TCVN

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Version 1

FROZEN TUNA – SPECIFICATIONS

Frozen tuna – Specifications

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Foreword

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Frozen tuna – Specifications

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1 Scope of application

This Standard applies to frozen tuna products for direct consumption or for pre-processing of yellowfin tuna (*Thunus albacares*, Bonnaterre, 1788) and bigeye tuna (*Thunnus obesus*, Lowe, 1839).

2 Normative references

The following references documents are very essential for the application of this standard. For the references has the publication year in it, the indicated version shall be applicable. For the references doesn't have the publication year in it, then the latest version is applicable, including any amendments and modifications (if any).

TCVN 4830-1:2005 (ISO 6888-1:1999, With Amd. 1:2003), *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*

TCVN 4884-1:2015 (ISO 4833-1:2013), *Microbiology of the food chain - Horizontal method for the enumeration of microorganisms - Part 1: Colony count at 30 degrees C by the pour plate technique*

TCVN 7924-1:2008 (ISO 16649-1:2001) *Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of β-glucuronidase-positive Escherichia coli – Part 1: Colony-count technique at 44 °C using membranes and 5-bromo-4-chloro-3-indolyl β-D-glucuronida*

TCVN 10780-1:2017 (ISO 6579-1:2017), *Microbilogy of food chain - Horizonatal method for the detection, enumeration and serotyping of Salmonella - Part 1: Dectection of Salmonella*

ISO 11290-1:2017, *Microbiology of the food chain — Horizontal method for the detection and enumeration of Listeria monocytogenes and of Listeria spp. — Part 1: Detection method*

TCVN 7905-1:2008 (ISO/TS 21872-1:2007), *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*

TCVN 5276:1990, *Aquatic products – Sampling and preparation of sample*

TCVN 7602:2007, *Foodstuffs – Determination of lead content by atomic absorption spectrophotometric method*

TCVN 7603:2007, *Foods – Determination of cadmium content by atomic absorption spectrophotometric method*

TCVN 7604:2007, *Foods – Determination of mercury content by flameless atomic absorption spectrophotometric method*

AOAC 983.20, *Mercury (methyl) in fish and shellfish: Gas chromatographic method*

AOAC 988.11, *Mercury (methyl) in fish and shellfish: Rapid gas chromatographic method*

AOAC 990.04, *Mercury (methyl) in seafood: Liquid chromatographic - atomic absorption spectrophotometric method*

TCVN 6507-3:2005 (ISO 6887-3:2003), *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*

TCVN 8352:2010, *Fish and fishery products - Determination of histamine content - Method using high-performance liquid chromatography*

TCVN 11047:2015, *Fish and fishery products - Determination of histamine content - Fluorometric method*

TCVN 12153:2018, *Tuna's raw material*

TCVN 12750:2019 (ISO 11035:1994), *Sensory analysis – Identification and selection of descriptors for establishing a sensory profile by a multidimensional approach*

QCVN 8-2:2011/BYT, *National technical regulation on the limits of heavy metals contamination in food*

3 Terms and Definitions

This standard uses the following terms and definitions:

3.1

Tuna loin

The flesh of fish without skin, fins, with or without bones, taken from the body of a tuna by cutting parallel to the backbone

3.2

Preliminarily prepare

Process that includes cleaning steps; cut off the head and tail; fish fillet; skin type, dark meat, offal and with or without bone removal

3.3

Frozen tuna

Tuna loin, other products cut from tuna loin without additives, processing aids or additives, processing aids are frozen, ensuring the heart of the meat is in the best part. thickest reaches -18ºC or below, stored and transported at -18ºC or below.

4 Technical requirements

4.1 General requirements

Frozen tuna production facilities must meet current regulations on hygiene and food safety assurance.

4.2 Requirements for raw tuna

Raw tuna has a complete profile to meet current regulations.

For raw tuna in fresh chilled or cold-preserved at a temperature of - 1^0C to 4^0C meeting the organoleptic criteria according to grades 1, 2 or 3 according to TCVN 12153:2018;

For raw tuna in frozen, always maintain the storage temperature at - 18^0C or lower before being put into the factory.

