



Inspection of Frozen Shrimp

9

Abstract

Inspection of frozen shrimp means assessment of final product through a variety of steps like physical, chemical, and biological examination or evaluation. The chapter highlights the topics on inspection, its importance and types, and the details of final inspection procedures, viz., inspection of cold storage temperature; selection of MC from cold storage; inspection of product temperature; inspection of size, count, color, grade, weights (gross weight/frozen weight/deglaze weight/defrost weight/net weight and individual weight of shrimp), uniformity ratio, organoleptic characteristics, and defects; cooking test; and inspection of final packaging, labeling, and reporting. The chapter also highlights the process of inspection of internal environment, inspection of sanitation standard, as well as rejection policy of the products. Different types of calculation, viz., formula of carton selection, calculation of pieces of frozen shrimps per pound, pieces of deglaze shrimps per pound, etc., are also included in this chapter.

Keywords

Gross weight · Net weight · Thawed weight · Cooking test · Rejection policy

9.1 Inspection

Normally, inspection means examination or evaluation of a product. Inspection of frozen shrimp means assessment of the final product (frozen shrimp) through examination, measurement, testing, evaluation, comparison, and final decision about the export grade shrimp. Inspection of frozen shrimp determines the quality, quantity, and condition of final products of the whole lot and also whether the applicable or specified requirements of the buyer as per specifications are being

conformed. It also identifies the errors or the defects of final products before shipping. The purpose of inspection is to meet customer satisfaction and needs.

9.2 Importance of Inspection

Inspection of frozen shrimp has been performed for the following reasons:

- Inspection of frozen shrimp ensures the quality of product.
 - Inspection of frozen shrimp helps to identify processing faults.
 - Inspection of frozen shrimp helps to identify hazards (physical, chemical, biological, etc.) of final products and recommend corrective actions.
 - Inspection of frozen shrimp helps to produce uniform products.
 - Inspection of frozen shrimp confirms packaging and labeling of the final products.
 - Inspection of frozen shrimp helps to avoid conflict in the future.
 - Inspection of frozen shrimp helps to share knowledge among industries even among the countries.
 - Inspection of frozen shrimp minimizes the customer complaints.
 - Inspection of frozen shrimp controls business reputation of the industry.
 - Inspection of frozen shrimp confirms buyer's specifications and consumer's satisfaction.
 - Inspection should be the mandatory process although it is expensive. Buyers/suppliers have to pay extra money to conduct the inspection.
 - Inspection is a time-consuming process.
 - Inspection has a chance to reject the product and fail shipment.
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9.3 Types of Inspection

There are two types of inspection that are mainly conducted in shrimp processing industries. These are:

1. Regular inspection
2. Final inspection

9.3.1 Regular Inspection

Regular inspection refers to the checking of running production. It is also called "on-line inspection." Regular inspection started from receiving of raw material and continued up to the storage of final product. Regular inspection is performed in every production period. Quality personnel of the processing industries have performed this supervision when production is going on. Sometimes buyers nominate their own recruited personnel who ensure the requirements as per the specification of the buyers. The main purpose of this inspection is to confirm the quality of

products in every step of production. It is necessary to maintain a written document in every step of inspection with photographs as proof. Quality personnel have the right to check random production. He/she may visit any area of the processing industries at any time and may select random products from anywhere of the processing line.

Responsible/quality personnel should check the following during regular inspection.

- Traceability of the products
- Quality of raw materials
- Freshness color, texture, appearances, etc.
- Product size/grade, count, glaze, etc.
- Frozen weight, deglaze weight, net weight, thawed weight, individual weight, etc.
- Total pieces/bag, pcs/lb, pcs/kg, etc.
- Uniform size, uniform weight, uniformity ratio, etc.
- Approved additive, % of additives, soaking duration, soaking gain, etc.
- Source of defect, type of defects, % of defect, recovery steps, etc.
- Temperature of raw materials, soaking water, chilled water, etc.
- Temperature of all equipment, processing room, anti-room, chill room, and store room
- Packaging and labeling
- Hygienic condition of processing industries, factory personnel, labor, and visitors
- Written documents and photographs for record keeping

It is necessary to analyze all the data after completion of regular production. If any kind of inconsistency in production line is found, then corrective action should be taken immediately to solve the problem. Quality personnel reserve the right to reject production if arise serious problem on running production (Appendix C: A model template of production supervision report).

