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EAST AFRICAN STANDARD

Fresh and frozen prawns/shrimps — Specification



EAST AFRICAN COMMUNITY

Foreword

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

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

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

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Introduction

This standard for fresh and frozen shrimp* defines minimum acceptability of fresh and frozen shrimp for taint, decomposition, unwholesomeness and other requirements, other than weight, and describes methods for determining that acceptability.

*NOTE Throughout this document, the term "shrimp" will be used to denote both shrimps and prawns.

In the preparation of this East African Standard, the following sources were consulted extensively:

KS 05-1285:1996, *Specification for fresh frozen prawns/shrimps*

IS 2237-1997(R2005), *Prawns (Shrimps) — Frozen — Specification*

Codex Alimentarius website: http://www.codexalimentarius.net/mrls/vetdrugs.jsp/vetd_q-e.jsp

USDA Foreign Agricultural Service website: <http://www.mrldatabase.com>

USDA Agricultural Marketing Service website: <http://www.ams.usda.gov/AMSV1.0/Standards>

European Union: http://ec.europa.eu/enterprise/sectors/pharmaceuticals/veterinary-use/maximum-residue-limits/index_en.htm

Assistance derived from these sources is hereby acknowledged.

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Fresh and frozen prawns/shrimps — Specification

1 Scope

This standard applies to fresh, frozen and previously frozen shrimp prepared from species of any of the following families:

- (a) *Penaeidae*
- (b) *Pandalidae*
- (c) *Crangonidae*
- (d) *Palaemonidae*

Fresh and frozen shrimp shall be prepared from sound, wholesome raw material processed using good manufacturing practices.

2 Normative references

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

CAC/GL 21, *Principles for the establishment and application of microbiological criteria for foods*

CAC/RCP 1, *Recommended international code of practice — General principles of food hygiene*

CAC/GL 30, *Principles and guidelines for the conduct of microbiological risk assessment*

CAC/GL 31, *Guidelines for the sensory evaluation of fish and shellfish in laboratories*

CD-K-572-2010, *Fish and fisheries products — Methods of sampling*

CAC/RCP 52[CD/K/521:2010], *Code of practice for fish and fishery products*

CAC/GL 53, *Guidelines on the judgement of equivalence of sanitary measures associated with food inspection and certification systems*

EAS 12, *Drinking (potable water) — Specification*

EAS 38, *Labelling of prepackaged foods — Specification*

EAS 41, *Fruits, vegetables and derived products — Sampling and methods of test*

EAS 123, *Distilled water — Specification*

CD/K/516:2010, *Dried and dry-salted fish — Specification*

ISO 4831, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of coliforms — Most probable number technique*

ISO 4832, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coliforms — Colony-count technique*

ISO 4833, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of microorganisms — Colony-count technique at 30 degrees C*

ISO 6579, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of Salmonella spp.*

ISO 6887-1, *Microbiology of food and animal feeding stuffs — Preparation of test samples, initial suspension and decimal dilutions for microbiological examination — Part 1: General rules for the preparation of the initial suspension and decimal dilutions*

ISO 6887-2, *Microbiology of food and animal feeding stuffs — Preparation of test samples, initial suspension and decimal dilutions for microbiological examination — Part 2: Specific rules for the preparation of meat and meat products*

ISO 6887-3, *Microbiology of food and animal feeding stuffs — Preparation of test samples, initial suspension and decimal dilutions for microbiological examination — Part 3: Specific rules for the preparation of fish and fishery products*

ISO 6888-1, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 1: Technique using Baird-Parker agar medium*

ISO 6888-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 2: Technique using rabbit plasma fibrinogen agar medium*

ISO 6888-3, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species) — Part 3: Detection and MPN technique for low numbers*

ISO 7251, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive Escherichia coli — Most probable number technique*

ISO 7937, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of Clostridium perfringens — Colony-count technique*

ISO 13720, *Meat and meat products — Enumeration of Pseudomonas spp.*

ISO 16050, *Foodstuffs — Determination of aflatoxin B₁, and the total content of aflatoxin B₁, B₂, G₁ and G₂ in cereals, nuts and derived products — High performance liquid chromatographic method*

ISO 21567, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of Shigella spp.*

ISO/TS 21872-1, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of potentially enteropathogenic Vibrio spp. — Part 1: Detection of Vibrio parahaemolyticus and Vibrio cholerae*

ISO/TS 21872-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of potentially enteropathogenic Vibrio spp. — Part 2: Detection of species other than Vibrio parahaemolyticus and Vibrio cholerae*

ISO 11290-1, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of Listeria monocytogenes — Part 1: Detection method*

ISO 11290-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of Listeria monocytogenes — Part 2: Enumeration method*