4.3 Preliminarily prepare

Preliminary processing is carried out in a period of not more than 25 minutes/fish and the temperature of the semi-finished products is always maintained at a temperature less than or equal to 4ºC.

4.4 Additives or processing aids

The use of additives or processing aids that meet current regulations on dosage and use is allowed.

The temperature of the incubation room is always maintained from -1ºC to 4ºC and the incubation time does not exceed 36 hours.

4.5 Freezing tuna loin

Tuna loin freezing is considered complete when the temperature at the center of the thickest part reaches -18ºC or lower.

4.6 Shaping and packaging

During shaping and packaging, the temperature at the center of the thickest part of the product is always maintained at -18ºC or lower.

Packaging and containers are made of materials that meet current regulations on ensuring food safety.

4.7 Sensory criteria

Table of sensory criteria is specified in Table 1

Table 1 - Sensory quality ranking of frozen tuna

Name of index	Request			
	Grade AAA	**Grade AA**	**Grade A**	**Grade B**
External inspection	The surface of the fish is shiny, the fish mass is clear. Outer layers are clearly visible Fish with additives or processing aids: pink to bright red Fish without additives or processing aids: Rose red to dark purple	The surface of the fish is less glossy, clear, less fresh Only fat veins can be seen on the outer layer Fish with additives or processing aids: pink to bright red Fish without additives or processing aids: Rose red to dark purple	Fish is not shiny, less bright. Can't see the grease Fish with additives or processing aids: Dull and opaque fish color Fish without additives or processing aids: Slightly brown color	Fish is not shiny, not bright Can't see the grease Fish with additives or processing aids: Dull and opaque fish color Fish without additives or processing aids: Brown
Muscle structure	The flesh is firm, elastic quickly when lightly pressed with the fingertips. No soft spots on the surface of the fish	The flesh is firm, elastic slowly when pressed lightly with the fingertips. There are one or two very small soft spots on the surface of the fish	The fish is less firm, not fully elastic when pressed lightly with the tip of a finger. Some small soft spots on the surface of the fish	The fish is tender, not elastic when lightly pressed with the fingertips. Large soft areas on the surface of the fish
Odor	Characteristic fresh smell of fish, no unpleasant smell			There is no characteristic fresh smell of fish
NOTE: Quality level grades AAA: Highest quality level for ready-to-eat or further product processing; AA: Next level of quality for ready-to-eat or further product processing; A: Quality level for further processing of products; B: The next level of quality used for further processing of products.				

4.8 Food safety requirements

4.8.1 Heavy metals content of chilled poultry fish

The maximum heavy metal pollution limits for frozen tuna are specified in Table 2 .

Table 2 - Heavy metals content

No.	Name of index	Maximum level (mg/kg)
1	Cadimi (Cd)	0,1
2	Lead (Pb)	0,3
3	Mercury (Hg)	1,0
4	Mercury (methyl) (MeHg)	1,0

4.8.2 Histamin

Permissible limits for histamine content in frozen tuna products are specified in Table 3 .

Table 3 - Permissible limit for histamine content

Name of index	Sampling plan		Limits (mg/kg)	
	n	c	m	M
Histamin	9	2	100	200
IN WHICH: n is the number of sample taken. c is the maximum allowed sample in n sample can have results between m and M. m is low limit. M is high limit. If there is a sample has results higher than M mean does not meet standard.				

4.8.3 Microbiology index

Permissible limits for microorganisms in frozen tuna products are specified in Table 4 .

Table 4 – Permissible limits for microorganisms

Criteria	Sampling plan		Litmit (CFU/g)	
	n	c	m	M
1. Ready to eat products				
Total anaerobic plate count	5	2	10^4	10^5
E.coli	5	0	Not detect	
Listeria monocytogenes	5	0	Not detect	
Vibrio choleral/25g	5	0	Not detect	
Salmonella/25 g	5	0	Not detect	
Coagulase-positive Staphylococcus aureus	5	0	Not detect	
2. Products heat treatment before eating				
Total anaerobic plate count	5	2	5×10^5	5×10^6
E.coli	5	2	5×10^2	5×10^3
Salmonella/25 g	5	0	Not detect	
IN WHICH: n is the number of sample taken. c is the maximum allowed sample in n sample can have results between m and M. m is low limit. M is high limit. If there is a sample has results higher than M mean does not meet standard.				