9.3.2 Final Inspection

The term final inspection refers to the activity of checking products that are performed in the final stage of export items. The main objective of final inspection is to assess the quality of final products to obtain customer's satisfaction. Buyers assign their staff or reputed third party to conducting final inspection. Sometimes buyers relay on suppliers QC report or final inspection report if the suppliers are well reputed or qualified. Normally, buyers prefer third-party inspection because of their independencies. Third-party inspection is conducted as per the buyer's protocol. Every buyer has his or her own protocol to conduct the final inspection or follow third-party inspection protocol. Quality personnel must follow the buyer-nominated inspection protocol. Final inspection is a mandatory requirement before shipping the product. Products are shipped only when the final inspection report got satisfactory. Unsatisfactory inspection report may stop the shipment without any official notice.

Assigned quality personnel should confirm that he/she has enough experience and no conflict of interest and is unbiased. Quality personnel should be very careful before concluding final inspection report because he/she has to assess the whole consignment considering only the inspection sample. Final inspection is also called “pre-shipment inspection.” The following steps should be addressed during conducting of a final inspection:

- Inspection of internal environment or internal audit
- Inspection of sanitation standard
- Inspection of final product
- Inspection of packaging and labeling
- Checking of traceability documents
- Preparation of final inspection report

[Appendix D: A model template of final inspection report]

9.3.2.1 Inspection of Internal Environment

Inspection of internal environment refers to checking of internal condition of the factory. It helps to assess quality of the factory whether it is suitable to produce food grade product or not. Internal environment of the processing industries must be clean, safe, and free from dirt, rodent, and contamination. It's a mandatory requirement for food industry. Internal environment should be checked regularly, and findings need to be preserved in record file. The inspectors of the buyer representative took a round of the whole processing industries, performed a mini audit, and reported to buyer about the internal environment of the factory. The following parameters are checked before starting final inspection:

- Cleanliness of inspection location/place
- Proper lighting on the room
- Cleanliness of inspection table and other equipment (scissor, balance, basket, etc.)
- Room temperature and cold storage temperature
- Cold storage condition, cleanliness and hygiene
- Stacking of master cartons (either master cartons are separated or not, or mixed with others products of same buyer or other)

9.3.2.2 Inspection of Sanitation Standard

Inspection of sanitation standard refers to checking of overall hygienic status of the processing industries. It specifies what to clean, how to clean, which methods are followed to clean, frequency and interval of cleaning, who is responsible person, what are the safety issues, what are the data to record, etc.

The following are inspected for the confirmation of sanitation standard:

- Are insect, birds, flies, rodents, etc. observed or not?
- Are dusts, darts, or frosts observed or not?

- Are workers found without gum boot, apron, hand gloves, musk, and head gear or not?
- Are workers following hygienic protocols or not?
- Are processing area, floor, utensils, and aprons clean and washed or not?
- Are grading, de-heading, peeling, deveining, washing, etc. in hygienic condition or not?
- Is there any chance of cross-contamination or not?
- Is processing industries GMP and HACCP certified or not?

9.3.2.3 Inspection of Packaging

The inspection of packaging refers to checking of packaging materials and their design, dimension, and labeling information. It's an essential part of final inspection. Packaging and labeling must be 100% accurate. Mislabeling is unacceptable. Any kind of anomalies in packaging and labeling may stop shipment or claim demurrage for this mistake. Inspectors or buyer representative should check the packaging and labeling very carefully and compare with approved packaging. Packaging materials, design, dimension, and labeling information all are approved by the buyer before printing. It's better to prepare a packaging and labeling checklist during or before final inspection. If any kinds of anomalies in packaging and labeling checklist are found, necessary steps should be taken before shipment. Quality personnel should prepare a packaging and labeling checklist and send to the buyer before shipment. The product will be shipped only subjected to the buyer's approval. The following parameters should be checked during the inspection of packaging:

- Is packaging made by approved materials?
- Is there any objectionable material present?
- Is the condition of master carton/box/bag ok?
- Is it free from dirt/dust/frost/torn?
- Is there any damaged bag/box/master carton present?
- Is the sealing of bag/box/master carton perfect?
- Is design and dimension ok as per requirements?
- Is there any color variation?
- Is labeling correct as per approved packaging (i.e., product name, art. no., lot no., size, count, factory approval no., barcode, language, production date, frozen date, expiry date, nutritional value, ingredients, etc.)?
- Is there any spelling mistake?
- Is there any language mistake?

[Appendix E: A model template of packaging and labeling checklist]

9.3.2.4 Inspection of Final Product

The steps of final inspection of frozen products are as follows:

1st Step: Preparation for Inspection

The inspectors or buyer representative should have proper knowledge about the products. All necessary information should be collected from buyers/suppliers, and the necessary documents should be prepared before going to start inspection. If the inspectors have a limitation on proper knowledge, then it will be difficult to handle the inspection. So, it's better to confirm the following parameters before starting the final inspection:

- Reference PO/code list/packing list etc.
- Importer address, supplier address, inspection location, etc.
- Details of product description (type of product, size, count, glazing, frozen weight, net weight, total volume, etc.)
- Buyer's instruction (sampling method, sampling plan, inspection protocol, etc.)
- Acceptance limits (pcs/lb, pcs/bag, defects list, defects %, uniformity ratio, etc.)
- Approved packaging materials
- Rejection policy of the buyer
- Need to prepare necessary documents and printed previously if necessary

2nd Step: Inspection of Cold Storage Temperature

At first, the inspectors should check the temperature of cold storage where the products are stored and waiting for shipment. Standard temperature of cold storage should be at least -18°C . Photographs of temperature reading should be taken and need to keep the records for final reporting (Fig. 9.1).

