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Recommended code of practice the processing and handling of thermally processed fish products

DEPARTMENT OF TRADE & INDUSTRY PHILIPPINES

BUREAU OF PRODUCT STANDARDS

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Foreword

This project is composed of the Technical Working Group (TWG) of different agencies and industry groups namely the Industrial Technology Development Institute (ITDI) of the Department of Science and Technology (DOST), Bureau of Food & Drugs (BFAD) of the Department of Health (DOH), Bureau of Agriculture and Fisheries Product Standards (BAFPS), Bureau of Product Standards (BPS), Bureau of Export and Trade Promotions (BETP) and Food Products Division (FPD) of the Department of Trade and Industry (DTI), Philippine Chamber of Food Manufacturers Incorporated (PCFMI) and Integrated Food Manufacturers Association of the Philippines (INFOMAPP).

The Philippine Council for Industry and Energy Research (PCIERD) of the DOST is the financing agency while the Philippine Food Processors and Exporters Organization, Inc. (PHILIFOODEX) signifies as the collaborating agency and the Department of Food Science and Nutrition (FSN) of the College of Home Economics, University of the Philippines – Diliman Campus as the implementing agency.

The TWG's main task is to draft standards and codes of practice for identified ethnic food products which will be later adopted as national standards after a series of reviews and public consultation in coordination with the Bureau of Food and Drugs.

In the preparation of this standard, related Codex Alimentarius standards were considered.

Recommended code of practice for the processing and handling of thermally processed fish products

1 Scope and purpose

This Code of Practice is concerned with the receipt of raw materials and ingredients, preparation and thermal processing of fish products as defined in this Code, in order to conform to the required standards stated in PNS/BFAD 06:2006. The product may be prepared from different species of fish used for thermal processing.

This Code is intended to provide guidelines to achieve compliance with the standards for thermally processed fish products packed in any suitable containers and packing medium.

2 Definition of terms

For the purpose of this Code, the following definitions apply:

2.1
acid food
any food that has a natural pH of 4.6 or below

2.2
acidified low-acid food
any food that has been treated so as to attain an equilibrium pH of 4.6 or lower after processing

2.3
come-up time
time, including venting time, which elapses between the introduction of heating medium into the enclosed retort and/or the time when the temperature in the retort reaches processing temperature

2.4
commercial sterility of thermally processed food
the condition achieved by application of heat, alone or in combination with other appropriate treatment, sufficient to render the food free from microorganisms capable of growing in the food at ambient conditions at which the food is likely to be held during distribution and storage

2.5
container
any form of packaging material, which completely or partially encloses the food (including wrappers). A container may enclose the food as a single item or several units or types of prepackaged food when such is presented for sale to the consumer

2.6
cutting
the severing of muscle, bone, and other components of aquatic organisms for the purpose of forming more than one piece from an existing single piece

2.7
equilibrium pH
pH of the blended or homogenized finished food once all components have attained pH uniformity

2.8
evisceration
the process of removing the entrails (internal organs) from the fish

2.9
filleting
the process of cutting the fish meat lengthwise away from the backbone

2.10
food
any substance, whether processed, semi-processed or raw, which is intended for human consumption, and includes drink, chewing gum and any substance which has been used in the manufacture, preparation or treatment of "food" but does not include cosmetics or tobacco or substances used only as drugs

2.11
food additives
any substance not normally consumed as a food by itself and not normally used as a typical ingredient of the food, whether or not it has nutritive value, the intentional addition of which to food for a technological (including sensory) purpose in the manufacturing, processing, preparation, treatment, packaging, transport or holding of such food results or maybe reasonably expected to result (directly or indirectly) in its or its by-product becoming a component of (or otherwise affecting the characteristic of) such food

2.12
food standard
a regulatory guideline that defines the identity of a given food product (i.e. its name and the ingredients used for its preparation) and specifies the minimum quality factors and, when necessary, the required fill of the container. It may also include specific labeling requirements other than or in addition to the labeling requirements generally applicable to all prepackaged foods

2.13
current good manufacturing practices (cGMP)
a quality assurance system aimed at ensuring that products are consistently manufactured, packed or repacked or held to a quality appropriate for the intended use. It is thus concerned with both manufacturing and quality control procedures

2.14
headspace
volume in a container not occupied by the food and the packing medium

2.15
heat processed food
any food processed by heat to an extent, which results in a product that is safe and will not spoil under normally expected temperature of non-refrigerated storage and transportation

