



Technical Specifications for the manufacture of:

CANNED MACKEREL

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1. SCOPE

This specification applies to **Canned Mackerel** distributed by WFP, hermetically sealed and processed by heat to achieve commercial sterility and prevent spoilage. The fish will be packed in 200g or 425g cans, in a medium of tomato sauce with or without vegetable oil and brine.

2. RAW MATERIALS

2.1 Mackerel

Canned fish shall be manufactured from fresh or frozen fish of a quality fit for human consumption. As mackerel belongs to the family of fish with high risk from scombroid toxin, post-harvest handling of the starting raw material must prevent histamine formation through strict time and temperature controls. The following species can be used in mackerel canning:

- *Scomber scombrus* (Atlantic mackerel)
- *Scomber japonicas* (Chub mackerel)
- Other species of *Scomber*
- *Decapterus maruadsi* (Japanese scad)
- *Rastrelliger kanagurta* (Indian mackerel)
- Other species of *Rastrelliger*
- *Cololabis saira* (Mackerel pike)
- Species of *Scomberomorus*
- Species of *Auxis*

2.2 Vegetable oil and fat

Vegetable oil, if used in pre-cooking fish or as an ingredient, should conform to:

- Codex Standard for Named Vegetable Oils (CODEX STAN 210-1999);
- Codex Standard for Olive Oils and Olive Pomace Oils (CODEX STAN 33-1981);
- Codex Standard for Fats and Oils not Covered by Individual Standards (CODEX STAN 19-1981).

2.3 Tomato and tomato sauce

Tomato used in manufacturing tomato sauce shall conform to Codex Standard for Tomatoes (CODEX STAN 293-2008) or Codex Standard for Preserved Tomatoes (CODEX STAN 13-1981).

Tomato sauce used as a medium for filling shall be manufactured in accordance with Codex Standard for Tomatoes (CODEX STAN 293-2008).

2.4 Other ingredients and food additives

All other ingredients and food additives used for canning shall be of food grade quality and conform to all applicable Codex standards.

3. PROCESSING

Canned Mackerel shall be manufactured in accordance with:

- Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003);
- Codex Standard for Canned Finfish (CODEX STAN 119 - 1981, REV. 1 – 1995);
- Recommended International Code of Practice for Canned Fish (CAC/RCP 10-1976);
- Recommended International Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned Foods (CAC/RCP 23-1979);
- Recommended International Code of Practice: General Principles of Food Hygiene, CAC/RCP 1-1969 Rev 3 1997 Amended (1999) including Annex “Hazard Analysis and Critical Control Point (HACCP) System and Guidelines for its application”.

For compliance with Codex standards, the processor must be able to demonstrate by principle and practice the adoption, implementation and recording of:

- Good Manufacturing Practices
- Hazard Analysis Critical Control Point program

In this context an appointed WFP Inspector / Quality Surveyor is entitled to visit the factory without prior notice during any period when WFP product is being manufactured to check that the GMP and HACCP systems are in place. The Inspector / Quality Surveyor may request to see:

- **Records** (i.e. names of people in charge of the process and quality control, temperatures and other details of the thermal process establishment, retort records, visual inspection and teardown for empty and seamed cans, incoming inspection of empty cans, cooling water chlorination, Cook-Chex monitoring records, swab test results, etc).
- **Procedures** (e.g. SSOPs such as cleaning, personnel hygiene and their verification; HACCP; sampling and analysis protocols for raw material and finished products, decomposition controls, retorting by-pass controls, etc).
- **Instructions** (e.g. process instructions, cleaning instructions, testing instructions).
- The **SSOPs, HACCP Plan and Quality Manual** for the process or factory.

The producer must be *registered under national food law* as a processor of foods for human consumption. In addition, the producer must have a *legal authorization* to produce this commodity in the country where the factory is located and the country where the product will be exported (e.g. *FCE- Food Canning Establishment- and SSID- Process Filing- numbers in the USA or equivalent*).

4. PRODUCT SPECIFICATIONS

4.1. General requirements

Net weight: 200 or 425grams (will be specified in the tender document and contract).

Drained weight: Min. 60% of net weight.

Number of fish (*headed, gutted, viscera, tail and fins are removed*):

- 2-4 pieces* for 200g cans
- 5-7 pieces* for 425g cans

Odour, flavour and texture: Canned mackerel shall have an odour, flavour and texture characteristic of the mackerel genus and the tomato sauce used as fill medium and shall not contain any objectionable odour, flavour and texture of any kind.