3rd Step: Selection of Master Cartons

Master cartons for final inspection should be selected randomly. Inspectors should go inside the cold storage to select the cartons with their preference. Inspectors have full freedom to select the cartons randomly from any location of any pallet. Selection

Fig. 9.1 Cold storage temperature



Fig. 9.2 Selection of cartons



of master cartons should be done in such a way that it covers all the products (same lot) in the store room (Fig. 9.2).

Cartons for final inspection should be selected based on the following parameters:

- Size/grade of products
- Types of products
- Types of brands
- Types of packing
- Date of production
- Total volume/quantity to be shipped

Inspectors should select the cartons randomly and mark the cartons with their signature over them. After selection, cartons are brought out from the cold storage and kept open for inspection. Different buyers have different standard for the selection of master cartons and final inspection.

- Generally, 1% master cartons of the total volume should be selected for final inspection, but minimum no. of selection will be at least 2 cartons if sample size is smaller (≤ 100 MC).
- Sometimes buyers ask to follow the formula below for selection of master cartons.

The formula is $= (\sqrt{n} + 1)/2$	Here, $n =$ total no. of cartons.
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For example, calculate the number of cartons for final inspection if total lot size is 1800.

Total no. of cartons $= (\sqrt{n} + 1)/2$ $= (\sqrt{1800} + 1)/2$ $= 21.7$ or 22 cartons	Here, $n = 1800$ no. of cartons to be selected = ?
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Perform the following exercise

Exercise 1:	Calculate the number of cartons to be selected for final inspection if the lot size is 2000.
Exercise 2:	Calculate the number of cartons to be selected for final inspection if the lot size is 1000.
Exercise 3:	Calculate the number of cartons to be selected for final inspection. The breakdown of products is as follows: 70% net weight 16/20 HLSO IQF 600 MC 80% net weight 21/25 HLSO IQF 500 MC 80% net weight 21/25 HLSO-EZP IQF 100 MC 80% net weight 26/30 HLSO block 600 MC 70% net weight 16/20 HLSO S. IQF 200 MC

4th Step: Inspection of Product Temperature

Temperature of the final product is checked through the digital thermometer. The thermometer should be inserted into the master carton and waited until stable of the temperature reading. It is necessary that sensor of the thermometer is completely inserted into the master carton. Temperature of the frozen products must be at least $-18\text{ }^{\circ}\text{C}$. Photographs of temperature reading should be taken for every product. Inspected temperature should also be recorded in hard copy. Temperature of the frozen products should be checked as soon as possible (Fig. 9.3).

5th Step: Inspection of Gross Weight

Gross weight of the master carton should be checked by using digital balance. Digital balance must be calibrated. Weight of every selected master carton is measured separately. Weight should be recorded in relevant hard copy for reporting. Photographs of gross weight should be taken as reference documents (Fig. 9.4).

It is necessary to check calibration before going to weighing of shrimp. Calibration certificates should be attached to the balance. There is a rough technique that

Fig. 9.3 Inspection of product temp



Fig. 9.4 Gross weight

may be used to assess the weighing performance of your balance and confirm whether the balance is okay or not. Check the procedure below:

- Select two samples (any kind of) first. Suppose, two samples are A and B.
- Weigh the samples separately. Let the weight of A be 1.0 kg and the weight of B be 2.0 kg.
- Weigh these two samples at a time. If the weight remains the same ($1 + 2 = 3$ kg), it means the balance is ok. But if these two weights are not same, it makes sense that the balance is not ok and needs to be sent for calibration.

Uses of equipment without calibration are strongly prohibited. Routine calibration of equipment is a mandatory process for processing industries.

6th Step: Selection of Inner Bag/Box

After checking of gross weight, it is necessary to open all master cartons for the selection of inner bag/box for final inspection of frozen products. Every bag/box within the master carton should be checked very carefully. The following parameters are checked carefully before selecting of inner bag or box:

- Frozen condition of products (good or not)
- Quality of products (good or not)
- Condition of packaging (perfect or damaged)
- Sealing of packaging (perfect or leak or tear)
- Location and information of rider card/sticker (perfect or not)
- Labeling of packaging—is outer packaging as same as inner packaging, etc.