2.16
hermetically sealed containers
containers which are sealed air-tight to protect the contents against the entry of microorganisms during and after heat processing

2.17
ingredient
any substance including food additive, used as a component in the manufacture or preparation of a food and present in the final product in its original or modified form

2.18
label
any tag, brand, mark, pictorial, or other descriptive matter, written printed, marked, embossed or impressed on, or attached to a container of food

2.19
labeling
any written, printed or graphic matter (1) upon any article or any of its container or wrappers and/or (2) accompanying the packaged food

2.20
lot
food produced during a period of time and under more or less the same manufacturing condition indicated by a specific code

2.21
low-acid foods
any food, other than alcoholic beverages, with a pH value higher than 4.6 and a water activity (a_w) greater than 0.85

2.22
packaging
the process of packing that is part of the production cycle applied to a bulk product to obtain the finished product. Any material, including painted material, employed in the packaging of a product including any outer packaging used for transportation of shipment. Packaging materials are referred to as primary or secondary according to whether or not they are intended to be in direct contact with the product

2.23
packing medium
the medium in which the food is packed for preservation and added flavor

2.24
pasteurization
heating of food at 100°C or below at specified time

2.25
pH
intensity or degree of acidity of a food material

2.26
potable water
water fit for human consumption and potability determined by health authorities cited in Philippine National Standards for drinking water (PNS 991:1993 Agricultural and Other Food Products – Bottled Drinking Water Specifications)

2.27
processed food
foods that have been subjected to some degree of processing (e.g. milling, drying, freezing, concentration and canning, etc), which partially or completely change the physico-chemical and/or sensory characteristics of the raw material

2.28
process schedule
the thermal process chosen by the processor for a given product and container size to achieve at least commercial sterility

2.29
refrigeration temperature
cold temperature of 3-5°C

2.30
retort
a pressure vessel designed for thermal processing of food packed in hermetically sealed containers equipped with an in-glass thermometer and a pressure gauge

2.31
room temperature
ambient temperature of 28-30°C

2.32
salt
the coarse or fine sodium chloride of food grade quality

2.33
sterilization temperature
the temperature maintained throughout the thermal process as specified in the scheduled process

2.34
sterilization time
the time between the moment the sterilization temperature is achieved and the moment the cooling started

2.35
thermal process
the heat treatment to achieve commercial sterility and is quantified in terms of processing time and temperature

2.36
vacuum
a state of pressure reduction below atmospheric

2.37
venting
thorough removal of the air from retorts by steam prior to scheduled process

2.38
water activity (a_w)
the ratio of water vapor pressure of the product to the water vapor pressure of pure water at the same temperature. It means water available for the growth of microorganisms

3 Raw materials, ingredients and packaging material requirements

3.1 Raw materials and ingredients

Raw materials for processing shall not contain parasites, microorganisms, toxins, and decomposed or extraneous substances.

3.1.1 Fish

Fish to be used for processing shall be prepared from sound fish of species listed in, but not limited to, Annex A, and is of a quality fit to be sold fresh for human consumption.

3.1.2 Water

Only clean, potable water shall be used for the preparation of packing medium and for all the pretreatment and processing steps. The standard for potable water is presented in Annex B.

Non-potable water may be used only for operations not in direct contact with the food materials provided that this does not pose a hazard to health as determined and approved by the official agency having the jurisdiction over it.

3.1.3 Packing medium

The packing medium may be comprised of the following: vegetable oil, water, brine solution, marinade, tomato sauce, different sauces or any formulations of these.

Ingredients to be used for the packing medium shall be of food grade quality and free from contaminants.

3.1.4 Other ingredients

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

3.1.5 Food additives.

All additives including acidulants, humectants, coloring and flavoring agents shall conform to the standards required by the Bureau of Food and Drugs (BFAD). They shall be properly packaged and stored.

3.2 Packaging materials

The packaging materials shall be appropriate for the product to be packed and for the expected conditions of storage. These shall provide the products appropriate protection from contamination and shall be sufficiently durable to withstand the mechanical, chemical and the thermal stresses encountered during heat processing and normal distribution. All packaging materials shall be stored in clean and sanitary manner.

Just before filling, rigid containers shall be cleaned to prevent incorporation of foreign matter into the finished product. Closures, semi-rigid containers, preformed flexible pouches and flexible pouch roll stock contained in original wrappings may be cleaned before use, subject to the conditions of handling by the processors or suppliers.