** number of pieces shall be adjusted to obtain a appropriate headspace during filling*

4.2. Thermal process establishment

The manufacturing facility shall establish the thermal processes used to assure commercial sterility of its canned products through scientific validation studies. Thermal process establishment must consist of two parts: 1) temperature distribution studies specific to the process lines and retort systems used; and 2) heat penetration studies specific to the product form, fill medium, ingredients and can size. The results for such studies must determine how the **minimum Fo value to achieve commercial sterility** is achieved when the operating parameters for the facility's cook schedules are followed. The studies shall also determine the critical factors for the thermal process, provide alternative process schedules, document the retort configuration and instrumentation, determine vent schedules and cooling protocols. Retort records must provide proof that these are monitored and complied. Such records shall be reviewed by a trained individual within 24 hours of the completion of the cook. Thermal processes must be established prior to use and validated at a frequency that reflects any changes that may impact the safety of the process or product. In the absence of such validation triggers, thermal process validation may be done annually or once every two years.

4.3. Hygiene

4.3.1 The final product shall be free from any foreign material that poses a threat to human health.

4.3.2 When tested by appropriate methods of sampling and examination prescribed by the Codex Alimentarius Commission, the product:

- shall be free from micro-organisms capable of development under normal conditions of storage; and
- no sample unit shall contain histamine that exceeds 20 mg per 100 g. This applies only to species of the families *Scombridae*, *Clupeidae*, *Coryphaenidae*, *Scombresocidae* and *Pomatomidae*.
- shall not contain any other substance including substances derived from microorganisms in amounts which may represent a hazard to health in accordance with standards established by the Codex Alimentarius Commission; and
- shall be free from container integrity defects which may compromise the hermetic seal.

4.4. Chemical contaminants and toxins

Contaminants and toxins in the **Canned Mackerel** could come from the fish itself, the fishing grounds, from ingredients, equipment, utensils and even from the cans. These shall not exceed the levels or country-specific regulatory requirements, whichever is stricter.

Canned Mackerel shall not contain pesticide residues in amounts which may represent a hazard to health. In some markets, there are chemical requirements about can lacquers.

4.5 Hermetic seal

The manufacturing facility shall have an incoming goods sampling program for empty cans and lids. Specifications for can bodies and ends must be on file and specific to the can supplier. They shall include details of can dimensions, end profile, can body weight, can body and end thickness, side seam weld, empty can water capacity, external and internal lacquers (coatings), seam dimensions of the sealed end. The seam dimensions must specify acceptable range or limits for parameters, such as seam thickness, seam length, body hook and cover hook, needed to calculate overlap as well as those, such as vacuum, countersink, wrinkle, that could indicate potential can defects from the seaming operation.

During production, the manufacturing facility shall ensure that seamers are operated to match the can properties and obtain a vacuum to maintain a hermetic seal. Checks for defects in seamed finished product cans shall be done visually at a minimum of every 30 minutes. In addition, seam teardowns must be carried out at minimum every four hours, using either a micrometer or a seam projector. All seaming records are considered legal documents and therefore, must be recorded accurately and reviewed within 24 hours of production.

4.6. Shelf life

It shall retain normal product qualities for at least three years from the date of manufacture when stored dry at ambient temperatures prevalent in the country of destination. Thermal processing, seaming and other HACCP records shall be kept for a minimum of shelf-life plus one year.

5. PACKAGING

Canned Mackerel can be packaged into 200g or 425g tin can to constitute the primary packaging. The secondary packaging is cartons to facilitate transportation and storage.

5.1. Tin can

The metal containers (tins) must be coated internally and externally with lacquers appropriate for the product. Specifications and guarantees for the material, lacquers and other treatments used shall be available. Likewise, the facility must obtain the acceptable ranges and limits for the double seam dimensions and other characteristics of the filled can specific to the can type, size and supplier. Together with fill standards required for the product, these specifications will be used to ensure the finished product is hermetically sealed during the seaming operation.

Some guidelines are shown in table 1.

Table 1: Specification for tin can

	Can size	
	200g	425g
Can size	74.1 x 59.0 mm	115.0 x 75.0 mm
Can weight	29.9g	59.0g
Internal tin coating mass	8.4- 11.2g/m ²	
External tin coating mass	2.8- 11.2g/m ²	
Lid type	regular or easy open	

5.2. Cartons

Cartons should be new, strong cardboard cartons containing 50 tin cans of 200g or 24 tin cans of 425g, manufactured from well-constructed single wall, fluted paper, corrugated board with a specific weight of approximately 750g per square meter. This specific weight corresponds to a carton weight of approximately 560g.