Some common mistakes like label of outer packaging (master cartons) not matched with inner packaging (bag or box), wrong placement of rider card/sticker, inverse position of rider card, wrong rider card/sticker, etc. are observed sometimes. In that case, it is necessary to recheck all the cartons and needed to attach proper labels as well. After checking of packaging inspectors, select an inner bag/box from

Table 9.1 The standard of gross weight in different products

Product type	Packing	Gross weight
• Block	6 × 1.8 kg	10.8 kg (6 × 1.8 kg) + Packaging (inner box + master carton)
• S.IQF	10 × 1 kg	10.0 kg (10 × 1 kg) + Packaging (inner box + master carton)
• IQF	10 × 1 kg	10.0 kg (10 × 1 kg) + Packaging (inner bag + master carton)

the master carton and send it for next step. Selection of inner packaging should be done in such a way that one bag/box is from one master carton.

7th Step: Inspection of Gross Weight

Weighing is a crucial part of the shrimp business. Weight must be accurate as per product specifications. Weight shortage is an illegal practice that makes a bad reputation for the suppliers as well as the country. Calibrated electronic/digital balance is used for the measurement of accurate weight. Weighing is performed in different stages of processing, i.e., during receiving of raw materials, counting of pieces, before freezing, and sometimes after freezing. Different types of weights, i.e., frozen weight, gross weight, net weight, thawed weight, defrost weight, etc., are inspected during final inspection. Inspection of gross weight is the 1st step of weighing process. Literally, gross weight means total weight including frozen product and packaging. In case of frozen seafood, gross weight means a total weight of a master carton, inner cartons, and frozen shrimp. See the following equation of gross weight (Table 9.1):

$$\text{Gross weight} = \text{Weight of master carton} + \text{Weight of inner cartons} \\ + \text{Weight of frozen shrimp}$$

[Note that gross weight is not a constant value. It may vary from one master carton to another. There is no objection from the buyer if gross weights vary within the same products, but suppliers may face weighing problems in port or customs during shipment. Weights of packaging materials (master cartons + bag/box) are also variable]

The following are the images of gross weight of different products (Figs. 9.5, 9.6, and 9.7).

8th Step: Inspection of Frozen Weight

Frozen weight means weighing of frozen shrimp including its protecting glaze. Weights of packaging materials are not included here. See the following equation of frozen weight (Table 9.2):

$$\text{Frozen weight} = \text{Weight of frozen shrimp} + \text{Weight of protecting glaze}$$

During final inspection frozen weight of the selected inner bags/boxes is measured and recorded. Frozen weights are measured separately for every single unit (bag or block). Calibrated digital balance is used for accurate measurement. It's better to have frozen weight within standard limit although a little bit variation is

Fig. 9.5 Gross weight (S. IQF)



Fig. 9.6 Gross weight (IQF)



Fig. 9.7 Gross weight (Block)



Table 9.2 The standard of frozen weight in different products

Product type	Packing	Glaze	Frozen weight
• Block	6 × 1.8 kg	20%	1.8 kg (1.44 kg shrimp +0.36 kg glaze)
• S.IQF	10 × 1 kg	20%	1.0 kg (0.8 kg shrimp +0.2 kg glaze)
• IQF	10 × 1 kg	20%	1.0 kg (0.8 kg shrimp +0.2 kg glaze)

Fig. 9.8 BT-HLSO-Block**Fig. 9.9** BT-HLSO-Block

acceptable. The following are the images of frozen weight of different products (Figs. 9.8, 9.9, 9.10, 9.11, 9.12, and 9.13):

[Note: It's not possible to find exactly 1.8 kg or 1.0 kg practically. Usually, it is greater than the standard. Frozen weight may vary from one block to another or one

Fig. 9.10 BT-HOSO-S.IQF



Fig. 9.11 BT-HOSO-S.IQF



bag to another. Weight of inner packaging is not included in frozen weight. If included, then it will be gross frozen weight instead of frozen weight. Supporting equipment (basket, inner box, polybag, etc.) must be tare before weighing of frozen weight.]

9th Step: Inspection of Frozen Count (Pcs/lb)

After the measurement of frozen weight, it is necessary to calculate the frozen count of shrimp. Frozen count calculates how many pieces (including protecting glaze) of shrimps are present in one pound. Frozen count is calculated for IQF shrimp only. Pcs of shrimp should be selected randomly for the calculation of frozen count. Inspectors may also separate the larger grade and smaller grade shrimp to calculate the frozen count separately for higher grade and lower grade of shrimp (Fig. 9.14).

Fig. 9.12 BT-EZP-IQF**Fig. 9.13** FW-EZP-IQF

10th Step: Calculation of Frozen Count (Pcs/lb)

*Calculate how many pieces (pcs) of frozen shrimp are present in one pound for BT, HLSO, raw, 8/12, FC, 80% net weight, 10×1 kg IQF products, if total no. of pcs/bag is 26 and frozen weight is 1000 g.

