Article 6. Specifications for Marine Products

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1. Specifications

1) Marine Products

(1) Characteristics: Be suitable

(2) The number of bacteria

① Frozen fish/shellfish in a container packaging, which are sanitarily treated for marketing so that final consumer can eat without further cooking : Not more than 100,000 per g

② Frozen Changran : Not more than 3,000,000 per g

(3) Coliform Group

① Frozen fish shellfish in a container package, which is sanitarily treated for marketing so that end user can eat without further cooking : Not more than 10 per g

(4) In some marine products, which can be directly ingested with no more processing or thermal treatment, *Vibrio parahaemolyticus, Salmonella spp., Staphylococcus aureus, and Listeria monocytogenes* should be negative.

(5) Carbon Monoxide

① Frozen or Chopped, Cut Tilapia (Filet) : Not more than 20 ㎍/㎏

② Frozen or Chopped, Cut Tuna (Filet) : Not more than 200 ㎍/㎏

③ Frozen Tilapia (Only limited to vacuum packaged product) : Not more than 10 ㎕/L

(6) Tetrodotoxin

① Flesh : Not more than 10 MU/g

② Skin : Not more than 10 MU/g

③ The kind of edible swellfish

	Scientific name
1	*Fugu niphobLes, Takifugu niphobLes*
2	*Fugu poeciLonotus, Takifugu poeciLonotus*
3	*Fugu pardaLis, Takifugu pardaLis*
4	*Fugu vermicuLaris vermicuLaris, Takifugu vermicuLaris snyderi*
5	*Fugu vermicuLaris porphyreus, Takifugu porphyreus*
6	*Fugu obscurus, Takifugu obscurus*

7	*Fugu chrysops, Takifugu chrysops*
8	*Fugu rubripes rubripes, Takifugu rubripes*

	Scientific name
9	*Fugu rubripes chinensis, Takifugu rubripes chinensis*
10	*Fugu xanthopterus, Takifugu xanthopterus*
11	*LagocephaLus inermis*
12	*LagocephaLus wheeLeri*
13	*LagocephaLus gLoveri*
14	*Sphoeroides pachygaster, Liosaccus pachygaster*
15	*Fugu fLavidus, Takifugu fLavidus*
16	*ChiLomycterus affinis*
17	*Diodon hoLocanthus*
18	*Diodon Liturosus*
19	*Diodon hystrix*
20	*Ostracion cubicus*
21	*Fugu stictonotus, Takifugu stictonotus*

2) Agar

(1) Characteristics : Be suitable

(2) Moisture(%) : Not more than 22.0

(3) Crude Protein(%) : Not more than 3.0

(4) Crude Ash(%) : Not more than 6.0

(5) Insoluble Residue in Hot Water(%) : Not more than 4.0

(6) Boric Acid(%) : Not more than 0.1

3) Frozen Cod Head

(1) Definition

Frozen cod head refers to one made by cutting the cod head (*Gadus morhua, Gadus ogac, Gadus macrocephaLus*) with pectoral fin and ventral fin attached, quick-freezing it to below -18℃ and then, processing it to make it suitable for food.

(2) Requirements of Raw Material

(A) Raw materials shall be classified as edible ones (HS 0303-52) in accordance with the World Customs Organization's Convention on the Harmonized Commodity Description and Coding System and determined by the relevant authority that they are processed in a sanitary manner.

(B) The intestines, coagulated blood, and gills shall be removed when cutting raw materials.

(C) Food additives and others shall not be added.

(3) Specifications

① Characteristics: Be suitable.

② Heavy metal

a. Total mercury : Not more than 0.5 ㎎/kg

b. Lead : Not more than 0.5 ㎎/kg

③ *E. Coli* : Negative

④ The number of bacteria : Not more than 1,000,000 per g

⑤ Radioactivity

a. ^{131}I : Not more than 300 Bq/kg

b. $^{134}Cs+^{137}Cs$: Not more than 370 Bq/kg

(4) Test Method

① Total mercury

It is tested according to (5) Mercury, 3) Metal test, 6. Heavy Metal described in Article 10. General Testing Methods.