3.2.1 Glass jars and metal closures (caps or lids)

Only heat resistant glass jars and metal closures shall be used. The glass jars shall be properly inspected for cracks, chips and other defects. These shall be washed with clean water to eliminate dirt and foreign matter. Metal closures shall be provided with heat resistant liners and shall be free from scratches, dents and other defects. It must also be provided with a self-sealing compound that will affect a hermetic seal after thermal processing.

Glass jars may be reused provided they are sound, and properly washed and sanitized. All metal closures shall never be re-used. Shrinkable plastic cap seals, when used to prevent tampering, shall fit the size of the closures and glass jars to protect bottleneck contamination and other physical damage.

3.2.2 Metal containers

Two- or three-piece metal cans shall be inspected for integrity of side seam and double seams, general cleanliness and presence of defects. If necessary, suitable inside linings may be used as required by the product. Closure of these containers shall be effectively carried out to provide the hermetic seal after thermal processing.

3.2.3 Semi-rigid and flexible containers

Preformed containers may be used provided they are suitable for the product, and free from pinholes, scratches, blisters and other defects. The pouch seal area must be free from contamination and wrinkles and shall provide a hermetic seal upon closure.

4 Hygiene

It is recommended that the product covered by the provisions of this code of practice be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1 – 1969, Rev. 4 (2003)) and/or the A.O. No. 153 s. 2004 - Guidelines, Current Good Manufacturing Practices in Manufacturing, Packing, Repacking or Holding Food, covering the plant facilities and operations requirement including the construction and layout of processing plant, hygienic facilities, equipment, utensils and working surfaces.

5 Preparation and processing of thermally processed fish products

The preparation of fish and packing mediums are described separately from the receipt of raw materials until the pre-filling operations.

5.1 Preparation of raw materials for thermal processing

5.1.1 Fish

5.1.1.1 Receipt of raw materials

Fish shall only be accepted if they are sound and suitable for processing. Those that show signs of deterioration shall not be used.

5.1.1.2 Inspection and sorting

Prior to processing, the fish shall be inspected and sorted according to size and quality before processing. The general condition of the fish may be specified in different ways depending upon whether the fish is fresh or frozen (Table 1) or pre-processed.

Table 1 – General conditions of fresh and frozen fish

Fresh fish	Frozen fish
• shining, iridescent with bright color • slightly protruding eyes • little or no blood staining at the gills • fresh sea-weedy odor or slight oily odor • containing no feed • free from disease and with no obvious infestation with parasites • minimum of damage • no burst bellies	• general good appearance • eyes flat or slightly sunken • blocks well glazed to minimize the development of rancidity • odor slightly oily or neutral with no off-odors particularly at the gills • containing no feed • no evidence of disease or parasitic infestation • very little skinning or damage, fairly firm flesh • no burst bellies

Where fresh fish is being used by the manufacturer, the delay between catching and landing must be as short as possible, ideally less than 12 hours. Where this period is likely to be exceeded there must be some form of refrigeration to hold the product at 0°C, such as boxing and icing, or use of refrigerated seawater, to minimize quality deterioration. Once the fish has been accepted in the factory the maintenance of a fish temperature of 0°C is essential to prevent accelerated spoilage. Ideally, storage shall be in clean plastic boxes where the fish is mixed with ice and the boxes held in an insulated chilled room operating at between 1°C and 2°C.

5.1.1.3 Washing and/or cleaning

The fish shall be washed immediately after receipt and stored under conditions that will protect them from contamination.

5.1.1.4 Scaling and skinning

Scaling is the process of removing the scales from the exterior of a fish. For large species of fish, the scale is often removed prior to processing. Manual scaling can be done by rubbing a rough surface on the exterior of a fish hard enough to remove the scales. For large scale production, a machine is often utilized for this process. Some types of fish also require skinning where the skin from a whole fish or a part of a fish is removed.

5.1.1.5 Salting

Salting is the process of mixing fish with the appropriate amount of food grade salt, sugar, spices and all optional ingredients and/or of adding the appropriate amount of salt to obtain the appropriate concentration. Salting in brine is done in water-tight containers. The fish must be uniformly salted. The fish may be washed after the defined salting period.