3 Description and processing

3.1 Styles of presentation

Shrimp may be presented in the following ways:

- 3.1.1 Whole** — Shrimp which have the head, shell and tail fan on.
- 3.1.2 Headless** — Shrimp on which the head has been completely removed, but with shell and tail fan on.
- 3.1.3 Peeled, tail fan on (Fantail Round)** — Shrimp on which the head and shell have been removed down to the last segment, but with the shell on the last segment and the tail fan present.
- 3.1.4 Peeled, tail fan removed (Fantail Deveined)** — Shrimp with the head, shell and tail fan removed. (As in 3.1.3 but the dorsal tract removed.)
- 3.1.5 Peeled and Deveined (Peeled and Cleaned)** — In addition to having the head and shell removed, the vein has been removed. (Head and shell and dorsal tract removed completely.)
- 3.1.6 Butterfly Style (Fantail)** — In addition to having the head, shell and vein removed, the peeled segments of the shrimp have been split longitudinally through the dorsal axis into two sections which remain attached on the ventral side.
- 3.1.7 Broken (Pieces)** — Pieces of shrimp containing less than 5 segments, for counts less than 150/kg; or pieces of shrimp containing less than 4 segments, for counts greater than 150/kg.
- 3.1.8 Cooked and Peeled** — Peeled after cooking.
- 3.1.9 Peeled Deveined and Cooked** — As in 3.1.6 but cooked.
- 3.1.10 Whole, Cooked** — As in 3.1.1 but cooked.
- 3.1.11 Peeled Undeveined** — Head and shell removed completely.
- 3.1.12 Headless Blanched** — As in 3.1.2 but blanched.
- 3.1.13 Peeled and Deveined Blanched** — As in 3.1.6 but blanched.
- 3.1.14 Peeled Undeveined and Blanched** — As in 3.1.10 but blanched.
- 3.1.15 Individually Quick Frozen (IQF)** — Any of the types mentioned above but quick frozen individually.

3.2 Other presentations

Any other presentation of the product may be permitted provided that it:

- a) is sufficiently distinctive from the forms of presentation set out above; and
- b) meets all other regulatory requirements; and
- c) is adequately described on the label in accordance with all regulatory labelling requirements.

3.3 Descriptions

3.3.1 The shell and flesh of frozen prawns shall have characteristic colour of the respective types and shall be free from any black discoloration. The meat shall be firm and consistent.

3.3.2 The prawns/shrimps shall be:

- (i) **Raw** — Not exposed to temperature sufficiently high to coagulate the protein at the surface.
- (ii) **Frozen** — Be either individually quick frozen or quick frozen in blocks to -40 °C.

- (ii) **Cooked** — Heated for a period of time such that the thermal centre of the product reaches a temperature adequate to coagulate the protein.

3.4 Pre-processing prerequisites

3.4.1 The raw prawns shall be cooled to 0 °C as fast as possible by placing them in chilled water before they are iced.

3.4.2 The temperature of the prawns at the centre shall be close to 0 °C until received at the factory.

3.4.3 Prawns shall be handled in well drained food grade containers.

3.4.4 The ratio of ice to prawns shall be 1.1 minimum.

3.4.5 Table 1 indicates processing requirements of prawns/shrimps.

Table 1 — Processing requirements for prawns/shrimps

| Processing stage | Maximum time for processing | Temperature |
|----------------------|--|-------------------------------|
| (i) Chilling water | processing of fresh prawns/shrimps shall not exceed 2 h | min. +0 °C max. +0 °C |
| (ii) Icing of prawns | semi-processing period of prawns/shrimps shall not exceed 3 h | min. -2 °C max. -0 °C |
| (iii) Freezing | maximum 6 h for thermal centre to pass through the zone of max. Ice crystals formation (critical zone) | -40 °C in the centre of block |

3.4.6 Organoleptic analysis before processing

3.4.6.1 Organoleptic quality of the prawns using the following definitions, concerning freshness:

3.4.6.2 Prawns shall be bright but not dull and dark in colour.

3.4.6.3 Prawns shall have firm and translucent shells.

3.4.6.4 Prawns shall have own natural characteristic odour.

3.4.6.5 Prawns shall be free from any objectionable flavours.

3.4.6.6 Prawns shall have no signs of melanosis.

3.4.6.7 Prawns shall have firm but not mushy texture.

3.5 Size classification

Frozen prawns shall be graded in any form of presentation acceptable to national/international standards as indicated in Table 2.