② Lead

It is tested according to (2) Lead, 3) Metal test, 6. Heavy Metal described in Article 10. General Testing Methods.

③ *E.Coli*

It is tested according to 6) E. Coli, 8. Microorganism described in Article 10. General Testing Methods.

④ The number of bacteria

It is tested according to 2) The number of bacteria, 8. Microorganism described in Article 10. General Testing Methods.

⑤ Radioactivity

It is tested according to 12. Radioactivity described in Article 10. General Testing Methods.

2. Test Method

1) Description (Sensory test)

In type (sensory test) test, some selective items such as appearance and color should be commonly applied to each marine product, and each product with designated test item should be not less than 3 points on average and not contain one point item in following score standard with the selective items.

Classification	Item	Score Standard
Common	Appearance (Shape)	1. Excellent treatment without damage & deformation is 5 points. 2. Good treatment without almost damage & deformation is 4 or 3 points according to its degree. 3. Damaged & deformed or bad treated one is 2 points. 4. Too much damaged & deformed or worst treated one is 1 point.
	Color (Gloss)	1. Excellent intrinsic color is 5 points. 2. Good intrinsic color is 4 or 3 points according to its degree. 3. Bad color is 2 points. 4. Too much bad color is 1 point.
	Assortment	1. When size & quality are uniform and foreign & broken product is not mixed, the material is 5 points. 2. When size & quality are uniform and foreign product is not mixed but broken product is little mixed, the material is 4 or 3 points according to its degree. 3. When size & quality are a little uneven and foreign product is not mixed but broken product is mixed, the material is 2 points. 4. When size & quality are uneven and foreign & broken product is mixed, the material is 1 point.
Live Fish /Shellfish	Activity	1. Live one with excellent activity and no damages by blight and harmful insects is 5 points. 2. Live one with good activity and no damages by blight and harmful insects is 4 or 3 points according to its degree. 3. Live one with common activity and no damages by blight and harmful insects is 2 points. 4. Live one with bad activity or damages by blight and harmful insects is 1 point.
Fresh chilled Product	Freshness	1. Excellent freshness & intrinsic fresh odor is 5 points. 2. Good freshness is 4 or 3 points according to its degree of intrinsic fresh odor. 3. Low freshness & little different odor(hydrogen sulfide, ammonia odor) is 2 points. 4. Bad freshness & different odor(hydrogen sulfide, ammonia odor) is 1 point.
Frozen Product	Freshness	1. Excellent freshness & intrinsic fresh odor is 5 points. 2. Good freshness is 4 or 3 points according to its degree of intrinsic fresh

		odor. 3. Low freshness & little different odor(hydrogen sulfide, ammonia odor) is 2 points. 4. Bad freshness & different odor(hydrogen sulfide, ammonia odor) is 1 point.
Frozen Product	Drying & rusting	1. Fully grazed or packaged one without drying and rusting is 5 points. 2. The one with relatively little drying and rusting is 4 or 3 points according to its degree. 3. The one with usual drying and rusting is 2 points. 4. The one with severe drying and rusting is 1 point.
Dried Product	Flavor	1. Excellent intrinsic flavor without blight & mold is 5 points. 2. Good intrinsic flavor without blight & mold is 4 or 3 points according to its degree. 3. Common intrinsic flavor without blight & mold is 2 points. 4. Bad intrinsic flavor without blight & mold is 1 point.
Salted Product	Flavor	1. Excellent intrinsic flavor with even saturation of salt to flesh is 5 points. 2. Good intrinsic flavor with even saturation of salt to flesh is 4 or 3 points according to its degree. 3. Common intrinsic flavor with a little uneven saturation of salt to flesh is 2 points. 4. Bad intrinsic flavor with uneven saturation of salt to flesh is 1 point.
Agar	Manufacturing	1. String, acid and powder agar The one without quick-freezing, kiln-drying, air-drying, and sand-mixing is 5 points. Powder, impression, and other agar The one with Even form & quality is 5 points. 2. String, acid and powder agar The one with little quick-freezing, kiln-drying, air-drying, and sand-mixing is 4 or 3 points according to its degree. Powder, impression, other agar The one with generally even form & quality is 4 or 3 points according to its degree. 3. String, acid, and powder agar The one with a little quick-freezing, kiln-drying, air-drying, and sand-mixing is 2 points. Powder, impression, and other agar The one with a little uneven form & quality is 2 points.