- Cartons should have burst strength (edge crush test) of approximately 44 pounds per square inch or 3.2 kg/ cm² or equivalent.
- Carton sides and flaps should be glued, not stapled or strapped.
- Substance of cartons 275-120-275 (750g per m²).

Slip sheets or plywood should be placed inside each container at every three layer of cartons to provide the required stacking strength. Pallets with appropriate stacking configuration could also be used.

6. MARKING

6.1. On tin cans

The following information should be available on tins:

- Name of the product
- Net weight
- Name of manufacturing facility (including country of origin)
- Batch number (should be traceable to retort and seamer used for manufacturing)
- Production date (and shift, if there is more than one shift)
- Best before date / Expiry date
- Additional marking as per contractual agreement

6.2. On cartons

The following information should be available on each carton:

- Name of the product
- Number of tins per carton
- Net weight
- Name and address of the supplier (including country of origin)
- Production date
- Expiry date
- Additional marking as per contractual agreement

7. STORING

Canned Mackerel must be stored under cool, dry and hygienic conditions.

8. INSTRUCTION FOR USE

Consume all contents once opened.

9. ANALYTICAL REQUIREMENTS

The principal tests in table 2 must be performed in order to check if the quality of the **Canned Mackerel** meets above requirements. Additional analyses shall be defined in case of further quality assessment is required.

Table 2: Limit of compulsory tests and reference method

No	Tests	Requirements		Reference method (or equivalent)
		200g cans	425g cans	
1				
2	Number of fish (headed, gutted, viscera, tail and fins are removed)	2-4 pieces	5-7 pieces	Visual inspection
3	Net weight	200g	425g	CODEX 119 - 1981, Rev.1-1995
4	Drained weight (60% of net weight)	Min. 120g	Min. 255g	CODEX 119 - 1981, Rev.1-1995
5	Can size and weight	74.1 x 59.0 mm; 29.9g	115.0 x 75.0 mm; 59.0 g	Can manufacturer specifications
6	Fish species	<ul style="list-style-type: none"> - <i>Scomber scombrus</i> (Atlantic mackerel) - <i>Scomber japonicas</i> (Chub mackerel) - Other species of <i>Scomber</i> - <i>Decapterus maruadsi</i> (Japanese scad) - <i>Rastrelliger kanagurta</i> (Indian mackerel) - Other species of <i>Rastrelliger</i> - <i>Cololabis saira</i> (Mackerel pike) - Species of <i>Scomberomorus</i> - Species of <i>Auxis</i> 		Visual inspection
7	Organoleptic (texture, color, smell, taste)	Characteristic of fresh fish and good quality fill medium		CAC-GL31-1999
8	- Thermal Process - Incubation Tests	Minimum Fo value, cook schedules		- Temperature distribution, heat penetration study, retort records - GB/T4789.26 (2003); TIS 335; BAM Chapter 21A
9	Seam checks	Specific to can size, type, supplier		Vacuum, overlap, seam records
10	Total Coliform	Max. 40cfu/g		BS 5763:1991 Part 2
11	Escherichia Coli	Max. 10cfu/g		AOAC 966.23B,
12	Salmonella	Absence (in 25g of sample)		ISO 6579:2002
13	Staphylococcus aureus	Absence (in 25g of sample)		AOAC 975.55
14	Lysteria monocytogenes	Absence (in 25g of sample)		AOAC 993.09 AOAC 994.03
15	Mercury (Hg)	Max. 0.5ppm		AOAC 977.15
16	Cadmium (Cd)	Max. 0.05ppm		AOAC 945.58
17	Lead (Pb)	Max. 0.5ppm		AOAC 972.23
18	Inorganic Arsenic (As)	Max. 1.0ppm		AOAC 986.15
19	Tin (Sn)	Max. 200ppm		AAS
20	Melamine	Max. 250ppm		ELISA AgraQuant® kit. Romer Labs. http://www.romerlabs.com/pdts_kits.htm
21	Para red	Absence		HPLC or LC-MS/MS
22	Rhodamine	Absence		HPLC or LC-MS/MS
23	Sudan red dyes (I, II, II and IV)	Absence		HPLC or LC-MS/MS
24	Histamine	Max. 10 mg/100 g		AOAC977.13