Table 2 — Size designation of canned shrimp

| 1 | 2 |
|--------------------|---|
| Designation | Number of whole shrimp per 100 g of drained final product |
| Extra large, jumbo | 13 or less |
| Large | 14-19 |
| Medium | 20-34 |
| Small | 35-65 |
| Tiny or miniscule | More than 65 |

4 Essential composition and quality factors

4.1 General

4.1.1 The material shall be prepared from clean, wholesome and fresh prawns, and shall not show any visible signs of spoilage. The material shall as far as possible be free from any discoloration, off-odours, dehydration, black spots, whole insects or its fragments, rodent droppings and any other foreign matter. However, the defects for various quality characteristics shall not exceed the tolerance limits given in Table 3.

4.1.2 After harvesting, prawns shall be thoroughly rinsed in plenty of water to wash off the debris, mud and other foreign matter.

4.1.3 Appearance — Prawns shall be attractive and generally uniform in size within any count category.

4.1.3.1 They shall be easily separated when labelled as individually frozen.

4.1.3.2 The colour of prawns shall have the characteristic of the species and habitat or areas from which harvested.

4.1.3.3 Finished product shall be practically free from dehydration black spot, blockening or other abnormal colouration.

4.1.3.4 The product shall be clean, free from fore matter and practically free from legs, loose shell, antennae, heads, prawns with parts of heads, veins or improperly peeled as appropriate for the form of presentation, distorted, damaged and free from unacceptable materials.

4.1.4 Odour and flavour — After thawing, and where cooking by steam or boiling is applicable, prawns shall have a good characteristic odour and flavour and shall be free from objectionable odours and flavours of any kind.

4.1.5 Texture — After thawing, prawns shall be relatively firm and not mushy.

4.1.6 Glazing — Prawns shall be glazed either individually or in bulk. When glazed the coating of ice shall cover the prawns so as to minimize dehydration and oxidation.

Table 3 — Tolerance limits for defects for various characteristics

| S/No. | Characteristic | Tolerance limit | |
|-------|---|----------------------------------|-----------------------|
| | | Headless Shell on Type (percent) | Other Types (percent) |
| (1) | (2) | (3) | (4) |
| (i) | Deterioration with spoiled pieces | 5 | 5 |
| (ii) | Discoloration of shell and meat | 10 | 20 |
| (iii) | Black spot on shell and meat | 3 | 2 |
| (iv) | Broken, damaged and soft shelled pieces | 5 | 10 |
| (v) | Legs, bits of veins, loose shells, etc | 2 | 5 |
| (vi) | Dehydration | 15 | 15 |

4.2 Optional ingredients

Water utilized either for glazing, cooking or for freezing may contain the following:

- (i) Salt.
- (ii) Lemon juice
- (iii) Sugars such as sucrose, invert sugar, dextrose, fructose, glucose syrup and lactose.
- (iv) Seasonings, spices, flavourings (hydrolyzed vegetable protein).
- (v) Ascorbic acid.

4.3 Freezing and storage for the final product

The product shall be subjected to a freezing process which shall be carried out in appropriate equipment in such a way that the range of temperature is as shown in Table 1. The quick freezing process shall be regarded as complete when the product temperature has reached -40 °C at the thermal centre after stabilization. During transportation, storage, distribution and sale the temperature shall be maintained at -25 °C.

The storage of head-on prawn and headless prawns shall be not more than five (5) months and twelve (12) months at a temperature of -25 °C respectively.

5 Food additives

Only additives complying with EAS 103 are permitted.

6 Hygiene and handling

6.1 The product covered by the provisions of this standard shall be prepared and handled in accordance with CAC/RCP 52[CD/K/521:2010] and the relevant public health regulations.