Frozen count (pcs/lb) can be calculated in two ways:

- **Manual process**

Weigh first 454 g frozen shrimp (including glaze), and then count manually how many pcs of shrimp are present in 454 g frozen weight. Result should be noted in hard copy.

Fig. 9.14 Frozen count (pcs/lb)



• **Mathematical process**

$\begin{aligned} \text{Frozen count (pcs)/lb} &= \frac{\text{Total no. of pcs per bag}}{\text{Frozen weight}} \times 454 \\ &= \frac{26}{1000} \times 454 \\ &= 11.8 \\ &= 12 \text{ pcs/lb} \end{aligned}$	<p>Here, Size/grade = 8/12 Frozen weight = 1000 g Net weight = 800 g Total no. of pcs per bag = 26 1 lb (pound) = 454 g Frozen count (Pcs)/lb = ?</p>
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Result: 12 pcs of shrimps are present in one pound (lb) for frozen count of shrimp.

Perform the following exercise

Exercise 1:	Suppose a product is FW, HLSO, raw, 21/30, FC, 80% net weight, 10 × 1 kg IQF products. Calculate frozen count (pcs/lb). [Hints: All are standard parameters].
Exercise 2:	Calculate frozen count (pcs/lb) for FW, HLSO, raw, 41/50, FC, 75% net weight, 10 × 1 kg IQF products. Frozen weight is measured 1080 g. [Hints: Consider minimum no. of pcs of standard calculation].

11th Step: Inspection of Deglazed Weight

Deglazed weight means the weight of shrimp without its protecting glaze. Shrimps are weighted immediately after removing of protecting glaze. Deglaze weight is always greater than drained net weight. Standard process should be followed during the measurement of deglazed weight. Time is very short for removing of protecting deglazed for IQF products. Frozen shrimps are dipped into water for removing of protecting glaze at a temperature of 20 °C ± 5 °C. Time of deglazing may vary from 10 s to 2 min depending on the percentage of glaze, type of product, and size/grade

Fig. 9.15 Removing of glaze**Fig. 9.16** Releasing of water

of shrimp. Do not let the sample be dipped for long time; otherwise it will be defrosted instead of deglazed. Special care should be taken during deglazing of small size shrimp, it tends to defrost within very short time.

$$\text{Deglaze weight} = \text{Frozen weight} - \text{Weight of protecting glaze (external)}$$

Deglaze weight is too important and it must be accurate. It is necessary to measure deglazed weight very carefully and keep the record in hard copy during final inspection. Inspectors should be more careful in this step because deglaze time is very short; inspectors should avoid defrost weight during the measurement of deglaze weight. Calibrated digital balance is a must for accurate measurement. The following are the images of deglazed weight of different products (Figs. 9.15, 9.16, 9.17, 9.18, 9.19, and 9.20).

Fig. 9.17 Deglaze weight (HLSO)



Fig. 9.18 Deglaze weight (P&D)



[Note: Only external glaze can be removed for deglaze weight. If internal fluid is drained out, then it will be defrosted weight. Never use hot water for doing the step faster. Uses of hot water and longtime dip into water make weight shortage due to release of internal fluid of soaking gain.]

12th Step: Inspection of Deglazed Count (Pcs/lb)

Besides deglaze weight, inspectors have to calculate deglaze count as per buyer requirements. Deglaze count calculates how many pieces (excluding protecting glaze) of shrimp are present in one pound. Pieces (pcs) of shrimp should be selected randomly for the calculation of deglaze count. Inspectors may also separate the larger grade and smaller grade of shrimp to calculate the deglaze count separately for higher grade and lower grade of shrimp.

Fig. 9.19 Deglaze weight (P&D)



Fig. 9.20 Deglaze weight (EZP)



13th Step: Calculation of Deglaze Count (Pcs/lb)

*Calculate how many pcs of deglaze shrimp are present in one pound for BT, HLSO, raw, 8/12, FC, 80% net weight, 10×1 kg IQF products? [Total no. of pcs/bag is 26].

Frozen count can be calculated in two ways:

- **Manual process**

Weigh first 454 g deglazed shrimp (without glaze), and then count manually how many pcs of shrimp are present in 454 g deglaze weight. Result should be noted in hard copy.

• **Mathematical process**

$\begin{aligned} \text{Deglaze count (pcs)/lb.} &= \frac{\text{Total no. of pcs per bag}}{\text{Deglaze weight}} \times 454 \\ &= \frac{26}{800} \times 454 \\ &= 14.7 \\ &= 15 \text{ pcs/lb.} \end{aligned}$	<p>Here, Size/grade = 8/12 Frozen weight = 1000 g Deglaze weight = 800 g Total no. of pcs per bag = 26 1 lb (pound) = 454 g Deglaze count (Pcs)/lb. = ?</p>
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Result: 15 pcs of shrimp are present in one pound for deglaze count.

