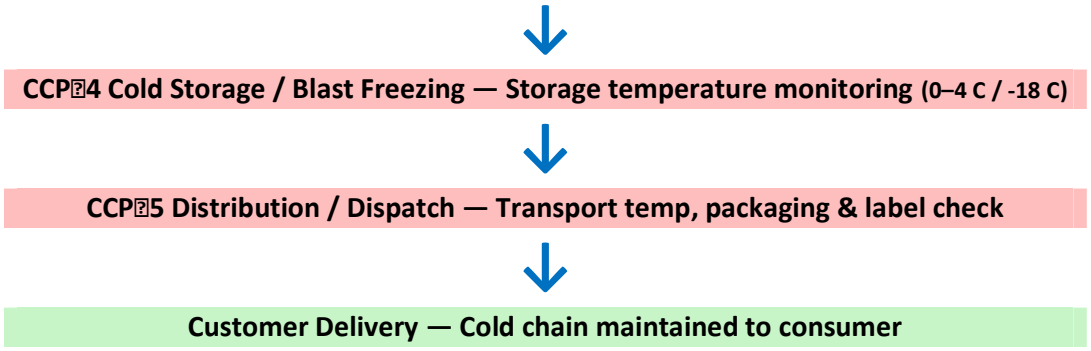
Filleting / Cutting / Marinating — Prevent cross□contamination

↓

CCP□2 Cooking / Blanching / Freezing — Temperature□time control (pathogen kill / rapid cooling)

↓

CCP□3 Packaging — Seal integrity & label verification (batch, date, storage, allergens)



Legend: Red boxes = CCPs | Green = Final step | Blue boxes = Processing steps | Thick arrows = Product flow direction

5 Water & Ice Quality Requirements under FIQC Rules (Bangladesh) (Summary Table)

Table-1: Potable Water — Definition & Standards (Schedule-10, FIQC Rules)

Aspect	Requirement / Description
Legal Reference	Fish & Fish Products (Inspection & Quality Control) Rules, 1997 — *Schedule-10*
Definition of Potable Water	Water meeting the **physical, chemical & microbiological limits** prescribed in Schedule-10 for safe use in fish processing
Use in Processing	Washing, cleaning, preparation, cooling, chilling, equipment sanitation, ice production
Compliance Basis	Water must be **fit for human consumption and food contact**

Table-2: Water Quality Parameters (Schedule-10 — Examples)

Parameter Type	Examples / Limits (Guide or Max. Admissible)
Chemical / Physical	Sodium (Na): 20–175 mg/l; Potassium (K): 10 mg/l; Aluminium (Al): 0.05–0.2 mg/l; Iron (Fe): 50 mg/l; Manganese (Mn): 20–50 mg/l *(Full Schedule-10 includes additional parameters)*
Microbiological	Total Coliforms: ≤100 (guide), **Max: 0 MPN / 100 ml**; Fecal Coliforms: ≤100 (guide), **Max: 0**; Fecal Streptococci: ≤100 (guide), **Max: 0**; Sulphite-reducing Clostridia: ≤20 (guide), **Max: 0**
Public Health Intent	Water must be **free from fecal contamination indicators** at point of use

Table-3: Regulatory Expectations for Processing Establishments

Requirement	Compliance Expectation
Water Quality Compliance	Must meet **Schedule-10 chemical & microbiological limits**
Laboratory Test Reports	Valid **physical, chemical & microbiological test reports** required for licensing & inspection

Requirement	Compliance Expectation
Point of Use Requirement	Water used in washing, processing, cleaning, chilling must be **potable**
Documentation	Records must be retained for **audit and FIQC verification**

Table-4: Ice Quality Requirements

Aspect	Requirement / Interpretation under FIQC Rules
Separate Ice Standard	Not listed separately — **ice follows potable-water standards**
Basis	Ice is produced from **processing water** and comes in direct contact with fish
Compliance Requirement	Ice must be made from **potable water (Schedule-10 compliant)**

Water Quality and Ice Standards

All water used in contact with fish, equipment, or food contact surfaces (including processing, cleaning, and sanitizing) must be of potable quality (safe for human consumption). This standard requires regular microbiological and chemical testing for verification.

Similarly, all ice used for chilling or storage must be produced exclusively from potable water in a licensed facility. The ice must be handled hygienically during crushing and transportation to prevent re-contamination. Furthermore, ice containers and storage facilities must meet established hygiene standards, and ice must not be stored on the floor.

a. Water Quality Standards

Parameter	Acceptable Limit	Testing Frequency / Notes
Total Coliforms	0 / 100 mL	Weekly or as per risk assessment
E. coli	0 / 100 mL	Indicator of fecal contamination
Total Plate Count (TPC)	≤ 100 CFU/mL	Monthly monitoring
pH	6.5 – 8.5	Daily check (processing water)
Turbidity	≤ 5 NTU	Clear appearance; checked visually
Residual Chlorine (if chlorinated)	0.2 – 0.5 mg/L	Continuous or daily monitoring
Nitrates (NO_3^-)	≤ 50 mg/L	Quarterly
Iron (Fe)	≤ 0.3 mg/L	Quarterly
Lead (Pb)	≤ 0.01 mg/L	Annual
Arsenic (As)	≤ 0.01 mg/L	Annual
Odor / Taste	Acceptable / none	Sensory check daily

Note: Non-potable water (if used for fire control, sanitation or refrigeration) must be supplied through separate pipelines, clearly marked and color-coded, with no cross-connection to potable lines.

b. Ice Quality Standards

Parameter	Requirement / Limit	Notes
Source Water	Potable water only	Must meet drinking water standards
Microbial Quality (E. coli, Coliforms)	0 / 100 mL	Same as potable water

TPC	≤ 100 CFU/mL	Indicates good hygiene during ice production
Physical **Characteristics**	Clear, odorless, free from debris	No foreign material or discoloration
Storage Conditions	< –18°C (for storage ice)	Ice bins must be clean and covered
Handling	Contact surfaces and tools sanitized	Prevent contamination from floor or workers

c. Operational Controls

- Periodic monitoring of both water supply and ice plant systems must be recorded.
- UV sterilization or chlorination (0.2–0.4 mg/L residual chlorine) should be maintained in the main water supply.
- During RtE processing, water used for rinsing or glazing must be microbiologically sterile or treated (e.g., by UV, ozone, or reverse osmosis).

6 Raw Material Selection and Freshness Assessment for Fish

a. Fish and crustaceans (shrimp, prawn, crab etc) are highly preferred by consumers for both Ready-to-Cook (RtC) and Ready-to-Eat (RtE) preparations. A comprehensive market assessment on the demand, price of raw materials, and total production cost should be carefully conducted, taking into account all value-adding components — including marketing, processing, packaging, transportation, labor, electricity, and power supply costs.
b. Raw material selection is a critical step. SMEs should procure fresh and traceable fish and crustaceans only from verified farms or markets that maintain movement and traceability records of their products.
c. Ensure that all raw materials maintain the cold chain immediately after harvest and that they originate from sources following Good Aquaculture Practices (GAqP).
d. Freshness assessment of fish and crustaceans should be performed using:
   (a) *Visual–organoleptic tests*
   (b) *Chemical tests*
e. Chemical testing for adulteration (e.g., detection of formalin) may be carried out using portable field test kits, whereas tests for proximate composition and putrefaction status must be conducted in accredited laboratories such as the DoF–FIQC or other designated facilities, following approved sampling protocols.
f. Instant organoleptic testing of fresh and chilled fish should be performed through visual and sensory observations as outlined in the table below.