6.2 The material shall conform to the requirements prescribed in Table 4.

Table 4 — Requirement for prawns (shrimps) — Frozen

| Characteristic | Requirement | | | | Method of test |
|---|------------------------------|--|--|---|----------------|
| | Whole, headless and IQF type | Peeled and deveined type including butterfly, fantail round and IQF type | Cooked type including cooked-peeled, whole-cooked, peeled-deveined, cooked and IQF | Blanched type including headless blanched, peeled-deveined, and peeled undeveined blanched and IQF type | |
| (1) | (2) | (3) | (4) | (5) | (6) |
| i) Total bacterial count/g in the finished product, Max | 500 000 | 500 000 | 100 000 | 200 000 | ISO 4833 |
| ii) <i>Escherichia coli</i> Count/g, Max | 20 | 20 | Absent | Absent | ISO 7251 |
| iii) Faecal <i>Streptococci</i> count/g, Max | 100 | 100 | 100 | 100 | Annex C |
| iv) Coagulase positive <i>Staphylococci</i> /g, Max | 100 | 100 | Absent | Absent | ISO 6888 |
| v) <i>Salmonella</i> | Absent per 25 g | Absent per 25 g | Absent per 25 g | Absent per 25 g | ISO 6579 |
| vi) <i>Shigella</i> | Absent per 25 g | Absent per 25 g | Absent per 25 g | Absent per 25 g | ISO 21567 |
| vii) <i>Vibrio cholerae</i> | Absent per 25 g | Absent per 25 g | Absent per 25 g | Absent per 25 g | ISO/TS 21872 |
| viii) <i>Listeria monocytogenes</i> | Absent per 25 g | Absent per 25 g | Absent per 25 g | Absent per 25 g | ISO 11290 |
| ix) Formaldehyde mg/kg, Max | 10.0 | 10.0 | 10.0 | 10.0 | Annex D |
| x) Indole, mg/kg, Max | 2.5 | 2.5 | 2.5 | 2.5 | Annex E |
| xi) Heavy Metals: | | | | | |
| a) Mercury, mg/kg, Max | 0.5 | 0.5 | 0.5 | 0.5 | EAS 41 |
| b) Copper, mg/kg, Max | 20.0 | 20.0 | 20.0 | 20.0 | EAS 41 |
| c) Zinc, mg/kg, Max | 50.0 | 50.0 | 50.0 | 50.0 | EAS 41 |
| f) Arsenic, mg/kg, Max | 0.1 | 0.1 | 0.1 | 0.1 | EAS 41 |
| e) Lead, mg/kg, Max | 0.3 | 0.3 | 0.3 | 0.3 | EAS 41 |
| f) Tin, mg/kg, Max | 250.0 | 250.0 | 250.0 | 250.0 | EAS 41 |
| g) Cadmium | 0.3 | 0.3 | 0.3 | 0.3 | EAS 41 |
| h) Methylmercury | 0.5 | 0.5 | 0.5 | 0.5 | EAS 41 |

7 Packing and marking

7.1 Packing

The material shall be packed in suitable container as agreed between the purchaser and the processor. In the absence of any such agreement the material shall be packed in containers which may withstand the stress and strain of transportation and can prevent deterioration during transportation and frozen storage. A layer of polyethylene shall be used between the material and the container when individually frozen prawns are packed.

7.2 Marking

7.2.1 Each container shall be marked legibly and indelibly with the following information:

- a) The name of the product shall be "Shrimp", "Shrimps" or "Prawns" and the brand name, if any.
- b) If desired, "X Shrimp", "X Shrimps" or "X Prawns" may be used where the "X" is the name of a country or a geographic area from which the shrimps originate, or where "X" is the common name of the species in accordance with the applicable sections of the Codex Alimentarius Recommended International Code of Practice for Quick-Frozen Shrimps.
- c) Any descriptive terms used, including those denoting style of presentation and size designation, must accurately reflect the contents of the unit. Note: If a size designation is declared, it must be expressed in terms of a count range. Terms such as "medium", "jumbo", etc. are unacceptable unless accompanied by a count range.
- d) Name and address of the processor;
- e) Batch or code number;
- f) Count per kg (if required by the purchaser);
- g) Minimum net mass of the contents which is equivalent to the drained mass ascertained after complete thawing and excluding the glaze;
- h) Name of the additives used, if any;
- i) Any other requirement as given OIML R87, *Quantity of product in prepackages*.

7.2.2 Certification marking

The product may also be marked with the relevant Standard Mark.

8 Sampling, examination and analyses

NOTE For determining the defects in cooked as well as raw frozen products, remove the wrapper of the frozen material and place it in a closed polythene bag. The polythene bag is further immersed in potable water at room temperature in a clean container wherein the potable water is introduced from the bottom of the container at a flow rate of 25 l/min. The material shall not come in direct contact with water. After all the glaze that can be seen or felt is removed, and the pieces separate easily, transfer the products to the preweighed sieve. Drain for 2 minutes at the inclined position and weigh. Calculate the net mass. Number of pieces of shrimp may be determined in the above material by counting the pieces in 1 kg.

8.1 Sampling

8.1.1 The sampling and tolerance plans in CD-K-572:2010 shall be used to determine the acceptability of the lot. The sampling plans dictate the minimum sample size to be taken. If necessary, in the opinion of the inspector, more than the minimum sample size specified may be taken.

8.1.2 Sampling of lots for the sensory examination of the product shall be in accordance with CD-K-572:2010 except that a lower acceptance number for decomposition shall be used as indicated in the sampling tables.

The tables specify the minimum number of sample units to be used for the following types of inspections:

- a) Level I — Sensory examinations of all products subject to inspection other than lots which are subject to reinspection.
- b) Level II — Sensory examinations of all products which are under reinspection.