Perform the following exercise

Exercise 1:	Calculate how many pcs of deglaze shrimp are present in one pound for BT, raw, HLSO, 21/30, FC, 80% net weight, 10 × 1 kg IQF products. [Hints: Consider maximum no. of pcs of standard calculation.]
Exercise 2:	Calculate deglaze count (pcs/lb) for FW, raw, HLSO, 41/50, FC, 75% net weight, 10 × 1 kg IQF products. [Hints: Required all are standard parameter.]
Exercise 3:	Calculate deglaze count (pcs/lb) for FW, raw, PND, 16/20, RC, 80% net weight, 10 × 1 kg IQF products if deglaze weight is 815 g and. [Hints: Consider minimum no. of pcs/bag in standard calculation.]

14th Step: Inspection of Defrost/Thawed and Net Weight

The term defrost/thawed weight refers to the weight of shrimp after completely melting of ice (external + internal) crystal from its body. To perform defrost/thawed weight, shrimps are dipped into water for long time until completely removing ice crystal from the body. Defrost/thawing time depends on freezing method, product type, size/grade of shrimp, and percentage of glaze. Thawing should be performed in chilled water; never use hot water to make thawing faster. The complete thawing of the product is determined by gently squeezing the sample occasionally so as not to damage the texture of the shrimp, until no hard core or ice crystals are left. Frozen shrimps are soaked in water for a long time up to completely removing protective glaze/ice from the outer surface of shrimp and also the core of its body. After completely defrosting/thawing, shrimps acted as soft as raw shrimp. Inspectors should perform defrosting in chilled water instead of adding warm/hot water for making time short. Uses of warm/hot water are strictly prohibited. Let the shrimp defrost itself. Avoid mass handling during thawing process; otherwise, soaking gain will be released in water that may result in the shortage of weight. On the other hand, net weight means actual weight of shrimp without its external and internal glaze. Basically, there is no huge difference between defrost/thawed and net weight. Both of them are almost similar. Soaking gain of shrimp should be included during calculation of net weight. See the following formula for the measurement of net weight:

Fig. 9.21 Thawing/
defrosting



Fig. 9.22 Addition of
flake ice



$$\text{Net weight} = \text{Frozen weight} - \text{Weight of glaze (external + internal)}$$

Measurement of net weight is very important for avoiding of weight shortage. Shortage of weight is a crime in international seafood business though it is very rare in practice. Normally, suppliers put some extra weight than their declared to avoid weight shortage and keep them in safe side. Inspectors should check the net weight very carefully to avoid weight loss.

The following are the images of defrost/thawing process and net weight (20% glazed) of different products (Figs. 9.21, 9.22, 9.23, 9.24, 9.25, 9.26, 9.27, 9.28, and 9.29):

15th Step: Inspection of Individual Weight

Normally, measurement of individual weight of shrimp is not an essential requirement, but sometimes buyer asked to check individual weight for more accuracy. At that time, inspectors need to check individual weight for every shrimp in a bag or

Fig. 9.23 Defrosting of IQF shrimp



Fig. 9.24 Checking of defrosting



block. After checking of individual weight, it is necessary to calculate and note down how many pcs of shrimp are out of standard limit (maximum and minimum). A standard of individual weight measurement procedure (Table 9.3) and comparison of standard weight (Table 9.4) of different products are given below.

16th Step: Inspection of Uniformity Ratio

After completing of thawing process, inspectors go ahead for the measurement of uniformity ratio. Uniformity is one of the major concerns of the buyer. Inspectors should check the uniformity ratio very carefully and make a comparison with buyer requirements. If uniformity ratio goes out of limit, it makes sense that the product quality is not good and may not be accepted by the buyer. It makes a great problem to the buyer and may lose his customers for this uncontrolled uniformity. Sometimes buyer suggests repacking the product with correct uniformity. Note that standard uniformity ensures accurate pieces and individual weight of shrimp. Uniformity

Fig. 9.25 Thawing of S.IQF shrimp



Fig. 9.26 Shrimp after thawing



Fig. 9.27 Net weight



Fig. 9.28 Shortage of weight**Fig. 9.29** Excess of weight

ratios are recorded in hard copy for reporting to buyer. The following are the images of uniformity ratio of different products (Figs. 9.30, 9.31, and 9.32).