5.1.1.6 Cutting, slicing/filleting and separation of edible portion

These steps must be done as rapidly as possible to prevent contamination. Care must be practiced during evisceration to prevent viscera of the fish and other unnecessary portions from getting in contact with the edible portions.

After removing the entrails, the body cavity shall be washed with potable water to remove any blood, slime or similar materials.

5.1.1.7 Drying, smoking, frying and other treatments

Some fish and packing medium require pre-cooking by methods such as boiling. This is done by boiling in water to soften the raw material in order to attain the required texture. If the fish is to be soaked in the packing medium, this shall be done in such a manner that the fish is completely immersed to the soaking medium for the required soaking period. Should the addition of a chemical preservative become necessary, the amount added shall be based on allowable limits.

5.1.1.8 Cooking in packing medium

The prepared fish may be cooked or boiled in the packing medium with the required strength, the amount of which shall be sufficient to cover the fish during boiling. The fish shall be occasionally mixed during boiling to allow even cooking. The fish must be cooked until the required packing medium penetration is achieved. Cooked fish shall not be allowed to remain at room temperature longer than 8 hours, or they shall be refrigerated to minimize microbial activity.

5.1.2 Other ingredients

All other ingredients shall be inspected and sorted to ensure conformity to food standards. Ingredients of vegetable origin shall be selected on the basis of optimum quality and shall not contain residual chemicals that may pose a hazard to health. The salt shall be coarse or fine and of food grade quality, and meets the purity requirements as specified in Section 4.1 of the Implementing Rules and Regulations of the ASIN Law, Republic Act (RA) 8172, an Act Promoting Salt Iodization Nationwide.

5.2 Preparation of cooking and packing medium

Packing medium shall be prepared by dissolving and/or incorporating the specified ingredients of the chosen type of medium in the main base/carrier (i.e., water, brine, vegetable oil, etc.). It shall be heated to dissolve all the crystal ingredients and filtered to remove any foreign matters present. Packing medium with a required concentration must be checked with a refractometer and adjustments made either with addition of one or more of the ingredients.

pH of packing medium shall be adjusted, if necessary to conform to specific requirements for acidified products. Care shall be taken that the suitable quality and correct amount of acidifying agents (e.g., citric acid, fumaric acid) is added and uniformly mixed to each batch of packing medium prepared. A pH meter shall be used to determine the pH of the packing medium.

Types of packing medium

The packing medium prepared from one or more ingredients or in combination of these shall be classified accordingly and described as follows:

5.2.1 Water

Products packed in water with less than 4% salt and/or for lower grain (less than 10) vinegar-water mixture.

5.2.2 Brine

Products packed in a salt-water solution of 4% or more.

5.2.3 Vegetable oil

Products packed in vegetable oil. Vegetable oil to be used shall be clear, refined, deodorized and edible in conformity with all applicable standards.

Other oils – All other food grade oils applicable for use as packing medium for fish and are compliant with all applicable food standards.

5.2.4 Tomato sauce/paste

It is the concentrated product prepared from the liquid extracted from mature, sound, whole tomatoes; the sound residue from preparing such tomatoes for canning; the residue from partial extraction of juice; reconstituted tomato paste (concentrated tomato juice containing not less than 24% by weight of natural tomato soluble solids); or any combination of these ingredients to which is added salt and spices. One or more nutritive sweetening ingredients, vinegar or vinegars, onion, garlic, or other vegetable flavoring ingredients may be added.

5.2.5 Other sauces

A thickened liquid made from acceptable food grade ingredients giving a characterizing flavor and odor to the product.

5.2.6 Marinades

A thin liquid made from acceptable food grade ingredients, usually containing a sweetener, an acid solution or an alcoholic solution, with or without spices, herbs, seasonings, vegetables and other condiments.

5.3 Acidification process

To produce products with a pH of 4.6 or less, acidification must be properly carried out. It is important that perishable ingredients must not be contaminated before acidification and until equilibrium pH of 4.6 or less is reached.

5.4 Filling of containers

The filling of containers, either mechanically or manually, shall be controlled so as to meet the filling and headspace requirements specified in the process schedule. It is important to standardize filling, not only for economic reasons, but because the heat penetration and the container integrity may be affected by excessive fill variation. Properly filled containers shall result in cut-out net weight equivalent to at least 90% of the water capacity of the container. Overfilling can lead to contamination of seals which can affect container integrity.