8.1.3 The sample unit shall consist of a package of shrimp and the contents thereof. For package sizes of 2.27 kg (5 lb.) or greater, it is permissible to examine a sub-unit consisting of at least 1 kg of product, if, in the Inspector's opinion, a representative sub-unit can be obtained.

8.2 Sensory and physical examination

Samples taken for sensory and physical examination shall be assessed by persons trained in such examination and in accordance CAC/GL 31.

8.3 Examination methods

8.3.1 Complete net weight determination, according to defined procedures (deglaze as required). If shrimp are breaded, examine for coating defects as defined in the standard for breaded products; remove breading as required according to defined procedures.

NOTE For all product examinations conducted using sub-units, base all calculations on the actual weight or number of shrimps in the sub-unit, as appropriate.

8.3.2 Examine each unit for compliance to standards of identity as required.

When a size designation (count per lb or kg) is declared, count the number of whole shrimp present. Calculate the whole shrimp per lb or kg using the following formula:

$$\frac{\text{number of whole shrimp in unit}}{\text{actual thawed weight of unit, kg}} = \# \text{ shrimp/kg}$$

During this procedure, separate broken pieces and determine the percentage of broken shrimp present. The percentage of broken shrimp may be calculated using the following formula:

$$\frac{\text{weight of broken shrimp (kg)}}{\text{actual thawed weight of unit, (kg)}} \times 100 = \% \text{ broken shrimp}$$

Where shrimp is further described on the label, the product is examined for compliance. For example, compliance with the requirements for deveining is determined as follows:

$$\frac{\text{number of improperly deveined shrimp}}{\text{number of shrimp in unit}} \times 100 = \% \text{ improperly deveined shrimp}$$

8.3.3 Examine shrimp for presence of dehydration by counting the number of shrimps in the unit containing any dehydration which can only be removed with a knife or other sharp instrument. Determine the percentage affected using the following formula:

$$\frac{\text{number of shrimp affected}}{\text{number of shrimp in unit}} \times 100 = \% \text{ shrimp affected by dehydration}$$

8.3.4 Examine package and thawed shrimp for presence of foreign material. Assess shell-on shrimp for presence of blackspot; calculate the percentage of shrimp affected in the unit.

8.3.5 Assess colour. Calculate the percentage of shrimp with distinct yellow appearance and black discolouration of the flesh and shrimp affected by faded pigment or liver stain when in association with an odour or flavor of decomposition.

8.3.6 Assess odour. Assess flavour and texture as required.

Cooking procedures may be used for **reinspection** purposes only when, in the opinion of the inspector, cooking is required to define the flavor in order to render a decision on the acceptance or rejection of the sample unit. The unit is cooked according to the following procedure. For all unit sizes, cook the entire unit. This may be done using a boil-in-bag procedure, or by steaming or microwaving in a closed container, until the protein at the centre of the shrimp has coagulated. (Depending on the method chosen and the equipment available, cooking times may vary. For example, a 500 g thawed sample unit should require a cooking time of 3-4 minutes at a microwave power of 700 watts; the unit should be stirred once during this procedure to ensure even heating).

Let cool slightly, then assess odour, flavour and texture of cooked unit. Calculate percentage of unacceptable shrimps in the unit.

NOTE When the amounts of tainted or decomposed shrimps are each less than 10%, but exceed 10% when combined, the unit is rejected, and is subject to the higher acceptance number (AQL 6.5) in the sampling and acceptance plan.

8.3.7 Record any defect for that unit on the appropriate worksheet.

8.4 Classification of defectives

A sample unit shall be classified as defective when it fails the defects for decomposition, tainted or unwholesome conditions or the criteria for the standards of identity as described in section 6, or when more than 10% of the declared weight of the sample unit is affected by any combination of tainted or decomposed conditions.

9 Definition of defects

9.1 Taint

A unit will be considered tainted when more than 10% of the number of shrimps in the unit are affected by any of the following conditions:

- a) **Rancid**
 - Odour characterized by the distinct or persistent odour of oxidized oil; or
 - Flavour characterized by that of oxidized oil which leaves a distinct bitter aftertaste.
- b) **Abnormal** — Distinct and persistent uncharacteristic odours or flavours such as burnt or acrid, metallic, or associated with feed, and not defined as rancid or decomposed.

9.2 Decomposition

A unit will be considered decomposed when more than 10% of the number of shrimps in the unit are affected by any of the following conditions:

- a) **Odour or flavour** — Persistent, distinct and uncharacteristic odour or flavour including but not limited to the following: ammonia, musty, yeasty, vegetable, sour, faecal, hydrogen sulphide, putrid.
- b) **Discolouration**
 - Shrimp with distinct yellow, green or black, singly or in combination, discolouration of the flesh; or

— Shrimp with faded pigment or liver stain in association with odour or flavour of decomposition.

c) **Texture** — Textural breakdown characterized by muscle structure which is mushy.