		4. String, acid and powder agar The one with Much quick-freezing, kiln-drying, air-drying, and sand-mixing is 1 point. Powder, impression, other agar The one with uneven form & quality is 1 point.

2) The number of Bacteria

Frozen sample should be thawed at 40 or lower with packaging itself as fast as possible and the surface of its container & packaging should be washed with 70% alcohol cotton. Then it should be tested under 2) The number of bacteria (the number of general bacteria), 8. Microorganism described in Article 10. General Testing Methods.

3) Coliform Group

Sample solution, which is prepared in above 2), should be tested by ② Quantitative Method using Desoxycholate Lactose Agar, (2) Quantitative test, 5) Coliform group, 8. Microorganism in Article 10. General Testing Methods.

4) Tetrodotoxin

It is extracted by acetic acid extraction Method and tested by toxicity test with the abdominal injection to mouse.

5) Carbon Monoxide Test Method

(1) Reagents

① Standard Carbon Monoxide : Correction gas (81.5 μL/L or similar concentration), it should be diluted by air in use.

② Sulfuric Acid : Special

③ n-octyl alcohol : Special

(2) Operation Condition of Gas Chromatograph

① Detector : Flame Ionization Detector(FID)

② Methanizer

③ Reduction Temperature : 350~400℃

④ Column: HP-MOLSIV capillary column (30m × 0.53 mm ID, 25 ㎛) or equivalents

⑤ Column temperature : injection at 60℃, maintained for 1 minute, elevated to 120℃(30℃/min) and maintained for 2 minutes.

⑥ Injection Temperature : 150~ 200℃

⑦ Detector Temperature : 150~ 200℃

⑧ Carrier Gas & Flow Rate : Nitrogen or Helium (flow rate should be properly adjusted at optimum condition)

(3) Test Method

① General Method

a) Test Method

ⓐ After being thawed, sample is peeled and finely cut, accurately weighed as 300 g, added by double quantity of water cooled by 4℃ and homogenized, (30 seconds for tuna, 1 minute for tilapia) This solution is used as sample solution.

ⓑ 200 g of sample solutions, which are prepared at its preparation date or after 2 days at 5℃, is taken to centrifuging tube and centrifuged(3,000rpm, 10 min.) at 10℃ and its upper phase is taken.

ⓒ Upper phase 50 mL is put to 100 mL head-space bottle and added by 5 drops of n-octyl alcohol, 5 mL of water, 20 mL of 20% sulfuric acid, and sealed and then severely shaken for 2 minutes. After being settled for 10 minutes, sample is again shaken for 1 minute and 1 mL of gas phase from bottle is taken by gas-tight syringe and then injected in Gas chromatograph.

ⓓ After diluting standard carbon monoxide with clean air or nitrogen gas to proper concentration, the diluted sample 1 mL is injected to gas chromatograph by gas-tight syringe and calibration curve is drawn from acquired peak area and then a quantity of carbon monoxide in sample is acquired. When carbon monoxide concentration from fish flesh is acquired, the following coefficient is utilized.

Weight of 1 mL standard carbon monoxide (20℃) = carbon monoxide Conc. of standard gas x 1.165 ㎎

ⓔ if the concentration of carbon monoxide is over 20 ㎍/g in tilapia, 200-500 ㎍/g in tuna, sample solution of ⓐ is put into open vessel, homogenized and stored at 5℃ for 2 days. And then procedure of ⓑ-ⓒ is repeated and measured the residue of carbon monoxide.

ⓕ Comparing the concentration of carbon monoxide in ⓐ and ⓐ after storing at 5℃ for 2 days, it is used to determine if the sample is treated or not

b) Judgment of the Presence of Carbon Monoxide Treatment

ⓐ When analysis data at sample solution preparation date is not more than 20 ㎍/㎏ in tilapia & 200 ㎍/㎎ in tuna, it is judged that carbon monoxide is not treated.