The food material may be packed hot or cold into containers. Glass containers for hot filling may be dipped in hot water before filling to prevent thermal shock or breakage. During filling, contamination of sealing areas with product must be avoided. They must be kept clean and dry to obtain a satisfactory closure.

After filling, the filled containers may be carefully tapped at the bottom to settle the contents and obtain a full pack. Subsequently, the packing medium is added to cover the product until the correct headspace is achieved. Hot packing medium shall be added to shorten exhausting period and help displaced trapped air.

5.5 Exhausting of filled containers

Exhausting of filled containers shall be controlled to create the necessary vacuum upon cooling. It also prevents and minimizes corrosion of closures and removes air that would cause loss of color, flavor and vitamins. This may be done by heat exhausting, hot filling, steam injection or mechanical/vacuum exhausting.

During heat exhausting, the temperature of the contents must reach at least 65°C (150 °F). This would be sufficient to produce vacuum readings of 8 psi - 12 psi (equivalent to 5.5 in. Hg - 13.6 in. Hg or 18.6 kPa - 46.2 kPa) in the finished product.

5.6 Closing or sealing of containers

Seams and other closures shall be sealed airtight to meet the requirements of the processors.

Self-sealing metal caps or lids shall be tightened and secured to each filled container before thermal processing. No further tightening shall be done during and after processing to avoid breaking the seal that could result to leakage.

To prevent leakage and contamination, the sealing surface must be free of defects and damage. After closing, the caps shall be essentially level, not cocked or tilted, and seated well down the finish. This will prevent damage caused by bumping of adjacent containers as they move along conveyors.

The pouch seal area must be free of food material and wrinkles. Sealing temperature, pressure and dwell time should conform to the packaging material specifications.

5.7 Coding of sealed containers

Coding of sealed container must be indelible with details of production date and time, batch code, product code, the product line in which product is packed, the manufacturing plant and other information necessary for product traceability. Where the container does not permit the code to be embossed or inked, the label shall be legibly perforated or otherwise marked, and securely affixed to the product container.

5.8 Washing of sealed containers

Where necessary, filled and sealed containers shall be thoroughly washed before sterilization to remove grease, dirt and product from the outside of the container.

5.9 Thermal processing of sealed containers

Thermal processing shall start as soon as possible after closing or sealing the containers to prevent unnecessary decrease in product temperature.

Processing schedules for specific formulations of thermally processed fish shall be established only by a competent personnel having expert knowledge of thermal processing requirements and having adequate facilities for making such determinations.

5.9.1 Thermal processing operations

Process schedules and retort venting procedures for each product and container size being packed shall be written on a board conspicuously placed near the processing equipment. Such information must be readily available to the retort or processing system operator and any duly authorized inspector of the BFAD.

To segregate processed from unprocessed food products all retort baskets, trucks, car or crates containing unprocessed /unretorted food product shall be conspicuously marked with heat sensitive indicators or other effective identifying markers.
An accurate wall clock must be posted where it is clearly visible from the retort operator's station.

5.9.2 Low-acid foods

Thermally processed fish with pH higher than 4.6 and a_w above 0.85 shall be sterilized at 115.6° - 121°C (240° - 250°F), which is equivalent to pressure of 10 psi -15 psi (50.3 in. Hg - 60.4 in Hg or 170 kPa - 205 kPa) at a heat duration specified in the process schedule. The process must be adequate to destroy the spores of *Clostridium botulinum*, a heat resistant food-poisoning bacterium that survives in improperly processed low-acid foods. Appropriate sterilization equipment for low-acid foods packed in glass jars, cans and pouches must be used.

5.9.3 Products with reduced water activity (a_w)

Thermally processed fish with a_w of 0.85 and lower shall be processed based on the combined effect of low a_w and pasteurization temperature at 100°C (212°F) to prevent the growth of *Clostridium botulinum*. Water activity is controlled by the addition of humectants that bind or reduce free moisture in foods. Examples of these humectants are sugar, salt, glycerol, propylene glycol, sorbitol, invert sugar and high fructose syrup.

5.9.4 Acid/acidified foods

Acid and acidified foods with equilibrium pH of 4.6 and below, regardless of a_w, shall receive a heat treatment much less than that necessary for low-acid foods. The low pH of these products is generally adequate to prevent the growth of *Clostridium botulinum* and other spore-forming bacteria.