Organoleptic Assessment of Freshness in Fish

Organoleptic Quality Assessment — Fresh Fish / Crustaceans (FIQC Reference Criteria)

No.	Parameter (Appearance / Quality Attribute)	Observation Criteria	Fresh / Acceptable Condition *(Complies with FIQC Rule — Fit for Processing / Marketing)*	Loss of Freshness / Spoiled Condition *(Reject as per FIQC Rule)*
1	General Appearance / Skin	Color, surface condition, slime	Bright, natural color; metallic sheen; clean surface; no excessive slime	Dull, faded, or discolored; opaque / yellowish / brown patches; thick or sticky slime
2	Eyes	Clarity, position, brightness	Clear, full, bright, and convex (bulging)	Sunken, cloudy, dull, shrunk, or discolored
3	Gills	Color, cleanliness, odor	Bright red or pink; moist; fresh, non-off odor	Brown, grey, greenish; slimy; sour or putrid odor
4	Odor (Sniff Test)	Overall smell	Fresh, marine / neutral odor; no off-odor	Sour, ammonia-like, rancid, or decomposed odor
5	Texture / Firmness	Elasticity, muscle tone	Firm, elastic; flesh springs back on pressure	Soft, mushy, sticky; finger mark remains
6	Belly Condition	Integrity, leakage, odor	Tight belly wall; no rupture or discoloration	Burst belly; gut leakage; strong putrid odor
7	Scales (Finfish)	Adherence and shine	Shiny, tightly attached scales	Loose, dull, missing, or easily detachable scales
8	Shell Condition (Crustaceans)	Color, hardness, odor	Hard, glossy shell; translucent flesh; mild marine odor	Discolored, soft shell; pink/black patches; sour smell
9	Tail Reflex (Shrimp / Prawn)	Reflex after handling	Tail curls tightly under body (indicates freshness)	Tail remains straight; no reflex
10	Meat Color (After Filleting / Deshelling)	Internal color & moisture	Natural white to pinkish; clear, moist, translucent flesh	Dull, yellowish / opaque; watery or dry texture
11	Drip / Exudate	Quantity & nature of liquid	Minimal, clear, odorless drip	Excessive, milky / cloudy exudate with odor
12	Overall Judgment	Final QC decision	All parameters satisfactory → Accept / Process	Any spoilage indicator present → Reject Lot / Batch

Testing Notes:

- Sampling: Minimum 3–5 fish/crustaceans per batch or per 100 kg lot.
- Test Frequency: At raw material reception and before processing.
- Record Sheet: Include date, time, lot no., supplier, and inspector's signature.
- Reject Handling: Separated immediately and sent for disposal or return.

A 0–3 organoleptic scoring system, aligned with established practice under the FIQC Rules of the Department of Fisheries (DoF), has been prescribed for the sensory grading of fish and crustaceans and may be adopted by SMEs engaged in Ready-to-Cook (RtC) and Ready-to-Eat (RtE) fish product processing.

Scoring Meaning (FIQC Reference Practice)

- 3 = Fresh / Fully Acceptable (Complies — Fit for processing/marketing)
- 2 = Slight Loss of Freshness (Acceptable with caution — monitor closely)
- 1 = Loss of Freshness Evident (Low quality — normally reject or segregate)

- 0 = Spoiled / Unfit (Reject — unsafe / unacceptable as per FIQC)

A **batch is accepted only if all critical parameters score ≥2** and **overall mean score ≥2.5** (recommended SME practice). Detailed in the **Annexure -IX**

7 Use of Chemicals, Disinfectants, Preservatives, and Cleaners

Certain chemicals, disinfectants, preservatives, and cleaning agents are restricted or prohibited in food-processing centers, especially in facilities handling fish and fisheries products. These controls exist to prevent health risks, product contamination, and to ensure compliance with regulations set by BFSA, FIQC, BSTI, the EU, and Codex Alimentarius. Entrepreneurs and processing-center workers must be aware of these rules and apply them in daily practice.

7.1 Permitted / Allowable Chemicals, Disinfectants, Preservatives, and Cleaners

Allowable Chemicals, Disinfectants, Preservatives, and Cleaners may be used with accurate doses and in consultation with competent authorities.

Category	Substance / Chemical Name	Purpose / Area of Use	Conditions / Limits of Use
Disinfectants	Sodium hypochlorite (Chlorine-based, 50–200 ppm)	Disinfection of utensils, tables, and equipment	Rinse thoroughly with potable water before contact with food
	Quaternary Ammonium Compounds (QACs / Benzalkonium chloride ≤200 ppm)	Equipment, walls, floors	Avoid direct food contact; use within concentration limits
	Hydrogen peroxide (3–5%)	Surface disinfection and equipment sterilization	Effective on stainless steel and plastic surfaces
	Peracetic acid (≤0.5%)	Equipment and container sanitation	No rinse needed if within prescribed limits
Cleaning Agents	Food-grade neutral or mildly alkaline detergent	Cleaning of food contact areas prior to disinfection	Use approved formulations only
	Caustic soda (Sodium hydroxide, for CIP (Cleaning-In-Place) systems)	Cleaning-in-place (CIP) of pipes and tanks	Controlled concentration; complete rinse after use
	Acid cleaners (phosphoric, nitric acid-based)	Descaling stainless steel and removing mineral deposits	Controlled application; never mix with chlorine compounds
Preservatives (Conditional Use)	Sodium benzoate (≤1000 mg/kg)	In sauces, marinades, or brines	Not for raw fish flesh; follow Codex/BSTI limits
	Potassium sorbate (≤1000 mg/kg)	Prevent mold or yeast growth	Only in coating or marinade formulations

Water and Ice Treatment	Ozone	Disinfection of water used for washing or ice	On-site generation only; no residual chemicals
	UV sterilization	Sterilization of recirculated or chilled process water	Physical process; no chemical residue
	Chlorine dioxide (0.2–0.4 mg/L residual)	Water and ice sanitation	Maintain acceptable taste and odor
	Calcium hypochlorite (residual 0.5–1 ppm)	Water sanitation	Maintain pH 6.5–8.5 and record concentration
Pest Control (Non-Chemical)	Food-grade insect light traps	In processing area (away from food lines)	Regular cleaning and bulb replacement

7.2 Prohibited / Restricted Chemicals, Preservatives, and Cleaning Substances.

The bellow Chemicals, Preservatives, and Cleaning Substances should not be used in at RtC and RtE fish product processing centers.

Category	Substance / Chemical Name	Reason for Prohibition / Restriction	Remarks / Regulations Referenced
Disinfectants	Formaldehyde / Formalin	Carcinogenic; illegal in food processing	Banned by BFSA, EU Regulation (EC) No. 1333/2008
	Phenolic compounds	Toxic residues; harmful vapors	Not food-grade; prohibited by Codex and EU
	Unregistered chlorine-based disinfectants	Unknown residue and concentration risks	Must be food-grade, with supplier MSDS
Cleaning Agents	Kerosene, diesel, or solvent-based cleaners	Non-food-grade; toxic and flammable	Environmental hazard; contaminates food
	Detergents with perfume, colorants, or phosphate additives	Leave residues and odor; unsafe for food contact	Not acceptable under HACCP hygiene rules
Preservatives	Sodium nitrite / nitrate	Not permitted in fish or seafood	Causes nitrosamine formation (toxic)
	Sulphites (SO_2, sodium metabisulfite)	Allergenic; only allowed in raw shrimp pre-processing (≤100 ppm)	Not for RtE or RtC final products
	BHA, BHT	Potentially carcinogenic; alters flavor	Not allowed in fish and seafood under Codex
	Formalin-treated fish or glaze water	Toxic and illegal	Criminal offense under BFSA regulation
Pest Control Chemicals	DDT, Malathion, or similar fumigants	Persistent, bio-accumulative toxins	Prohibited inside processing premises
	Aerosol insecticides / sprays	Contaminates surfaces and product	Use only mechanical or UV traps

Other Substances	Hydrogen sulfide, bleaching powder (non-food-grade)	Unsafe and leaves residues	Not permitted under Codex General Principles of Food Hygiene

8 Critical Control Point (CCP) Monitoring and Corrective Action

There are five CCP in main production system though there may be more CCP's in other establishment and activities which are also the part of HACCP system. (**Annexure - XII**)

Step	CCP No	Hazard	Critical Limit	Monitoring	Corrective Action
Receiving & Inspection	CCP-1	Spoiled fish, physical contaminants	Fish must have proper smell, color, texture	Visual inspection, smell test	Reject contaminated batches; record rejection
Cooking/Blanching	CCP-2	Pathogenic bacteria (Salmonella, Listeria)	Core temp ≥ 70°C for ≥ 15 sec	Digital thermometer check	Re-cook or discard batch; record incident
Packaging	CCP-3	Cross-contamination, packaging defects	Packaging intact, no leakage	Visual inspection	Repack or discard; sanitize packaging area
Cold Storage	CCP-4	Microbial growth	RTC: 0–4°C, RTE frozen: ≤ -18°C	Temp log check	Adjust storage, discard spoiled products
Dispatch	CCP-5	Temperature abuse during transport	Maintain cold chain	Temp log at loading	Delay shipment until cold chain ensured

9 Sanitation Standard Operating Procedures (SSOPs) on Cleanness.

SSOPs are written cleaning and hygiene procedures that ensure all equipment, surfaces, and environments remain safe and contamination-free. These are essential prerequisite programs under GMP and HACCP, especially critical for Ready-to-Eat (RtE) products where no further cooking kills bacteria.