5 Test methods

5.1 Sensory evaluation methods

5.1.1 Sample preparation

Sensory evaluation samples with a thickness of 2.5 - 3 cm, thawed by soaking in clean water with a temperature of 18 - 20 ºC until the piece of fish feels soft (about 15 - 20 minutes), placed on a white plate, clean.

5.1.2 Evaluation methods

Perform sensory evaluation according to TCVN 12750:2019

A list of terms for sensory descriptions can be found in Appendix A .

5.2 Cadimi determination as TCVN 7603:2007 or TCVN 8126:2009.

5.3 Lead determination as TCVN 7602:2007 or TCVN 8126:2009.

5.4 Mercury determination as TCVN 7604: 2007 (AOAC 971.21)

5.5 Mercur methyl determination as AOAC 983.20 as AOAC 988.11 as AOAC 990.04

5.6 Histamin determination as TCVN 11047:2015 or TCVN 8352:2010

5.7 *Listeria monocytogenes* detection as ISO 11290-1:2017

5.8 *Vibrio choleral* detection as TCVN 7905-1:2008 (ISO/TS 21872-1:2007)

5.9 *Coagulase-positive Staphylococcus aureus* detection as TCVN 4830-1:2005 (ISO 6888-1:1999, with Amd 1:2003)

5.10 S*almonella* detection as TCVN 10780-1:2017 (ISO 6579-1:2017)

5.11 Total anaerobic bacteria determination as TCVN 4884-1:2015 (ISO 4833-1:2013)

5.12 *E.Coli* detemination as TCVN 7924-1 : 2008, TCVN 7924-2:2008 (ISO 16649-2:2001), TCVN 7924-3:2008 (ISO 16649-3:2005)

6 Labeling

According to current requirements on labeling.

7 Transportation, storage, shelf-life and traceability

7.1 Storage and transportation

Frozen tuna must be stored, transported by specialized means, ensure food hygiene and safety and have an ambient temperature maintained at -18ºC or lower.

7.2 Traceability

Comply with current legal requirement.

Appendix A

List of terms for sensory description of frozen tuna products

(Reference)

No.	Term	Scale (0-5)	Definition and assessment
1. Appearance			
1.1	Surface gloss	No Gloss → Very Glossy	Use a sharp knife to cut the fish into slices, observe the cut surface and evaluate the light contrast from the surface
1.2	Surface brightness	Very dark/dark → Very light/fresh	Brightness as seen by the eye
1.3	Translucent	No translucent → Very translucent	Hold the fish in front of the light source, if a part of the light is able to penetrate the meat, then the transparency is strong.
1.4	Rainbow light	None → Very clear	Observe the rainbow on the surface. No rainbow is Grade A, if there is a rainbow, it is Grade B, from Grade B down it doesn't matter the rainbow
1.5	Metallic luster	None → A Lot	Appearance of iridescence around points of decay, discolouration or discoloration, is a sign of poor quality
1.6	Fatness	No fatness → Very fatness	Observe the amount of fat more or less on the surface of the slice by assessing the amount of exudate on the surface after cutting
1.7	Crushing degree	Not crushed → Very broken	Observe muscle mass
1.8	Red (meat without additives or processing aids)	Rose red → Dark purple red	Observe the white flesh of the fish body, pinkish red (like the color of a young watermelon), dark purple red (like the color of a ripe plum)
1.9	Brown (meat without additives or processing aids)	Light brown → Dark brown	Observe the white flesh of the fish loin, light brown (low milk coffee) dark brown (dark chocolate color), for meat without additives or processing aids