When properly acidified and the required pH maintained, these products can attain commercial sterility through pasteurization at 100°C (212°F), or lower. This is sufficient to destroy mold, yeasts and vegetative cells of bacteria, and to inactivate enzymes. Heat processing systems include steam retorts at atmospheric pressure, water bath processors and steamers capable of processing at 100°C (212°F) or lower, provided that the slowest heating point of the product reaches pasteurization temperature.

5.10 Cooling of processed products

Cooling of finished products is dependent on the thermal processing systems used. Low-acid products processed in water retorts with air overpressure are cooled in the same heating equipment. Precaution should be taken not to reduce pressure abruptly in cooling of products particularly in glass jars and pouches. Air-cooling is recommended for product in glass jars.

To avoid thermophilic spoilage and/or sensory characteristics deterioration of the product, the containers shall be cooled as rapidly as possible to a temperature of 40°C - 50°C (104°F - 122°F). This temperature is necessary to dry the container surface.

Cooling water must be of low microbial content, which can be achieved by adequate chlorination. After its use, the level of residual free chlorine shall be 0.5 ppm – 2.0 ppm. Chlorine levels in excess of 2.0 ppm may accelerate corrosion of certain metallic containers. Residual chlorine levels in cooling water must be monitored and recorded.

5.11 Washing

The containers of finished products may be washed in warm water to remove adhering product and must be immediately dried. Pouches may be dried promptly using an appropriate air dryer.

5.12 Post-process container handling

Mechanical and thermal shocks leading to leaker infection and breakage of glass containers due to container abuse must be avoided. These occur by knocking against each other during conveying, in-place cooling, packaging and labeling operations, among others.

Before unloading crates, water must be drained from container surfaces by tilting the crates as far as possible and allowing sufficient time for the water to drain. Processed containers shall not be manually handled while wet.
Pouches must be handled singly rather than in bunches, and care must be exercised so as to prevent damage by roughened contact surfaces.

6 Food additives

6.1 Food additives when used shall be in accordance with the regulations of the Bureau of Food and Drugs (BFAD), and may include the following:

Additive	Maximum allowable level
Acidity Regulators	
Acetic acid Lactic acid (L-, D- and DL-) Citric acid	GMP*
For bottled tuna and bonito only Disodium diphosphate	10mg/kg expressed as P_2O_5 (includes natural phosphate)
Modified Starches	
Acid treated starches (including white and yellow dextrins) Alkaline treated starches Oxidized starches Monostarch phosphate Distarch phosphate, esterified Acetylated distarch phosphate Phosphated distarch phosphate Starch acetate Acetylated distarch adipate Hydroxypropyl starch Hydroxypropyl starch phosphate	GMP

Additive	Maximum allowable level
Thickening or Gelling Agents (for use in packing media only)	
Alginic acid Sodium alginate Potassium alginate Calcium alginate Agar Carrageenan and its Na, K, and NH_4 salts (including furcelleran) Processed *Eucheuma* Seaweed Carob bean gum Guar gum Tragacanth gum Xanthan gum Pectins Sodium carboxymethylcellulose	GMP
Natural Flavors	
Spice oils Spice extracts Smoke flavors (Natural smoke solutions and extracts)	GMP

*GMP – The food additive must be used according to Good Manufacturing Practices (GMP), and its use self-limiting in food for technological, sensorial or other reasons thus need not be subjected to legal maximum limits.

6.2 Others – All others not included in the above list shall be allowed as carry-over, provided they are approved by the BFAD's Regulation on Food Additives and shall be in accordance to the "Principle Relating to the Carry-Over of Food Additives into Foods" of the Codex.

7 Post-process handling procedures

To control post-process leakage contamination or leaker infection in glass jars and cans, processed containers must be dried as soon as possible after processing so that exposure to post-wet retorting, conveying and handling equipment is minimized.

8 Inspection and labeling

8.1 Inspection of finished products

All processed products shall be inspected before labeling and casing. Defective products shall be withdrawn or rejected. The company must have an approved policy and procedures based on the A.O. No. 153 s. 2004 - Guidelines, Current Good Manufacturing Practices in Manufacturing, Packing, Repacking or Holding Food.

8.2 Labeling

Labeling shall be done after the prescribed incubation period when the product has passed quality evaluation. All containers shall be properly labeled. The label shall conform to the rules and regulations of BFAD.

8.3 Tamper-evident seals

Tamper-evident seals are highly recommended.