Key Objectives

- Prevent microbial and chemical contamination.
- Maintain clean, safe processing zones.
- Support regulatory compliance (BFSA, DoF, HACCP).
- Build consumer confidence

Typical Cleaning Steps

a. **Pre-check :** Inspect for cleanliness every day according to HACCP manual

b. **Remove waste:** Dry clean residue. Keep the processing area free from any dirt or waste.

c. **Wash:** Use detergent and water for washing floors, tables, utensils, processing tools etc.

d. **Rinse:** With potable water; the water must be tested to ensure freeness of microbes, heavy metal and chemicals.
e. **Sanitize:** With approved chemicals recommended by legislative authorities or hot water
f. **Inspect & record:** Supervisor verification is mandatory, a responsible person who have training already to check the cleaning status of the total system and premises every day.

10 Waste Management and Disposal

Proper waste management ensures a clean, hygienic, and environmentally safe processing environment, preventing contamination, odour, and pest attraction while complying with environmental and food safety regulations.

Types of Waste and disposal Methods

Category	Examples	Disposal Method
Solid waste	Fish heads, bones, shells, spoiled raw material	Segregate → store in closed bins → send for rendering, composting, or disposal
Liquid waste	Effluent, wash water, blood water	Treat in effluent treatment system (ETP) or sedimentation tank
Packaging waste	Plastic, paper, labels	Recycle or dispose as per local authority rules
Hazardous waste	Cleaning chemicals, used sanitizer containers	Dispose safely through approved waste handler

Vital Practices on Waste management

a. Use color-coded covered bins (separate edible / non-edible / recyclable waste).
b. Maintain waste removal frequency—at least twice daily.
c. Ensure drains are covered and flow to treatment systems (ETP).
d. No waste accumulation inside processing zones.
e. Keep waste area away from production and storage zones.
f. Maintain records of disposal (date, quantity, method).

11 Raw Material Receiving and Control

Proper control at the raw material receiving stage ensures that only safe, high-quality, and traceable fish and ingredients enter the production line. All incoming materials must meet approved supplier standards, quality criteria, and temperature requirements to maintain product integrity and food safety.

Criteria for Supplier Approval and Sourcing

Suppliers shall be approved based on documented evaluations of their hygiene practices, licenses, and product quality history. If possible, preference should be given to suppliers with traceable sources (registered landing centers, farms, markets etc.) and compliance with BFSA and DoF regulations.

Received Raw Fish and Ingredients Inspection

Each batch of incoming fish or ingredients shall be visually inspected (organoleptic test as mentioned in Chapter 6) for freshness, odor, texture, and contamination. Temperature must be recorded on

arrival (≤4°C for chilled fish, ≤-18°C for frozen fish). Quality assurance personnel shall verify that the product meets specification standards before acceptance.

All received raw materials must include traceability information or movement documents, such as catching or harvesting area, date, vessel or supplier name, and lot number. This information shall be recorded in the receiving logbook or digital traceability system (under process) for full product trace-back capability.

Procedures for Rejecting Non-Conforming Materials

Materials not meeting quality, temperature, or documentation requirements shall be segregated, labeled **"REJECTED," and stored in a designated area away from acceptable products. The rejection reason must be documented**, and suppliers shall be notified for corrective action or replacement

Packaging Material Specifications and Uses

The packaging materials used for RtC and RtE fishery products maintain product safety, quality, and shelf life, preventing contamination and ensuring compliance with food safety standards:

(Packing Material allowed to use for RtC & RtE Processing mentioned detailed in Annexure-II)

Type of Material

I. Primary Packaging (direct contact):

a. Food-grade, non-toxic, odorless, and moisture- and grease-resistant materials (e.g., polyethylene (PE), polypropylene (PP), multilayer laminated films, vacuum pouches, or retortable trays).

b. For RtE products, materials must be heat-stable and suitable for high-temperature sterilization or vacuum sealing.

II. Secondary Packaging (outer layer):

Corrugated cartons or boxes that protect products during storage and transport.

- Must be sturdy, dry, and labeled with batch and traceability information

Handling and Storage of Packaging Materials

a. Packaging materials shall be received, examined, and stored in a clean, dry, pest-free area.
b. Materials must be stored on a portable platform or racks, never directly on the floor or against walls.

Maintain FIFO (First In, First Out) use of packaging material

a. Only authorized and trained personnel should handle packaging.
b. Damaged or contaminated materials must be segregated and rejection or return.

Hygienic Controls during Packaging

a. Use sanitized packing tables, sealing machines, and tools.
b. Operators must wear clean gloves, aprons, and masks during packaging.
c. Maintain records of packaging material batch numbers, product lot numbers, and full traceability.

12 Finished Product Storage Conditions (Temperature and Humidity)

All finished RtC or RtE fishery products are stored under controlled temperature and humidity conditions to maintain product quality, safety, and shelf life until marketing or distribution.

12.1 Storage Temperature Requirements

Product Type	Condition	Recommended Temperature	Remarks
Ready-to-Cook (RtC)	Frozen products	–18°C or below	Maintain constant freezing; avoid temperature fluctuation or thawing.
	Chilled products	0°C to +4°C	Suitable for short-term storage (<48 hrs).
Ready-to-Eat (RtE)	Frozen	–18°C or below	For long-term preservation and marketing.
	Chilled (vacuum or MAP-packed)*	0°C to +3°C	Maintain strict hygiene to avoid microbial growth.

* Vacuum or MAP-packed: vacuum packaging removes air to create a vacuum, while MAP replaces the air with a specific mix of gases like carbon dioxide and nitrogen.

12.2 Relative Humidity (RH)

- Maintain 70–85% RH in cold storage rooms to prevent dehydration or frost formation on products.
- Excess humidity (>90%) may cause surface condensation and microbial growth; low humidity (<60%) can cause dehydration or cracking of packaging.

12.3 Temperature Monitoring During Shipment or Transportation

Transfer to Storage Area

- After final packaging and labeling, finished RtC and RtE products are immediately transferred to the designated chilled or frozen storage room.
- Ensure the transfer is done using clean, food-grade crates or trolleys to avoid contamination.

Pre-check of Storage Room

Before loading, check and record that the storage temperature and relative humidity (RH) are within acceptable limits:

- Frozen storage: –18°C or below, RH 70–85%
- Chilled storage: 0°C to +4°C, RH 70–85%

Product Loading

- Stack products on portable platform or racks, not directly on the floor.
- Maintain adequate spacing between stacks for cold air circulation.
- Arrange by product type, batch number, and production date following the FIFO system.

Product Dispatch

Only release products that have maintained correct temperature and humidity during storage. Check label integrity, batch code, and packaging condition before loading for dispatch.

13 Compliance Guidelines and Best Practices

(Entrepreneurs must practice **discipline, ethics, and innovation** for sustainable success.)

I. Improve Raw Materials Traceability

a. Ensure approved suppliers with documented catch/harvest area, date, and transport temperature records.
b. Maintain traceability codes from source to final product developed by competent authority.
c. Encourage suppliers to practice Good Aquaculture Practices (GAqP) and Good Handling Practices (GHP).

II. Reinforce Hygiene and Sanitation Controls

a. Implement and maintain SSOPs for each area: processing, storage, packaging, and waste disposal.
b. Conduct regular verification of cleaning efficiency through swab testing and microbial testing.
c. Regular training in hygiene for food handlers and supervisors.

III. Temperature and Time Controls

a. Ensure cold chain integrity from receiving to dispatch: ≤4°C for chilled and ≤–18°C for frozen material and product.
b. Use calibrated thermometers and data loggers for monitoring.
c. Include corrective action procedures for any temperature deviation in the SoP.

IV. Ensure Proper Zoning and Facility Layout for processing centers

a. Clearly separate raw, semi-processed, and finished product areas to avoid cross-contamination.
b. Provide airlocks, hand-washing stations, and controlled personnel flow between zones.
c. Maintain sanitary design of floors, drains, and equipment.

V. Improve Packaging and Labeling Processes

a. Use food-grade, approved packaging materials with supplier declarations.
b. Ensure that all packaging areas are temperature-controlled and clean.
c. Labels should contain product name, batch code, production/expiry date, storage instruction, and traceability code.

VI. Implement a Healthy HACCP System

a. Maintain a documented HACCP plan identifying the CCPs: Cooking, Cooling, Metal Detection, and Storage.
b. Regular verification (calibration, internal audit, product testing)
c. Periodically revise the HACCP plan or when process/equipment changes occur.