No.	Term	Scale (0-5)	Definition and assessment
1.10	Red (meat with additives or processing aids)	Rose red → Magenta	Observe the white muscle of the carcass meat, which is brighter red than the meat sample without additives or processing aids, and when defrosted it does not brown. When boiled meat is whiter than meat, no additives or processing aids are added.
1.11	White (sunshine or TS gas color)	Bright white → Opaque white	Observe the white muscle of the fish body, the color is from bright white to milky white, there is dehydration, contraction and fragmentation of the muscle, the higher the intensity, the lower the quality.
1.12	Amount of fat veins	None → Many	Only in the breast, see how much fat is on the surface of the slice
1.13	Scratch degree	None → A lot	For assessment of whole fish, observe the skin surface, may be scratched but not deeply embedded in the flesh
2. Structure by hand			
2.1	Firmness	Very flimsy → Very sure	Hang the piece of fish up with 2 fingers, use the other hand to stretch the meat fibers with a moderate force. The more easily the fibers fall apart, the less firm they are, and vice versa.
2.2	Elasticity	Not elastic → Very elastic	Apply a force to the surface of the fish. The easier it is for the product to return to its original shape, the higher the elasticity
2.3	Soft spot	None → Many soft spots	Observe the meat surface, detect abnormal soft spots due to biochemical damage, the more soft spots, the higher the intensity.
2.4	Flexibility	Not flexible → Very flexible	Using two fingers, roll a small piece of fish, round it on your hand, if the piece of fish is shaped according to the

No.	Term	Scale (0-5)	Definition and assessment
			hand's grip, it will be more flexible and vice versa.
2.5	Stickiness	Non-stick → Very sticky	Use your fingers to see if the pieces of fish stick to your hand more or less, reflecting the fatty character of the product. Fresh is good, less fresh is sticky
2.6	Shameful bottle	None → Many	By hand to judge on the piece of meat there are parts that are not soft and callous
3. Structure by mouth			
3.1	Toughness	Not tough → Very tough	Use a knife to cut a piece of fish of sufficient size, chew and stir in the mouth with the front teeth and molars to assess the toughness of the fish meat.
3.2	Flexibility	Not flexible → Very flexible	Use a knife to cut a piece of fish of sufficient size, chew and stir in the mouth with the incisors and molars to assess the plasticity of the fish meat.
3.3	Roughness	Not grainy → Very grainy	Use a knife to cut a piece of fish to the right size, bite or chew the piece of fish a few times to evaluate the texture of the fish meat.
3.4	Friction	Not frivolous → Very frivolous	Use a knife to cut a piece of fish of sufficient size, chew and stir in the mouth with the incisors and molars to assess the friability of the fish.
3.5	Succulent degree	Very dry → Very succulent	Use a knife to cut a piece of fish of sufficient size, chew and stir in the mouth with the front teeth and molars to evaluate the succulence of the fish.
4. Smell			Cut a small piece, if necessary, then crush it, put the piece of fish up to your nose and smell it. Then eat a small piece, then exhale through the nose to

No.	Term	Scale (0-5)	Definition and assessment
			smell backwards and evaluate the flavor of the product
4.1	Natural fishy smell	None → Very strong	
4.2	The smell of seaweed	None → Very strong	
4.3	The smell of cold air	None → Very strong	
4.4	The smell of cucumber	None → Very strong	
4.5	Sweet corn smell	None → Very strong	
4.6	The smell of rice	None → Very strong	
4.7	The smell of watermelon	None → Very strong	
4.8	Metallic smell	None → Very strong	
4.9	Characteristic fish flavor	None → Very strong	It is a unique flavor to distinguish it from other meats, sensed by reverse smell
4.10	Rancy oil	None → Have	
4.11	The smell of lactic fermentation	None → Have	
4.12	The smell of rotten fish	None → Have	
4.13	Fishy smell	None → Have	
4.14	The smell of damp cardboard	None → Have	
4.15	Cold burning smell (cold storage)	None → Have	
4.16	The smell of rotten radish	None → Have	
4.17	Mùi khoai hà/sùng	None → Have	
4.18	The smell of sweet potato/sweetness	None → Have	

No.	Term	Scale (0-5)	Definition and assessment
4.19	The smell of antibiotics	None → Have	
5. Taste			Cut a small piece, put it in your mouth to chew, focus to evaluate the taste felt on the surface of the tongue
5.1	The sweetness of fish meat	None → Very strong	
5.2	Sour	None → Very strong	
5.3	Salty	None → Very strong	