9 Quality Assurance

9.1 Record keeping

Permanent and legible dated records of time, temperature, code mark and other pertinent details shall be kept concerning each load. Such records are essential as a check on processing operations.

Record of time steam on, venting time and temperature, time sterilization temperature reached and time steam off shall be kept concerning each load.

Written records of all container closure examinations shall specify the code lot, the date and time of container closure inspections, the measurements obtained and all the corrective actions taken.

Records shall be maintained identifying initial distribution of the finished product to facilitate, if necessary, the segregation of specific food lots that may have been contaminated or otherwise unfit for intended use.

9.2 Deviations in processing

Whenever in-process monitoring records disclose that a product has received a thermal or sterilization treatment less than that stipulated in the scheduled process, the processor shall:

9.2.1 Identify, isolate and then reprocess that portion of the production involved. Complete reprocessing records shall be retained; or

9.2.2 Set aside that portion of the product involved for further evaluation as to any potential public health significance. Such evaluation shall be made by competent processing authority and shall be in accordance with recognized procedures. A record shall be made of the evaluations made and the results. After the determination that no significant potential for health hazards exists, that portion of the product involved may be distributed. Otherwise, that portion of the product shall be destroyed.

All process deviations involving failure to satisfy the minimum requirements of the process schedule shall be recorded detailing those deviations and the actions taken.

9.3 Hazard analysis and critical control points (HACCP)

HACCP plan must be developed for each thermally processed fish product. Prior to the development of HACCP plan, establishments must have developed, documented and implemented prerequisite programs based on BFAD's Current Good Manufacturing Practices (cGMP) and Hygiene Control.

Guidelines for the Application of the Hazard Analysis Critical Control Point (HACCP) System (CAC/GL 18-1993 or the FDA-CFSAN Seafood HACCP: www.cfsan.fda.gov/ ~comm/haccpsea.html) presents the recommended sequence and document formats for the application of the HACCP systems.

10 Storage and transport of finished product

Storage and transport conditions of the finished product shall be such that the integrity of the product container, and the safety and quality of the product are not adversely affected.

Cases and cartons shall be thoroughly dry. They must be of proper size so that the containers fit snugly and are not subject to damage from movement within the case. They shall be strong enough to withstand normal transport.

Warm products must not be stored in the warehouse to avoid growth of thermophilic organisms. Extreme temperature fluctuations during storage and transport of the product must be avoided to prevent product deterioration.

11 Laboratory control procedures

Each food processing establishment shall have access to laboratory control of both the processes used and the finished products. All food ingredients and food products declared unfit for human consumption by the laboratory shall be rejected.

Representative samples for each lot or batch shall be taken to assess the safety and quality of the product.

Microbiological laboratory must be separated from the processing area. No pathogens shall be handled within the premises of manufacturing plant.
Laboratory procedures for quality control of the processes and the product shall follow recognized or standard methods for easy interpretation of results.

12 End product specifications

Appropriate methods shall be used for sampling analysis and determinations to meet the following specifications:

12.1 To the extent possible in good manufacturing practice, the products must be free from any objectionable characteristics.

12.2 The product shall not contain any pathogenic organisms or any toxic substances originating from microorganisms.

12.3 The product must be free from chemical pollutants in amounts which may represent hazard to health.

12.4 The product shall comply with the requirements set forth by the Bureau of Food and Drugs and the Codex Alimentarius Commission on Pesticide Residues and Food Additives.

12.5 Products with an equilibrium pH above 4.5 shall have received a processing treatment sufficient to destroy all spores of *Clostridium botulinum*, unless growth of surviving spores would be permanently prevented by product characteristics other than pH.