VII. Staff Training and Competency Programs

a. Provide training in hygiene, food safety, and principles of HACCP to all processing personnel.
b. Maintain Training Attendance Records, refresher sessions annually.
c. Appoint a qualified HACCP Team Leader who assures compliance with SoP.

VIII. Improving Documentation and Record-Keeping

a. Use standardized forms/logs for receiving, processing, CCP monitoring, cleaning, and dispatch.
b. Keep records for at least 2 years for traceability and readiness for auditing purposes.
c. Establish document control to ensure latest versions are in use.

IX. Regular Internal Audit and Management Review

a. Conduct monthly internal audits to check for SoP and HACCP implementation.

b. Review non-conformities and corrective actions.
c. Hold quarterly management review meetings to improve the effectiveness of the system.

X. Comply with national and export standards

a. Follow all relevant national regulations (BFSA, FIQC, BSTI).
b. Meet export-market standards and buyer requirements (e.g., EU, Codex).
c. Maintain required licenses, certifications, and HACCP/FSMS records.
d. Keep proper traceability and documentation for all batches.
e. Conduct routine compliance checks and staff training.

XI. Maintain readiness for third-party, DoF-FIQC audits.

a. Keep HACCP/FSMS documents, SOPs, records, and logs updated at all times.
b. Ensure traceability records for raw materials, processing, storage, and dispatch are complete.
c. Maintain hygienic conditions, calibrated equipment, and validated processes.
d. Train staff to follow procedures and respond confidently during audits.
e. Conduct internal audits and corrective actions regularly to stay inspection-ready.

XII. Continuous Improvement

a. Encourage feedback from operators, QC staff, and buyers to update the SoP.
b. Integrate new technologies: rapid temperature sensors, hygienic design to improve product safety.
c. Review SoP annually and revise where necessary.

14 Conclusion

The development of Standard Operating Procedures (SOPs) for Ready-to-Cook (RtC) and Ready-to-Eat (RtE) fisheries products represents a significant milestone in establishing a structured, safe, and sustainable seafood-processing system for SMEs, particularly small enterprises in Bangladesh. These SOPs have been developed in alignment with the Fish and Fishery Products Inspection and Quality Control (FIQC) Act, BSTI food standards, BFSA guidelines and compliance requirements, as well as relevant international food-safety standards. The SOPs were validated through a stakeholder workshop with participation from DoF-FIQC, BSTI, and BFSA officials, along with RtC/RtE product developers and program personnel from the field and PKSF.

The SoP covers in detail all critical aspects of fish product processing-from the selection and receipt of raw materials to processing and hygiene control, packaging and labeling, storage, transportation, and distribution. Inclusion of Good Manufacturing Practices (GMP), SSOPs, and a HACCP framework in the production system will make the food safety management system effective and verifiable within the processing center or plant. There is scope of change SoP according need, facilities and legislative imposed by National Competent Authority. Hope the SoP will improve food safety knowledge and regarding value added fisheries products in Bangladesh and fisheries product will attract different classes of consumers.

15 Annexure

Annexure-I

15.1 Reference Table

Sl	Contents
1	The Fish And Fish Products (Fish Inspection and Quality control) Ordinance, 1983 (ORDINANCE NO. XX OF 1983)
2	The Fisheries and Fisheries (Inspection and Quality Control) Act, 2020.
3	Bangladesh Food Safety Act 2013
4	Bangladesh Standards and Testing Institution Ordinance, 1985 and 2018
5	EU import conditions for seafood and other fishery products; https://food.ec.europa.eu/sites/default/files/safety/docs/biosafety_fh_legis_guidance_interpretation_imports.pdf
6	DOF. 2024 Yearbook of Fisheries Statistics of Bangladesh, 2023-24. Fisheries Resources Survey System (FRSS), Department of Fisheries; Ministry of Fisheries and Livestock, 2024. Volume 41; 140p.
7	WorldFish / Feed the Future — Project reports: "Promote fish-based Ready-to-Cook (RtC) and Ready-to-Eat (RTE) products" / Annual & activity reports (2019–2023)
8	Food Safety (Labeling of Packaged Food) Regulation 2023
9	Food Safety (Food Contact Materials) Regulations, 2024
10	Bangladesh National Environment Policy 2018,
11	Bangladesh Environment Conservation Rule, 2023
12	Food Safety (Use of Food Additives) Regulation 2023
13	Food Safety (Use of Food Additives) Regulation 2023
14	Ready-to-eat and ready-to-cook foods current developments, nutritional value, and consumer acceptance, Journal of Current Research in Food Science2025, Vol. 6, Issue 2, Part B
15	TC Foods - A New Era in the Processed Food Industry "With Special Reference to MTR" https://www.scribd.com/document/319783537/RTE-and-RTC-Foods-pdf
16	Ready-to-Cook Foods: Technological Developments and Future Trends—A Systematic Review, College of Food Science and Nutritional Engineering, China Agriculture University, Beijing 100083, China; (https://creativecommons.org/licenses/by/4.0/
17	BFRI / Department of Fisheries publications & Annual Reports (DoF / BFRI 2021–2024) — BFRI Annual Report 2023–24; DoF Annual Report 2021–22.
18	Advancing Food Safety in Bangladesh: Challenges and Prospects- M.W. Ahmed et al. (review article, 2022/2023)

Annexure-II

15.2 Shrimp Quality Assessment

Organoleptic and Physical Tests

A. Organoleptic Test (Sensory Evaluation)

Organoleptic testing relies on **human senses**—sight, smell, touch, and sometimes sound. It is a **rapid, low-cost, and effective** method for assessing shrimp freshness at landing centers, markets, and processing facilities.

Attribute	Fresh / Good Quality	Poor / Spoiled
Appearance (Visual Check)		
Shell color	Bright, natural, translucent	Dull, yellowish, reddish, or black-spotted
Head condition	Firmly attached	Loose or separated
Black spots (melanosis)	Absent or minimal	Heavy black spots on shell or head
Flesh	Transparent and shiny	Milky, opaque, or discolored
Odor (Smell Test)	Mild seaweed or clean ocean-like smell	Ammonia-like odor, Sour or rotten egg smell, unpleasant fishy odor
Texture (Touch Test)	Firm and elastic, Flesh springs back when pressed	Soft or mushy texture Finger impression remains after pressing
Eye Condition (for Head-On Shrimp)	Black, shiny, and prominent eyes	Cloudy, sunken, or discolored eyes

B. Physical Test (Objective and Measurable Checks)

I. Firmness Test

- Gently press the shrimp flesh
- **Good quality:** Flesh recovers immediately
- **Poor quality:** Indentation remains

II. Shell Integrity

Check for:

- Broken shells
- Excessive peeling
- Cuts or physical damage

Good quality shrimp: Intact shell without cracks

III. Drip Loss / Dehydration

- Excess water or slime indicates:
  - Poor icing
  - Prolonged storage

Good quality shrimp: Moist surface but not slimy

IV. Ice and Temperature Condition

- Storage temperature: **0–4°C**
- Shrimp should be:
  - Fully covered with clean ice
  - Not floating in dirty meltwater

Annexure-III

15.3 List of utensils and machinery required for RTC

Utensils and machinery required for **Ready-to-Cook (RTC)** fisheries product processing centers in Bangladesh, aligned with FIQC (DoF) licensing, BSTI labelling, BFSA food safety oversight, and HACCP/GMP principles.