9.3 Unwholesome

a) **Critical foreign material** — A lot will be considered defective when any of the following conditions are found:

— the presence of any material which has not been derived from shrimp and which poses a threat to human health (such as glass, etc.); or

— distinct and persistent odour or flavour of any material which has not been derived from shrimp and which poses a threat to human health (such as solvents, fuel oil, etc.).

b) **Foreign material** — A unit will be considered defective when the following condition is found:

— the presence of readily detectable (without magnification) material which has not been derived from shrimp but does not pose a threat to human health (such as insect pieces, sand, etc.).

c) **Other defects** — A unit will be considered defective when any of the following conditions are found:

1) **Blackspot** — In the case of shell-on shrimp, 25% or more of the shrimps in the unit contain distinct areas of black discolouration (melanosis) which cover greater than 10% of the area of the shell.

2) **Dehydration (Freezer burn)** — 10% or more of the shrimp in the unit are affected by dehydration or freezer burn.

9.4 Failure to Meet a Standard of Identity

a) **Broken shrimp** — A unit will be considered defective for broken shrimp if it contains greater than 5% m/m of broken shrimp when examined by the method outlined in Clause 8.

b) **Deveining (Cleaning)** — In the case of deveined shrimp, a unit will be considered defective for deveining if it is found to contain more than 5% by count of improperly cleaned or deveined shrimp, when examined using the method outlined in Clause 8.

c) **Size Designation** — When a count range is declared, a unit will be considered defective for size designation if the count is greater than the range specified on the label, when examined by the method outlined in Clause 8.

10 Lot acceptance

A lot shall be considered as meeting the requirements of this standard when:

(i) not any single instance of critical foreign matter occurs; or

(ii) the total number of sample units found defective for taint, decomposition or unwholesomeness, individually or in combination, does not exceed the acceptance number for the sample size designated in the sampling plans in CD-K-572:2010; or

(iii) the total number of sample units found defective for decomposition does not exceed the acceptance number (c) shown in parentheses for the sample size designated in the sampling plans in CD-K-572:2010; or

- (iv) the total number of sample units found defective for standards of identity (style of presentation) and size designation or count range (if a size designation or count range is declared), exceeds the acceptance number for the sample size designated in the sampling plans.
- (v) the Food Additives, Hygiene and Labelling requirements of Sections 5, 6.1, 6.2, and 7 are met.



Frozen prawns



Fresh frozen prawns



Frozen prawns



Deep frozen prawns sales pack

Standard

Draft for comments

Standard



Frozen shrimps



Fresh frozen shrimps

Draft for



Frozen white shrimps



Cooked frozen shrimps in sales packages

Draft for

Draft



Frozen block of shrimps



Frozen block of shrimps

Draft



Fresh shrimps

Draft for comment

uard



Fresh shrimps



Fresh shrimps

Draft for



Fresh shrimps



Fresh shrimps

African Standard

Draft for



Fresh prawns



Fresh prawns



Fresh prawns



Fresh tiger prawns

Annex A
(informative)

Processing of prawns (shrimps) — Frozen

A.1 Processing

A.1.1 The prawns shall be iced and maintained at a temperature of 3 °C till they reach the factory for freezing.

A.1.2 The material along with crushed ice, shall be kept in clean stainless steel, aluminum or plastic containers of suitable size. It shall be processed, that is, converted into required product such as headless (deheaded), peeled and deveined or peeled and undeveined, blanched, etc.

A.1.2.1 For blanched products, the material shall be processed in stainless steel containers, heated electrically/or by steam by holding the product in water with or without additives or exposing to steam for required short period just to remove slime and/or bring about desirable change in colour of shell or meat but taking care that the product is not cooked. Best results can be obtained by immediate cooling in crushed ice or chilled water subsequent to blanching.

A.1.3 The material shall be size graded, and washed with chlorinated water containing 10 mg/kg available chlorine. It shall then be weighed and filled in polythene bags or waxed laminated cartons with a lining of waterproof material. The material after washing and selecting may be arranged on a conveyor for freezing.

A.1.4 The material shall be quick frozen at a temperature not exceeding –40 °C in the minimum possible time. During freezing, the time taken for the core of the material, 5 cm thick, to reach a temperature ranging from –18 to –20 °C, shall be preferably 1% h, but shall not exceed 3 h under any circumstances.

A.1.5 The quick frozen material shall be uniformly glazed if frozen in containers other than waxed cartons and packed in suitable receptacles. The packed material shall be immediately shifted to the cold storage and stored at a minimum temperature of –18 °C.