ⓑ When analysis data at sample solution preparation date is not less than 500 ㎍/㎎ in tuna, it is judged that carbon monoxide is treated.

ⓒ Except for above cases, when analysis data, which is preserved for 2 days from sample solution preparation date, is clearly decreased more than 10% from analysis data at sample solution preparation date, it is judged that carbon monoxide is treated.

② Test Method of Vacuum Packaged Tilapia

a) Test Method

Clean air 1.5 mL is taken by gas-tight syringe and injected to vacuum packaging and then immediately 1.0 mL of clean air is again taken and tested in gas chromatograph and quantitatively measured.

b) Judgment of the Presence of Carbon Monoxide Treatment

ⓐ In case of being detected at not more than 10 ㎕/L,

It is judged that carbon monoxide is not treated.

ⓑ In case of being detected at 10~100 ㎕/L,

It should be tested under ① General method and judged.

ⓒ In case of being detected at not less than 100 ㎕/L,

It is judged that carbon monoxide is treated.

6) Moisture

(1) Loss on Drying Method

It is tested according to ① Atmospheric thermal drying method, (1) Loss on Drying Method, 1) Moisture, 1. General composition described in Article 10. General Testing Methods.

(2) Infrared Moisture Measurement

Sample 2~10 g is taken in drying dish and dried until its weight is constant in Infrared Moisture Meter, which is controlled at 105± 1℃, and reduced weight is calculated and set as moisture content.

7) Crude Protein

It should be tested according to (1) Total nitrogen & crude protein, 3) Nitrogen complex, 1. General composition described in Article 10. General Testing Methods.

8) Ash

Sample 1~2 g is accurately weighed and tested according to 2) Ash, 1. General composition described in Article 10. General Testing Methods.

9) Insoluble Residue in hot water

Sample 5 g is accurately weighed and put to beaker and added by 0.05 N hydrochloric acid solution 300 mL and boiled to be melted for about 5 minutes and then this solution is absorbed & filtered in glass filter(IG4), of which constant weight is previously acquired, and the filter is dried in a drier at 105℃ and its constant weight is acquired.

Insoluble reside in hot water(%) =

S: weight of sample (g)

a: constant weight after drying (g)

b: constant weight of glass filter (g)

10) Boric Acid

It follows colorimeter method by Curcumin.

(1) Reagent

① Oxalic Acid-Acetone Solution : Oxalic acid 50 g is melted in acetone 500 mL and then filtered.

② Curcumin Solution : Curcumin(special) 0.1 g is melted in ethanol 400 mL.

③ Standard Boric Acid Solution: After drying in desiccator for 5 hours, 500 ㎎ of boric acid(H_3BO_3, special) is accurately taken and melted in water to prepare 1 L standard solution. 1 mL of this solution corresponds to 10 ㎍ of boric acid.

(2) Treatment

① Sample 1~2 g(equivalent to 0.3~0.8 ㎎ as boric acid) is taken in porcelain crucible and added by 1% sodium carbonate (Na_2CO_3) solution to be alkali and well mixed and then evaporated in water bath and incinerated in electric furnace of 500℃.

② Incinerated sample is melted by small amount of hydrochloric acid(HCl) (1:9) to be acidic and added by water to be 100 mL.

③ 2.0 mL of sample solution is taken in porcelain crucible and added by 1% Na_2CO_3 solution to be alkali and then evaporated in water bath.

④ After cooling residue, sample is added by HCl(1:4) 1 mL, oxalic acid-acetone solution 5 mL & curcumin solution 2 mL and heated at 55± 2 in water bath for 2.5 hours.

⑤ After cooling this, residue is added by acetone 20~30 mL to be melted and transferred to volumetric flask (100 mL) and several times washed by acetone and added to the flask to be 100 mL and its absorbance is measured at 540 nm.

⑥ Standard boric acid solutions 0.5~4 mL are separately taken in several steps and their absorbance are measured by same treatment to make calibration at the same time blank test is performed to revise the curve.

(3) Calculation

Boric acid (%) = $\frac{A}{S} \times V \times \frac{1}{10,000}$

S: Weight of sample (g)

A: Concentration of test solution acquired from calibration curve (㎍)

V: Dilution multiple