Utensils & Machinery Required at SME-Operated Centers

1. **Raw Material Receiving & Inspection Area**

Purpose: Quality assurance and temperature check, accept/rejection of fish/shrimp

Utensils

- Food-grade plastic crates (color-coded-for different product)
- Stainless steel (SS) inspection tables
- Digital probe needle thermometer
- Weighing scale (bench type)
- Magnifying glass with SS handle
- Receiving log register

Machinery / Equipment

- Ice boxes / insulated containers
- Hand pallet trolley (optional)

2. **Washing & Preparation/Processing Area**

(Deheading, gutting, scaling, filleting)

Utensils

- Stainless steel knives (filleting, boning, scale remover)
- Stainless steel scissor
- Knife sterilizer (hot water ≥82°C) or sanitizer dip
- Cutting boards (HDPE, color-coded- for different purposes)
- SS bowls, trays, colanders (different types)
- Fish descaling tools
- Aprons, gloves, hairnets or caps, mouth masks

Machinery / Equipment

- Potable water supply with hose
- Foot-operated hand wash basin
- Drainage with floor trap

3. **Filleting, Trimming & Portioning Area**

Purpose: RTC product preparation (fillets, steaks, chunks)

Utensils

- Precision knives and cutters
- Measuring scales
- Portioning trays
- SS worktables
- Waste bins

Machinery / Equipment

- Fish filleting machine *(optional – SME dependent)*
- Portion cutter *(optional)*

4. **Final Washing & Draining Area**

(Often managed as OPRP)

Utensils

- SS draining racks
- Perforated trays
- Food-grade baskets
- colander (sieve)
- SS buckets
- SS mugs

Machinery / Equipment

- Potable water spray system
- Water filtration unit (if required)

5. RTC Packaging & Labelling Area

(High hygiene zone)

Utensils

- SS packing tables
- insect treating devise /light
- Food-grade gloves
- Cutters
- Label applicators
- Date coding stamps

Machinery / Equipment

- Vacuum packing machine **or**
- Heat sealing machine
- Weighing scale (precision)
- BSTI-compliant packaging materials

6. Chilling & Freezing Facilities

Critical Control Point (CCP)

Utensils

- Insulated trays
- Product crates (food-grade)

Machinery / Equipment

- Chiller (0–4°C)
- Chest freezer or blast freezer (≤ –18°C)
- Temperature data logger / thermometer
- Ice flaker or ice crusher (optional)

7. Cold Storage & Dispatch Area

Utensils

- Stackable crates
- Dispatch checklists

Machinery / Equipment

- Cold room / freezer
- Insulated transport boxes
- Generator / backup power

8. Hygiene & Personnel Facilities

Utensils

- Hand wash units (liquid soap, sanitizer)
- Foot dips with allowed disinfectants
- PPE storage racks

Machinery / Equipment

- Hand dryer or disposable towel dispenser
- Lockers for staff
- Waste bins

9. Cleaning & Sanitation (SSOP)

Utensils

- Color-coded different types of cleaning brushes
- Mops & buckets
- Chemical measuring cups

Machinery / Equipment

- High-pressure washer *(optional)*
- Chemical storage cabinet (locked)

10. Quality Control & Monitoring Tools

Utensils

- Sample containers
- Logbooks (CCP, temperature, sanitation)

Machinery / Equipment

- Digital thermometer
- pH meter *(optional)*
- Metal detector *(optional for SME)*

11. Waste Management Facilities

Utensils

- Covered waste bins (color-coded)
- By-product collection containers

Machinery / Equipment

- Waste holding freezer *(optional)*
- Drainage with grease trap

❖ **Minimum Machinery Set for Small SME (Starter Pack)**

SS tables & knives
Ice boxes & chest freezer
Weighing scale & thermometer
Vacuum/heat sealer
Hand wash & sanitation setup

❖ **Recommended for Growing SME**

- Chiller room
- Blast freezer
- Vacuum packaging
- Data loggers
- Filleting machine

Annexure:-IV

15.4 List of utensils and machinery required for RTE

List of utensils and machinery required for **Ready-to-Eat (RTE)** fisheries product processing at SME-operated centers in Bangladesh, aligned with FIQC (DoF) licensing, BSTI labelling, BFSA food safety oversight, and HACCP/GMP principles.

Ready-to-Eat (RTE) Fisheries Product Processing for SME-Operated Centers

Utensils & Machinery Required at SME-Operated Centers

1. **Raw Material Receiving & Inspection Area**
   Purpose: Quality assurance and temperature check, accept/rejection of fish/shrimp

Utensils

- Food-grade plastic crates (color-coded-for different product)
- Stainless steel (SS) inspection tables
- Digital probe needle thermometer
- Weighing scale (bench type)
- Magnifying glass with SS handle
- Receiving log register

Machinery / Equipment

- Ice boxes / insulated containers
- Hand pallet trolley (optional)

2. **Washing & Preparation/Processing Area**
   (Deheading, gutting, scaling, filleting)

Utensils

- Stainless steel knives (filleting, boning, scale remover)
- Stainless steel scissor
- Knife sterilizer (hot water ≥82°C) or sanitizer dip
- Cutting boards (HDPE, color-coded- for different purposes)
- SS bowls, trays, colanders (different types)
- Fish descaling tools
- Aprons, gloves, hairnets or caps, mouth masks

Machinery / Equipment

- Potable water supply with hose
- Foot-operated hand wash basin
- Drainage with floor trap

3. **Cooking / Heat Treatment Area**

Critical Control Point (CCP-1)

Utensils

- SS cooking trays
- Heat-resistant gloves
- Cooking baskets

Machinery / Equipment

- Steam cooker / boiling kettle / retort
- Temperature gauges and probes
- Timer devices
- Steam boiler *(food-grade steam)*

4. Rapid Cooling Area

Critical Control Point (CCP-2)

Utensils

- Perforated SS trays
- Food-grade cooling baskets

Machinery / Equipment

- Blast chiller **or**
- Ice-water cooling tank
- Digital thermometer / data logger

5. Post-Cooking Handling & High-Hygiene Zone

Purpose: Prevent re-contamination

Utensils

- SS handling tools (tongs, spoons)
- Color-coded trays (cooked only)
- PPE for high-hygiene area

Machinery / Equipment

- Positive-pressure ventilation *(recommended)*
- UV insect killers *(outside processing line)*

6. RTE Packaging & Labelling Area

(High-Hygiene Zone – BSTI Compliance)

Utensils

- SS packing tables
- Label applicators
- Date coding stamps

Machinery / Equipment

- Vacuum packing machine **or**
- Heat sealing machine
- Precision weighing scale
- Metal detector *(recommended for RTE)*
- BSTI-compliant packaging materials

7. Chilling, Freezing & Cold Storage

Critical Control Point (CCP-3)

Utensils

- Insulated crates
- Stackable trays

Machinery / Equipment

- Chiller (0–4 °C)
- Blast freezer or chest freezer (≤ –18 °C)
- Cold room *(finished product)*
- Temperature monitoring system
- Backup generator

8. Quality Control & Monitoring Tools

Utensils

- Sample containers
- CCP monitoring records

Machinery / Equipment

- Digital thermometers
- pH meter *(optional)*
- Weighing balance (calibrated)

9. Hygiene & Personnel Facilities

Utensils

- Hand-wash units (soap, sanitizer)
- Foot dips
- PPE storage racks

Machinery / Equipment

- Hand dryers / towel dispensers
- Lockers for staff

10. Cleaning & Sanitation (SSOP)

Utensils

- Color-coded brushes and mops
- Buckets and measuring cups

Machinery / Equipment

- High-pressure washer *(optional)*
- Chemical storage cabinet (locked)

11. Waste Management Facilities

Utensils

- Covered waste bins (color-coded)
- By-product collection containers

Machinery / Equipment

- Waste holding freezer *(recommended)*
- Drainage with grease trap

Minimum Machinery Set for Small RTE SME

- SS tables, knives & trays
- Steam cooker or kettle
- Blast chiller or ice-cooling system
- Vacuum sealer
- Chiller & freezer
- Thermometers & records

Recommended for Export-Oriented / Advanced SME

- Retort or automated cooker
- Blast freezer
- Metal detector

- Temperature data loggers
- Separate high-hygiene packing room

Annexure-V

15.5 Packing Material allowed to use for RtC & RtE Processing

Packing Material allowed to use in SMEs Ready-to-Cook (RtC) and Ready-to-Eat (RtE) Products Fisheries Products Processing Centers

Packing Materials for Ready-to-Cook (RtC) Products

Type of Material	Key Properties	Example Use
LDPE (Low-Density Polyethylene) Bags	Flexible, moisture barrier, heat-sealable	Vacuum packing of raw fish fillets or marinated fish
HDPE (High-Density Polyethylene) Trays	Rigid, puncture resistant, recyclable	Frozen fish portions, breaded raw shrimp
PET (Polyethylene Terephthalate) Trays	Transparent, display-friendly, moderate barrier	Retail chilled fish display packs
PA/PE (Polyamide/Polyethylene) Films	Excellent oxygen and moisture barrier	Vacuum or MAP (Modified Atmosphere Packaging)
Aluminum Foil Laminates	Light and odor barrier	Marinated or spiced products
Corrugated Fiberboard Cartons	Structural support, printable surface	Secondary transport packaging for frozen fish

Packing Materials for Ready-to-Eat (RtE) Products

Type of Material	Key Properties	Example Use
Retortable Pouches (PET/Al/PP)	Withstands sterilization up to 121°C, high barrier	Shelf-stable cooked fish curry or meals
Polypropylene (PP) Trays with Sealing Film	Microwaveable, heat-sealable	Chilled ready meals and cooked fish portions
Vacuum Thermoform Packs	Airtight, high clarity	Smoked, grilled, or marinated cooked fish
MAP Trays (Modified Atmosphere)	Gas mix of N_2 and CO_2 extends shelf-life	Grilled or baked fish fillets
Glass Jars or Bottles	Non-reactive, reusable, vacuum-sealable	Pickled or sauce-based fish
Paperboard Sleeves / Labels	Branding, instructions, recyclable	Outer retail display packaging
Shrink Films (PE/PO)	Tight protective wrapping	Retail multipacks or meal kits

Secondary and Transport Packaging

- Corrugated cartons lined with poly-film or wax coating for moisture resistance.
- Insulated boxes or expanded polystyrene (EPS) containers for frozen transport.
- Plastic straps and shrink wrap to stabilize stacked cartons on pallets.
- Clearly mark with product name, batch code, storage temperature, and “Handle with Care” instructions.