A.1.5.1 Individually quick frozen products shall be glazed, preferably hardened, prior to packing, weighing and stored at a minimum temperature of –22 °C.

NOTE Glazing shall be done with ice cold potable water containing 5 to 10 mg/kg available chlorine. Glazed water can also be added to the material before freezing to produce uniform glaze. Citric acid, sugar and sodium chloride may be added to the glazing water up to levels of 0.2, 0.5 and 0.5 percent respectively. Permitted food colours and/or other permitted additives may be used in the case of cooked and peeled; deveined and cooked; whole cooked and blanched.

A.1.6 Food colours and/or other permissible food additives may be used in the case of cooked and peeled; deveined and cooked; whole cooked and blanched prawns.

Annex B (normative)

Determination of total bacterial count

B.1 Medium

B.1.1 Tryptone glucose beef extract agar with the following composition shall be used:

| | |
|-------------------------------|----------|
| Beef extract | 3.8 |
| Dextrose | 1 g |
| Tryptone Agar | 5 g 15 g |
| Distilled water (see EAS 123) | 1 litre |

B.1.1.1 Dissolve the agar by steaming. Dissolve the other ingredients mentioned above (B.1.1) in the molten agar. Adjust pH to 7.2. Filter through absorbent cotton and distribute in suitable quantities in glass containers. Sterilize in an autoclave at 121 °C for 30 minutes.

B.1.2 Phosphate Buffer

B.1.2.1 Stock Solution

Dissolve 34 g of potassium dihydrogen phosphate in 500 ml distilled water (see EAS 123), adjust the pH to 7.2 and make up the volume to 1000 ml with distilled water (see EAS 123).

B.1.2.2 Solution for Use

Add 1.25 ml of the stock solution to 1000 ml of distilled water (see EAS 123). Distribute in glass containers as required for serial dilution. Sterilize in an autoclave at 121 °C for 30 minutes.

B.2 Procedure

B-2.1 Collection of Sample

Scrap off the surface glaze from the material with a sterile scalpel. Using a sterile core sampler, in the case of blocks and sterile scissors, in the case of individual quick frozen materials, collect sample from the different parts of the frozen material to make up a total of about 10 g.

B.2.2 Preparation of Homogenate

Disintegrate the sample (B.2.1) with 90 ml of phosphate buffer (B.1.2.2) in a sterile homogenizer of stomacher type. Prepare sterile dilutions up to 0.000 001 using this homogenate.

B.2.3 Transfer aseptically dilutions beginning with 1 ml of 0.01 dilution and ending with 0.000 001 dilution into sterile petri dishes.

B.2.4 Introduce nearly 10 ml of the melted and cooled (40 °C) agar (B.1.1) into the petri dishes (B.2.3) and mix by rotating gently.

B.2.5 Incubate the petri dishes (B.2.4) after setting at 37 °C for 48 h. Count the colonies in the appropriate dilutions and compute their number per gram.

Annex C
(normative)

Determination of faecal streptococci count

C.1 Medium

C.1.1 Sterile KF agar with the following composition shall be used:

| | |
|--------------------------------|----------|
| Proteose peptone No. 3 | 10 g |
| Yeast extract | 10 g |
| Sodium chloride AR | 5 g |
| Sodium glycerophosphate | 10 g |
| Maltose CP | 20.0 g |
| Lactose | 1 g |
| Sodium azide | 0.49 g |
| Sodium carbonate AR | 0.0636 g |
| Bromocresol purple | 0.015 g |
| Agar | 10 g |
| Distilled water (see EAS 153) | 1 litre |

C.1.1.1 Dissolve the agar in 750 ml of the distilled water by steaming. All ingredients mentioned above (C.1.1) except bromocresol purple and sodium carbonate are dissolved separately in 250 ml of distilled water. Mix the two solutions well. Add sodium carbonate in small portions and then filter through absorbent cotton. Add Bromocresol purple in the filtrate and mix well. Distribute in appropriate quantities and sterilize in an autoclave at 121 °C for 15 minutes.

NOTE In case compounded agar medium is used, follow manufacturer's instructions for sterilization.

C.1.2 Add 1 ml of 1.0 percent solution of 2, 3, 5 triphenyl tetrazolium chloride per every 100 ml of the melted and cooled agar prior to use.

C.1.3 Pour 1 ml each of the 0.1 and 0.01 dilution sample (B.2.2) to two separate sterile petri dishes. Add the cooled agar (nearly 10 ml). Mix it by rotating. Incubate the plates at 37 °C for 48 h. Count the red and pink colonies and compute their number per gram.