17th Step: Inspection of Organoleptic Characteristics

Freshness, smell, color, odor, texture, general appearance, etc. are the important characteristics of quality assessment of frozen shrimp. The organoleptic sensory method is used for the assessment of these characters. Organoleptic assessment in final inspection totally depends on buyer representative or buyer nominated inspectors. Actually, organoleptic assessment is a relative perception; it may vary from one person to another. Expert personnel or inspectors check the freshness, smell, color, odor, general appearance, texture, and taste and make a grade whether it is poor, normal, good, very good, or excellent. If the freshness of shrimp is good, the general appearance is good, the texture is firm, and it is free from odor, then quality personnel will approve it, but if any kind of inconsistency is found, the product may

Table 9.3 Individual weight measurement procedure for frozen shrimp

Sl. No.	Product description	No. of Pcs/bag	Min.–Max. individual weight of shrimp (g)	Observed individual weight (g)	Remarks
1	FW HLSO Raw 4/6 RC	11	76–114	76	Weight within standard limit (accepted)
2	80% NW 10 × 1 Kg IQF Shrimp			122	Bigger than standard (not accepted)
3				77	Weight within standard limit (accepted)
4				45	Smaller than standard (not accepted)
5				102	Weight within standard limit (accepted)
6				56	Smaller than standard (not accepted)
7				77	Weight within standard limit (accepted)
8				75	Weight within standard limit (accepted)
9				78	Weight within standard limit (accepted)
10				48	Smaller than standard (not accepted)
11				52	Smaller than standard (not accepted)

[Appendix B: Size and weight table]

go for further assessment or non-shipment. Serious reasons may cause rejection of the consignment. The following are the images of organoleptic assessment of shrimp (Figs. 9.33, 9.34, and 9.35).

18th Step: Observation of Defects

Inspectors checked the defects very carefully. Defects may be caused by poor quality of raw materials and improper handling and processing of shrimp. A variety of defects occur during the processing of shrimp that are not accepted by the buyer. Inspectors should enlist the defects in hard copy for analysis of the percentage of

Table 9.4 The comparison of standard weight of different products of frozen shrimp

Product description	Block	IQF	Semi-IQF
Size/grade	8/12 RC	8/12 FC	8/12 FC
Glaze	20%	20%	20%
Packing	6 × 1.8 kg	10 × 1 kg	10 × 1 kg
Pcs per bag/block (Min.-Max.)	25–38 pcs	18–26 pcs	8–12 pcs
Weight (s)			
Gross weight	10.8 kg	10.0 kg	10.0 kg
Frozen weight	1.8 kg	1.0 kg	1.0 kg
Net weight	1440 g	800 g	800 g
Individual weight of shrimp (Min.–Max.)	38–57 g	30–45 g	67–100 g

Fig. 9.30 Uniformity (BT-HOSO)



Fig. 9.31 Uniformity (BT-HLSO)



Fig. 9.32 Uniformity (BT-PND)



Fig. 9.33 Checking of odor/ bad smell



defects and also for record keeping. Photographs are a must in every defect with proper tagging. If defects exceed buyer requirements, buyer may reject the container.

19th Step: Inspection of Cooking Test

The final step of inspection is cooking test. Cooking test can be performed at 65–70 °C temperature. Cooking duration varies depending on size and type of shrimp and cooking temperature and cooking method. It should be kept in mind that shrimp must not be overcooked; it may misguide your assessment. Cooking test can be performed as per buyer requirements. Microwave method and boil-in-bag method are used in cooking test. The most commonly used cooking technique is boil-in-bag procedure. The steps of boil-in-bag procedure in shrimp are given below.

Fig. 9.34 Checking of general appearance



Fig. 9.35 Checking of texture, color, and taste after cooking



Step 1:	At least two pcs of shrimp are selected from every sample after completion of the inspection.
Step 2:	Products of different samples are kept separated in different poly bags.
Step 3:	Selected samples must be sealed in air tide conditions before going to boil.
Step 4:	Selected samples are kept in ice with proper tagging.
Step 5:	Sample-sealed poly bags are dipped into boiling water for cooking.
Step 6:	Products are kept in ice immediately after cooking of shrimp.
Step 7:	After a few minutes, inspectors open the sealed bags and observe its smell/odor, appearance, color, texture, and taste. Inspectors may consume the cooked shrimp for better assessment.

• Observation of Cooked Shrimp

Smell/odor:	Smell/odor should be checked immediately after opening of the sealed bags. Smell of quality shrimp is fresh, typically with no muddy or moldy smell, but decomposed shrimp produce a bad smell (odor) when opening the sealed bags.
Appearance:	Freshly cooked shrimp looks like gorgeous or shiny but not for defect shrimp.
Color:	Good-looking shiny color comes up for freshly cooked shrimp, but if the shrimp has any defects, that would be exposed clearly after cooking. For example, the sign of melanosis/necrosis is more visible in cooked shrimp.
Texture:	Texture of shrimp is checked by chewing off its muscle/meat. Texture of quality shrimp is firm, not too soft, and not too dry, but decomposed shrimp has no texture; it's too soft and breaks down easily that is observed clearly in cooked shrimp.
Taste:	Taste should be fresh, be typical, and have no foreign taste from fresh shrimp, but the taste is not good and off-flavor from decomposed shrimp.