Hygiene and Handling of Packing Materials

- Store in a clean, dry, pest-free designated packaging material store.
- Use FIFO (First-In, First-Out) rotation to prevent aging of materials.
- Operators handling packaging materials must wear clean gloves, mask, and cap.
- Reusable crates or trays must be washed, sanitized, and air-dried before use.

Notes on Sustainability

•Encourage use of biodegradable or recyclable materials (rPET, paperboard, PLA films).

•Minimize plastic waste by optimizing pack size and film thickness.

•Properly segregate packaging waste (plastic, paper, metal) for recycling or safe disposal.

Annexure-VI

15.6 Different Aspects between RtC and RtE

Main aspect differences between Ready-to-Cook (RtC) and Ready-to-Eat (RtE) Fishery Products

Aspects	Ready-to-Cook (RtC)	Ready-to-Eat (RtE)
Definition	Semi-processed fish products that require further cooking by the consumer before eating.	Fully processed and cooked fish products that are safe to eat without any further cooking.
Processing Level	Partially processed — includes cleaning, cutting, marinating, breading, portioning, or pre-freezing.	Fully processed — includes cooking (boiling, frying, baking, smoking, steaming, etc.), and often ready for direct consumption.
Consumer Preparation	Must be cooked to eliminate pathogens before consumption.	No further cooking needed — only heating (if desired) for taste.
Food Safety Requirement	Focus on preventing contamination before consumer cooking.	Focus on preventing recontamination after cooking (high hygiene and separation essential).
Processing Area Hygiene	Medium risk — requires standard hygienic conditions and temperature control.	High risk — requires high care or high-risk zones with strict sanitation, air filtration, and personnel control.
Temperature Control	Typically stored below 4°C (chilled) or below –18°C (frozen) until cooking.	Requires strict cold chain control after cooking (≤4°C chilled or ≤–18°C frozen).
Items	Fish fillets, marinated fish, fish fingers (uncooked), breaded raw shrimp, cutlets.	Cooked fish curry, grilled fish fillet, smoked fish, ready seafood meal packs, fish patties.
Packaging Materials	LDPE, HDPE, PET trays, vacuum bags, corrugated cartons.	Retort pouches, PP trays, vacuum thermoform packs, MAP trays.
Microbiological Standard	Limits for raw fish pathogens (e.g., Salmonella, E. coli).	Must be free of pathogens (Listeria, Salmonella, Clostridium botulinum).
Label Declaration	Must include “Cook Before Eating” instructions.	Must include “Ready to Eat” or “Fully Cooked” label.
Critical Control Points (CCPs)	Handling, freezing, marination, packaging.	Cooking temperature, cooling rate, packaging hygiene, storage.
Market Segment	Retail frozen foods, restaurants, catering suppliers.	Supermarkets, convenience foods, institutional catering, airlines.

Annexure-VII

15.7 Competent legislative Authorities

Authorities involved in fisheries product production, marketing, and food safety management in Bangladesh

Relevant departments and organizations are engaged in licensing, monitoring, and regulatory oversight of value-added fisheries product processing within SME enterprises.

Department of Fisheries- Fish Inspection & Quality Control (FIQC) is the competent licensing and inspection authority (licenses for processing plants/centers, export-import, health certificates, and sanitary inspection) for fish & seafood (a common RtE/RtC category). The facilities and design must be in accordance of the FIQC rule and approved by local and regional competent Authority (DD-FiQC or delegated fisheries officers). DG DoF is the National or Central competent authority on the FIQC activities in Bangladesh.

Bangladesh Food Safety Authority (BFSA) ensure and supervise sector guidance on any materials or objects designed to come into contact with food, that touches food product during processing, packaging, storage must be safe and not contaminate the food with chemicals, bad taste, or odor.

Bangladesh Standards and Testing Institution (BSTI); provides national standards (BDS) for any food items, additives and packaging; product standards and labeling rules often reference BSTI/BFSA rules. Ensure proximate contents are labeled with additives and dates of processing and life of use. The product need to be registered whenever marketed in packing or sealed condition.

Other agencies involvement as required: **Department of Inspection for Factories and Establishments (DIFE);** (factory registration & labor safety), **Department of Environment (DoE)** (effluent/waste permits/EIA if applicable), **Municipal Authorities** (public health, social acceptance, plant construction, trade license etc.), **RJSC** (company registration) and **NBR** concern with tax/VAT.

Chamber of Commerce and Industries: Entrepreneurs may obtain membership; may be suportive for bargaining with govt. and local facilities

Basic legal & business registrations

a. Company legal registration (Registrar of Joint Stock Companies and Firms (RJSC)) or sole proprietorship from the local City Corporation, Municipality, Upazila Parishad, or Union Parishad.
b. Trade license from the local City Corporation / Municipality, Union Parishad on Agro-processing/Fish-processing trade.
c. Factory license / registration (if applicable) - Department of Inspection for Factories & Establishments (DIFE) for medium/large plants; also local building approvals.
d. Tax / VAT registration (NBR) for value added product marketing.
e. Export Registration Certificate (ERC) if the plan product exports.

f. Environmental permits / effluent control (DoE) or EIA clearance for large plants; local effluent discharge permission and waste management plan.

Annexure-*VIII*

15.8 List of documents Required for RtC vs RtE Fisheries Product processing center

Documentation Matrix (SME Level)

1 Core Food Safety Documentation

Documentation Item	RtC (Ready-to-Cook)	RtE (Ready-to-Eat)
FSMS Manual	Required (focus on hygiene & handling)	Required with enhanced controls for post-process safety
Product Description & Intended Use	Required	Must clearly state ready-to-eat, no cooking required
Process Flow Diagram	Required	Separate diagram for post-cooking & high-risk zones
GMP / Personal Hygiene SOP	Required	Stricter hygiene & entry controls
Training Records	Required	Must include RtE-specific contamination risk training
Internal Audit & Management Review	Required	Must assess RtE safety & cold-chain performance

2 HACCP & Risk Control Documentation

Documentation Item	RtC	RtE
Hazard Analysis	Moderate risk	High-risk pathogens control focus
CCP Identification	Fewer CCPs (mainly storage & handling)	More CCPs (cooking, cooling, chilling, cross-contamination)
Critical Limits	Required	Strict temperature & time limits required
Monitoring & Verification Records	Required	Higher frequency & verification depth
Corrective Action Procedure	Required	Must address post-process contamination incidents
Validation / Shelf-Life Basis	Optional / basic	Required for RtE (micro or reference support)

3 SOPs & SSOP Documentation

Documentation Item	RtC	RtE
Raw Material Receiving & Storage SOP	Required	Must include raw vs cooked zoning rules
Washing / Thawing / Cutting SOP	Required	Require separate tools & work areas
Cooking Process SOP	Not applicable / limited	Mandatory CCP SOP
Cooling / Chilling SOP	Optional (where applicable)	Mandatory & time-controlled
Packing & Labelling SOP	Required	High-hygiene packing environment

Equipment Cleaning SSOP	Required	More frequent + verification (swab/ATP if possible)
Waste Handling SOP	Required	Avoids cross-movement between zones

4 Prerequisite Programme Records

Documentation Item	RtC	RtE
Cleaning & Sanitation Schedule	Required	Zoning-based enhanced sanitation
Pest Control Program & Map	Required	Extra protection for high-risk rooms
Water & Ice Quality Testing Records	Required	Higher frequency + strict microbiological limits
Chemical Handling & SDS	Required	Only food-grade chemicals in RtE zones
Maintenance & Equipment Log	Required	Calibration essential for CCP equipment
Employee Medical Fitness Certificates	Recommended	Required for RtE