Annex D (normative)

Determination of formaldehyde

D.1 Principle

Quantitative determination of formaldehyde involves extraction of the fish muscle tissue with trichloroacetic acid for the removal of proteins and treatment with acetyl acetone — ammonium acetate reagent to form a coloured formaldehyde derivative. The absorbance is measured by spectrophotometer.

D.2 REAGENTS

- a) Trichloroacetic acid (10 percent solution);
- b) Sodium hydroxide (30 percent solution);
- c) Acetic acid (5 percent solution); and
- d) Acetyl Acetone — ammonium acetate reagent. To prepare 1 litre of the reagent, dissolve 150 g of ammonium acetate, 3 ml of glacial acetic acid and 2 ml of acetyl acetone in distilled water (see EAS 153) and make up volume to 1 litre.

D.3 Extract

Mince the fish muscle tissue using a homogenizer. Macerate 10 g of the fish mince in 10 percent trichloroacetic acid for 2 minutes using a mortar and pestle and then filter through a filter paper (Whatman No. 42) and make up the volume to 100 ml in a standard volumetric flask.

D.4 PROCEDURE

Place 5 ml trichloroacetic acid extract of the tissue in a 50 ml beaker. Add 10 ml of distilled water (see EAS 153) and make the solution alkaline with a few drops of 30 percent NaOH and adjust the pH to 6.0 with 5 percent acetic acid. Make up the solution to 25 ml with water and mix 5 ml of it with 5 ml of acetyl acetone — ammonium acetate reagent. Keep the mixture still for 50 minutes at 37°C and read the colour at a wave length of 410 'nm'.

For a blank, take distilled water in duplicate in the place of sample and for standard, prepare a series of tubes using 100 pg formaldehyde standard solution, concentration ranging from 0-80 pg.

D.5 Calculations

$$\text{Formaldehyde (mg, percent)} = \frac{\text{Absorbance of sample} \times \text{Concentration in standard} \times 25 \times 100 \times 100}{\text{Absorbance of standard} \times 5 \times 5 \times 10 \times 1000}$$

Annex E (normative)

Determination of indole

E.1 Principle

Indole is extracted with light petroleum from trichloroacetic acid — precipitated shrimp muscle. The extracted indole, soluble in light petroleum, is reacted and re-extracted with Ehrlich's reagent. Indole in the form of a rose indole complex can be determined spectrophotometrically.

E.2 Apparatus

- a) Spectrophotometer, and
- b) Refrigerated centrifuge.

E.3 Reagents

- a) Trichloroacetic Acid (TCA) - Dissolve 6 g TCA in 100 ml distilled water.
- b) Light petroleum (Boiling point 40-60 °C)
- c) Ehrlich's Reagent — Dissolve 9 g paradimethylaminobenzaldehyde (PABA) in 45 ml concentrated HCl in 250 ml volumetric flask and dilute to volume with ethanol.
- d) Standard Indole Solutions — Accurately prepare stock solution of 10 mg indole in 100 ml light petroleum. Use 1: 10 dilution as working solution. Refrigerate indole solutions.

E.4 Procedure

E.4.1 Homogenize 40 g shrimp with 80 ml ice-cold trichloroacetic acid solution (TCA) in a waring blender for 1 minute. Add 80 ml ice-cold light petroleum and blend for 1 minute. Transfer homogenate to 250 ml centrifuge bottle and centrifuge for 10 minutes at 10 000 rev/min. Filter supernate through Whatman No. 1 paper under suction. Transfer filtrate to 250 ml separatory funnel. After the two layers have separated, transfer acid layer (lower) to second 250 ml separatory funnel.

E.4.2 Wash TCA

Denatured protein precipitate (separated by centrifugation) with 40 ml light petroleum and filter as described above. Transfer filtrate to second 250 ml separatory funnel already containing TCA layer from first extraction. Shake for 1 minute and let two layers separate. Transfer lower acid layer to third separatory funnel and extract for third time with 40 ml light petroleum.

E.4.3 Combine all light petroleum extracts into 1 separatory funnel. Extract indole with exactly 5 ml freshly prepared Ehrlich's reagent by vigorously shaking for 1 minute. The rose indole complex formed is quantitatively transferred to Ehrlich's reagent layer. When layers have separated, transfer lower layer to 1 cm path cell and read at 570 nm against reagent black solution.

E.4.4 Prepare standard curve as follows: Accurately measure volumes from 0.5 to 4 ml stock indole solution (working solution) and add into 80 ml TCA in a separatory funnel. Extract indole by procedures described above and construct standard curve. Rose indole complex from indole standard and from TCA-extracted shrimp is stable up to 4 h.

E.5 Calculation

With the help of the standard curve the amount of indole present in 40 g shrimp can be determined. Indole content is usually expressed as the amount of indole in microgram per 100 g shrimp muscle.

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