The following are the images of cooking test of shrimp (Figs. 9.36, 9.37, 9.38, 9.39, 9.40, and 9.41).

20th Step: Reporting

After completion of the inspection procedure, it is necessary to prepare a report for the importer/buyer. A complete report has two parts:

1. Written documents
2. Photographs

Written documents are prepared based on inspected results, analysis, and interpretation of the results with reference photographs. Photographs are the mandatory part of inspection. It is necessary to be taken in every step of inspection and must be with a proper identification tag. Tag-less photographs are meaningless. Every photograph would have a self-explanation. The following necessary photographs are taken in final inspection:

Fig. 9.36 Sample in bag with ice



Fig. 9.37 Sealing of sample



Fig. 9.38 Cooked HLSO-EZP IQF

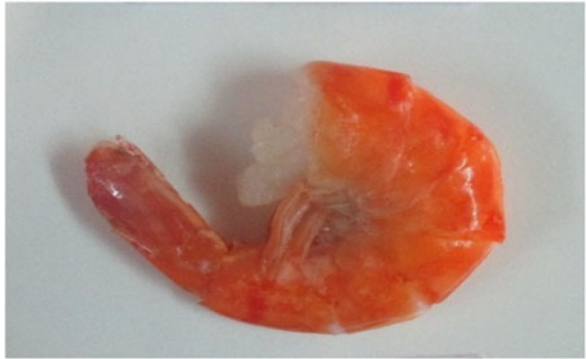


Fig. 9.39 Cooked PD Tail-On IQF



- Photographs of cartons selected for final inspection (all carton in a stack)
- Photographs of cold store temperature and product temperature
- Photographs of cartons stored in cold storage
- Photographs of all sides of the master carton, inner bag, and box
- Photographs of the outer label, inner label, sticker, and rider card
- Photographs of open master carton/bag/open box

Fig. 9.40 Cooked PD IQF shrimp



Fig. 9.41 Cooked HOSO shrimp



- Photographs of frozen product, deglazed product, and defrost/thawed product.
- Photographs of gross weight, frozen weight, deglazed weight, net weight, and defrost/thawed weight.
- Photographs of shrimp per pound.
- Photographs of 10% largest and 10% smallest weight of shrimp.
- Photographs of uniform/line-up shrimp.
- Photographs of defects and defect weight of shrimp.
- Photographs of cooked shrimp
- Photographs of barcode scanning
- Others

A complete report has a great combination of written words and reference photographs. Without photographs, the report has no meaning. Photographs act like an explanation of your written word. No one trusts you or your report without your photographs. Reports should be more accurate. It is necessary to review the reports several times before sending to the buyer. Besides inspection reports, buyer may ask you a raw inspection report, packaging checklist, supplier's checklist, supplier QC report, or other necessary documents. Inspection reports and other

necessary documents must be signed by the suppliers for authentication. Buyer or buyer representative checks all the reports and analyzes and takes the decision whether goods will be shipped or not. Final inspection report also known as a pre-shipment report (Appendix D: A model template of final inspection report).

9.3.2.5 Rejection Policy

Any kind of anomaly may cause container rejection. Different buyers followed the different policies to reject the container. Everyone has their own standard of sampling, inspection, and rejection procedure of the container. The following examples are the rejection policy of different importers.

If the inspectors check 1% of produced quantity (at least two for ≤ 100 MC) and all results are at satisfactory level, then the inspectors may advise to ship the container. If any kind of anomalies are found, only then the inspectors will check another 1% of the produced quantity or more than 1% (or as much as possible depending on product quantity and condition) of defect items. If the inspected products are in the satisfactory level, then the inspectors analyze the whole products, percentage of defects, types of defects, severity of defects, quantity of product, etc. and ask the responsible buyer to take their decision. Buyer will decide whether it is accepted or not. Inspectors are not the decision-maker; only buyer can take his or her decision. But, if the problems are found again, then buyer may cancel the shipment permanently or temporarily. Sometimes buyers try to find out the problems with its origin and causes and advise to take necessary steps of solutions. The products may be re-processed, re-packed, and re-inspected if necessary. Sometimes buyer advises to ship the products that have no defects. However, if found a serious problem that cannot be solved anymore, only then the container may not be accepted by the buyer.

[Note: All necessary documents of defects and causes of defects with photographs must be well noted in hard copy as well as soft copy for your safety and also for record keeping.]