5 Traceability, Recall & Distribution Records

Documentation Item	RtC	RtE
Batch Coding & Lot Traceability	Required	Tighter lot control (shorter shelf-life tracking)
Production & Dispatch Records	Required	Include temperature logs during storage/transport
Recall Procedure & Mock Recall	Required	Higher-priority recall readiness
Customer Complaint & CAPA Log	Required	Must assess food safety impact immediately

6 Labelling & Compliance

Documentation Item	RtC	RtE
Ingredient & Allergen Declaration	Required	Mandatory & fully compliant
Cooking / Handling Instructions	Required	Not applicable
Storage & Shelf-Life Instructions	Required	Must specify chilled/frozen safety limits
Regulatory License & Product Approval (BSTI/BFSA)	Required	Often required earlier due to higher public-health risk

Annexure-IX

15.9 Organoleptic Quality Assessment with FIQC Scoring (0–3 Scale)

No.	Parameter	Observation Criteria	Fresh / Acceptable (Score 3)	Slight Loss (Score 2)	Loss of Freshness (Score 1)	Spoiled / Reject (Score 0)
1	Appearance / Skin	Color, surface, slime	Bright, natural color; clean; no excessive slime	Slightly dull; minor slime	Dull color; visible slime patches	Yellow/brown discoloration; thick sticky slime
2	Eyes	Clarity, brightness, position	Clear, bright, convex	Slightly cloudy; partially sunken	Cloudy, dull, sunken	Opaque, discolored, collapsed
3	Gills	Color & odor	Bright red/pink; fresh smell	Slightly faded pink	Brownish with mild off-odor	Brown/green; sour/putrid smell
4	Odor (Sniff Test)	Overall smell	Fresh / neutral	Slight stale smell	Noticeable sour / rancid odor	Strong ammonia / decomposed odor
5	Texture / Firmness	Elasticity	Firm, elastic; springs back	Slightly soft but elastic	Soft, mushy; weak elasticity	Very soft; fingerprint remains
6	Belly Condition	Integrity & leakage	Tight belly; no leakage	Slight swelling	Minor rupture; mild odor	Burst belly; gut leakage; strong odor
7	Scales (Finfish)	Adherence & shine	Tight, shiny scales	Slight loosening	Loose / missing patches	Scales fall off easily
8	Shell (Crustaceans)	Color, hardness, odor	Hard, glossy; mild odor	Slightly dull shell	Soft shell; discoloration	Black/pink patches; sour smell
9	Tail Reflex (Shrimp)	Reflex on handling	Strong tight curl	Moderate curl	Weak curl	No reflex; tail straight
10	Meat Color	Internal flesh appearance	Clear, moist, translucent	Slightly opaque	Opaque; watery/dry	Yellowish, discolored
11	Drip / Exudate	Liquid in container	Minimal, clear	Slight increase	Milky / cloudy	Excessive, foul odor

No.	Parameter	Observation Criteria	Fresh / Acceptable (Score 3)	Slight Loss (Score 2)	Loss of Freshness (Score 1)	Spoiled / Reject (Score 0)
12	Overall Judgment	Composite decision	All parameters fresh	Minor loss; acceptable	Quality doubtful	Reject batch

Batch Acceptance Guide (Recommended for SMEs under FIQC)

- **Accept / Process** → Mean score **≥2.5** and no parameter **<2**
- **Hold / Sort / Re-inspect** → Mean score **2.0–2.4** (quality risk)
- **Reject** → Any **critical spoilage sign** or any parameter scored **0–1**

Annexure-X

15.10 A practical checklist of the HACCP / FSMS documents, SOPs, records, and logs that SMEs in RtC and RtE fish processing Should keep updated at all times

- **Core HACCP / FSMS Documents**
- Food Safety Policy & Objectives
- Product description and process flow diagram
- Hazard Analysis and HACCP Plan (CCPs, limits, monitoring, corrective actions)
- Risk assessment and validation/verification records
- FSMS manual / HACCP manual
- **Standard Operating Procedures (SOPs)**
- Raw material receiving & inspection
- Washing, cutting, marinating, cooking / heat processing (for RtE)
- Chilling, freezing, packing, labeling & storage
- Personal hygiene & handwashing
- Cleaning & sanitation (CIP/SSOP)
- Allergen control / cross-contamination prevention
- Pest control
- Waste handling & drainage
- Product recall / withdrawal procedure
- Non-conformance & corrective action procedure
- **Operational Records & Logs**
- Raw material receiving records (temperature, quality, supplier)
- CCP monitoring logs (time–temperature, cooking, chilling, freezing, metal detection, etc.)
- Corrective action records
- Traceability / batch & lot records
- Storage temperature logs (cold room, freezer)
- Dispatch & transportation logs
- **Hygiene, Maintenance & Support Records**
- Cleaning & sanitation records
- Pest-control service & inspection reports
- Equipment calibration & maintenance records

- Staff health screening and personal hygiene records
- Training records (GMP, GHP, HACCP, hygiene)
- Internal audit & management review reports
- **Export / Compliance (where applicable)**
- Supplier approval & COA/health certificate records
- Residue / microbiological test reports
- Licensing, plant approval, and certification files

Annexure-XI

15.11 Text-based visual workflow, CCP, Training, and Auditing

Integrating text-based visual workflow diagrams on RtC and RtE production at SMEs processing center, Critical Control Point (CCP) tables, and daily/weekly checklists for training and auditing activities.

Ensuring the production of safe, high-quality, and regulatory-compliant Ready-to-Cook (RTC) and Ready-to-Eat (RTE) fish products shall be a mandatory requirement for all processing establishments. Compliance shall be maintained in accordance with the prevailing laws, standards, and directives issued by the competent authorities. To achieve this, establishments shall implement and adhere to strict hygiene and sanitation protocols, monitor Critical Control Points (CCPs) as prescribed under the Hazard Analysis and Critical Control Point (HACCP) system, and maintain standardized processing procedures. Small and Medium-sized Enterprise (SME) operators shall ensure that personnel at all operational levels possess adequate technical knowledge and demonstrate compliance with the prescribed food safety and quality management requirements.

Scope

- Applicable to all production steps in fisheries product processing facilities in Bangladesh, including:
- Raw material handling
- Processing (cleaning, cutting, cooking, marinating)
- Packaging
- Storage and distribution
- Staff hygiene and training

Responsibilities of personnel's at plant

Role	Responsibility
Plant Manager	Overall compliance, audit readiness, resource allocation
Quality Control (QC) Officer	CCP monitoring, lab testing, HACCP adherence
Production Staff	Proper handling, cleaning, processing as per SOP
Sanitation Staff	Daily cleaning, utensil hygiene, waste management

Detailed CCP Visual Workflow Diagram

Flow diagram with graphic boxes and arrows. CCP steps

Raw Fish Procurement — Approved suppliers; documented sourcing records

↓

Receiving & Inspection — Visual quality check; reject spoiled or damaged fish

↓

CCP-1 Washing & Cleaning — Contamination Control (foreign matter, hygiene, safe water)

↓

Filleting / Cutting / Marinating — Controlled handling; prevent cross-contamination

↓

CCP-2 Cooking / Blanching / Freezing — Temperature–Time Control (pathogen kill / rapid chilling)

↓

CCP-3 Packaging — Seal Integrity & Label Verification (batch, date, storage, allergens)

↓

CCP-4 Cold Storage / Blast Freezing — Storage Temperature Monitoring (0–4 C / -18 C)

↓

CCP-5 Distribution / Dispatch — Transport temperature, packaging & label check

↓

Customer Delivery — Product reaches consumer under maintained cold chain

Legend: CCP steps are highlighted in red boxes. Arrows show one-way product flow direction.

Figure: Facilities and workflow diagram of a RTC/RtE fish product processing center

Annexure-XII

15.12 Critical Control Point (CCP) Management

Step	CCP No	Hazard	Critical Limit	Monitoring	Corrective Action
Receiving & Inspection	CCP-1	Spoiled fish, physical contaminants	Fish must have proper smell, color, texture	Visual inspection, smell test	Reject contaminated batches; record rejection
Cooking/Blanching	CCP-2	Pathogenic bacteria (Salmonella, Listeria)	Core temp ≥ 70°C for ≥ 15 sec	Digital thermometer check	Re-cook or discard batch; record incident
Packaging	CCP-3	Cross-contamination, packaging defects	Packaging intact, no leakage	Visual inspection	Repack or discard; sanitize packaging area
Cold Storage	CCP-4	Microbial growth	RTC: 0–4°C, RTE frozen: ≤ -18°C	Temp log check	Adjust storage, discard spoiled products
Dispatch	CCP-5	Temperature abuse during transport	Maintain cold chain	Temp log at loading	Delay shipment until cold chain ensured

a. Daily Checklist (Staff Training & Audits)

Production Area & Staff Hygiene

- ✓ Staff hand washing before starting work
- ✓ Hairnets, gloves, aprons worn correctly
- ✓ No open wounds or illness among staff

Equipment & Utensils

- ✓ Cutting boards sanitized
- ✓ Knives, blenders, slicers cleaned
- ✓ Cooking equipment calibrated

Raw Material Handling

- ✓ Fish inspected for spoilage
- ✓ Proper separation of RTE and RTC raw materials

HACCP Monitoring

- ✓ CCP-1: Receiving inspection recorded
- ✓ CCP-2: Cooking temp logs recorded
- ✓ CCP-3: Packaging integrity checked
- ✓ CCP-4: Cold storage temp logged
- ✓ CCP-5: Dispatch, Maintain cold chain

b. Weekly Checklist (Staff Training & Audit)

Infrastructure & Storage

- ✓ Deep cleaning of processing area
- ✓ Freezers defrosted and sanitized
- ✓ Pest control measures verified

Quality Assurance

- ✓ Random microbial testing of products
- ✓ Batch records reviewed
- ✓ Packaging material stock check

Training & Compliance

- ✓ Staff retraining on hygiene & CCPs
- ✓ Mock audit conducted

Update HACCP records and SOP improvements

Annexure-XIII

15.13 Water & Ice Quality Requirements under FIQC Rules — Summary Table

Table-1: Potable Water — Definition & Standards (Schedule-10, FIQC Rules)

Aspect	Requirement / Description
Legal Reference	Fish & Fish Products (Inspection & Quality Control) Rules, 1997 — *Schedule-10*
Definition of Potable Water	Water meeting the **physical, chemical & microbiological limits** prescribed in Schedule-10 for safe use in fish processing
Use in Processing	Washing, cleaning, preparation, cooling, chilling, equipment sanitation, ice production
Compliance Basis	Water must be **fit for human consumption and food contact**

Table-2: Water Quality Parameters (Schedule-10 — Examples)

Parameter Type	Examples / Limits (Guide or Max. Admissible)
Chemical / Physical	Sodium (Na): 20–175 mg/l; Potassium (K): 10 mg/l; Aluminium (Al): 0.05–0.2 mg/l; Iron (Fe): 50 mg/l; Manganese (Mn): 20–50 mg/l *(Full Schedule-10 includes additional parameters)*
Microbiological	Total Coliforms: ≤100 (guide), **Max: 0 MPN / 100 ml**; Fecal Coliforms: ≤100 (guide), **Max: 0**; Fecal Streptococci: ≤100 (guide), **Max: 0**; Sulphite-reducing Clostridia: ≤20 (guide), **Max: 0**
Public Health Intent	Water must be **free from fecal contamination indicators** at point of use

Table-3: Regulatory Expectations for Processing Establishments

Requirement	Compliance Expectation
Water Quality Compliance	Must meet **Schedule-10 chemical & microbiological limits**
Laboratory Test Reports	Valid **physical, chemical & microbiological test reports** required for licensing & inspection
Point of Use Requirement	Water used in washing, processing, cleaning, chilling must be **potable**
Documentation	Records must be retained for **audit and FIQC verification**

Annexure-XIV

15.14 FIQC prescribed Facilities and Standard for Semi-Processed Fish and Fish Products Processing Centers

Fish Inspection and Quality Control Department
Department of Fisheries
Dhaka

[See Rules 6, 15]
Prescribed Facilities and Standards for Semi-Processed Fish and Fish Products Processing Factories.

1. The floor of the semi-processed fish processing factory must be smooth, water-impermeable, and sloped such that oily substances can easily roll down into the drain.
2. The semi-processed fish processing factory must have a proper, sanitary drainage system for the removal of waste oily substances, and the drain outlets must be covered in such a way that insects or other animals cannot enter the drain.
3. The internal walls of the factory, up to a minimum height of 1.8 meters from the floor, must be smooth, water-impermeable, light-colored, and suitable for easy cleaning.
4. The height of the ceiling inside the workplace must be such that adequate ventilation and work can be easily performed beneath it. The junctions between the floor and the walls, between the walls, and between the walls and the ceiling must be parabolic (curved).
5. Windows and other openings must be constructed in a way that prevents dust from entering the workplace, and they must be covered with insect-proof netting.
6. Doors must be smooth, non-absorbent, equipped with a self-closing mechanism, and fitted with insect-proof arrangements.
7. At the entrance path to the processing area, there must be a foot-operated tap, a basin for hand cleaning, and a supply of suitable cleaning and disinfecting agents.
8. A system for disinfectant liquid must be present at the entrance path to the processing area so that the soles of the footwear of the person entering can be dipped in the substance.
9. Within or adjacent to the semi-processed fish processing workplace, there must be a sufficient number of sanitary restrooms for the use of the factory workers.
10. Near the entrance path to the restrooms, there must be a foot-operated tap, a basin for hand cleaning, and a supply of suitable cleaning and disinfecting agents.
11. Necessary space and facilities for workers to change clothes must be present at the entrance path to or adjacent to the semi-processed fish processing factory, and this area must be kept separate from the processing area.
12. For use in the semi-processed fish processing factory:
    (a) There must be a system for supplying safe drinking water;
    (b) There must be clean, sanitary water storage tanks with adequate water holding capacity and fitted with lids;
    (c) There must be a sufficient supply of hot water in the appropriate places; and
    (d) There must be a sufficient supply of clean water in the appropriate places.
13. In the processing factory:
    (a) There must be adequate lighting so that fish and other products can be easily seen; and
    (b) Electrical installations must be water-impermeable and bulbs must be covered.
14. The design of the factory building and other installations must be such that there is no possibility of cross-contamination of the fish, and the locations where activities that pose a

risk of disease transmission to the fish are carried out must be separated by partitions or by other means of isolation.

15. The processing area for aquatic animals other than shrimp and fish must be kept completely separate from the shrimp and fish processing area.
16. The processing area for fish or other substances not intended for human consumption must be kept completely separate from the fish processing area.
17. In the semi-processed fish processing factory:
    (a) Machinery, furniture, and equipment used in fish processing must be made of stainless steel or corrosion-resistant material;
    (b) There must be arrangements to prevent the use of wooden furniture in any place that may come into contact with fish; and
    (c) Equipment that may come into contact with fish must be non-absorbent.
18. There must be a system for the removal or destruction of waste materials from the processing factory in covered containers and in a sanitary manner.
19. Necessary facilities must be present to ensure that the environment is not polluted by waste materials from the processing factory.
20. There must be a system for knives made of materials that do not wear out easily when cutting fish, and the system must be capable of being easily cleaned and disinfected.
21. Fish cutting machines, grinders, and other machinery used for processing must be of a high standard.
22. (Missing/Skipped number in the original text)
23. Boxes, baskets, or other containers used for storing fish (excluding live fish) in the processing factory must have provisions for easy drainage of water.
24. Containers with wire mesh can only be used for the processing of 'lobsters' and 'crustaceans' (shrimps, crabs, etc.) and not for other fish processing.
25. Enamel or galvanized containers must not be used for fish processing.
26. In the semi-processed fish processing factory:
    (a) There must be one or more cold storage/freezers with necessary facilities for the proper storage of processed fish or fish products;
    (b) There must be a system to maintain the temperature of the cold storage or freezer chamber steadily at -18 0C to -25 oC or lower;
    (c) There must be arrangements for a dedicated ice-making machine or ice manufactured by a licensed ice factory under the Department of Fisheries must be used, and the temperature of the ice storage room must be maintained below 0oC.
27. In the semi-processed fish processing workplace:
    (a) in the case of producing value-added products, such as "Ready to Cook" products, the production system must be arranged according to the internal demand; and
    (b) There must be a system to prevent any kind of cross-contamination during the production of value-added products.
28. The semi-processed fish processing factory must have a generator with sufficient capacity to meet its own electricity demand.
29. There must be a system to use safe, clean water for cleaning and glazing of fish or fish products.
30. The factory must have rest areas and canteen facilities for the use of the workers.