Annex A

Species of fish utilized in the production of thermally processed fish*

	Scientific name	English name	Common local name
A.	**Marine species**		
Sardines and sardine-like fishes (Family clupidae)			
1.	*Amblygaster leiogaster*	Smooth belly sardinella	*Tamban, tamban-tuloy*
2.	*Amblygaster lsirm*	Spotted sardinella	*Tamban, tunsoy*
3.	*Anodontostoma chacunda*	Chacunda gizzard shad	*Kabasi*
4.	*Dussumieria acuta*	Rainbow sardines	*Tulis*
5.	*Dussmieria ellipsoides*	Slender rainbow herring	*Tamban*
6.	*Escualosa thoracata*	White sardines	*Bolinaw*
7.	*Herklotsichthys dispilonotus*	Black saddle herring	*Manamsi (Palawan)*
8.	*Herklotsichthys punctatus*	Spot back herring	*Dilat*
9.	*Pellona ditchela*	Indian pellona	*Ibis*
10.	*Sardinella albella*	White sardinella	*Tunsoy, tabagak*
11.	*Sardinella aurita*	Round sardinella	*Lapad*
12.	*Sardinella brachysoma*	Deep-body sardinella	*Lapad*
13.	*Sardinella fimbriata*	Fringe scale sardinella	*Tunsoy, silinyasi, tabagak*
14.	*Sardinella gibbosa*	Gold stripe sardines	*Tunsoy, silinyasi, tamban*
15.	*Sardinella jussieu*	Mauritian sardinella	*Tamban*
16.	*Sardinella longiceps*	Indian oil sardines	*Tamban, turay (P)*
17.	*Sardinella melanura*	Black tip sardines	*Tamban, tunsoy*
18.	*Sardinella tawilis*	Fresh water sardinella	*Tawilis*
19.	*Spratelloides delicatudus*	Delicate round herring	*Dilis bahura*
20.	*Spratelloides gracilis*	Silver striped round herring	*Mangsi, libod*

* Other species of fish not listed above may also be used provided that it conforms to standards stated herein.

	Scientific name	English name	Common local name
Tuna and mackerel (Family Scombridae)			
1.	*Auxis rochei*	Bullet tuna	*Tulingan*
2.	*Auxis thazard*	Frigate tuna	*Tulingan*
3.	*Cybiosarda elegans*	Leaping bonito	*Sanbagon (Surigao sur)*
4.	*Euthynnus affinis*	Kawa-kawa	*Katchorita*
5.	*Euthynnus yaito*	Eastern little tuna	*Bonito/Katchorita*
6.	*Grammatocynus bicariantus*	Shark mackerel	*Lamhu-an*
7.	*Grammatocynus bulineatus*	Double lined mackerel	*Lamhu-an*
8.	*Gymnosarda unicolor*	Dogtooth tuna	*Lamhu-an*
9.	*Katsuwonus pelamis*	Skipjack tuna	*Gulyasan*
10.	*Rastrelliger brachysoma*	Short mackerel	*Hasa-hasa*
11.	*Rastrelliger faugni*	Island mackerel	*Alumahan, hasa-hasa*
12.	*Rastrelliger kanagurta*	Indian mackerel	*Hasa-hasa, alumahan, burao*
13.	*Scomber australasicus*	Blue mackerel	*Alumahan, saramulyete*
14.	*Scomberomorus commerson*	Indo-pacific king mackerel	*Bangkulis*
15.	*Scomberomorus guttatus*	Narrow-barred Spanish mackerel	*Tanigue*
16.	*Scomber japonicus*	Chub mackerel	*Alumahan, saramulyete*
17.	*Scomberomorus munroi*	Australian spotted mackerel	*Bariles*
18.	*Sarda orientalis*	Striped bonito	*Tambacol*
19.	*Sarda sarda*	Atlantic bonito	*Tambacol*
20.	*Scomberomorus semifaciatus*	Broad barred king mackerel	*Tanigue*
21.	*Thunnus albacares*	Yellow fin tuna	*Tambacol, bariles*
22.	*Thunnus obesus*	Big-eye tuna	*Bagok (p)*
23.	*Thunnus tonggol*	Long-tail tuna	*Bariles*
Other fishes			
1.	*Acanthurus bleekeri*	Ringtail Surgeon fish	*Labahita*
2.	*Anguilla japonica*	Japanese eel	*Igat*
3.	*Arius manillensis*	Manila sea catfish	*Kanduli*
4.	*Caesio caerulaurea*	Blue and gold fusiliier	*Dalagang bukid*
5.	*Caranx sexfasciatus*	Big-eye trevally	*Talakitok*
6.	*Decapterus macarellus*	Mackerel scad	*Galunggong*
7.	*Decapterus macrosoma*	Round scad, short finned scad	*Galunggong*

*Other species of fish not listed above may also be used provided that it conforms to standards stated herein.

	Scientific name	English name	Common local name
8.	*Elegatis bipinulata*	Rainbow runner	*Salmon*
9.	*Encrasicholina oligobranchus*	Philippine anchovy	*Dilis*
10.	*Engraulis japonicus*	Japanese anchovy	*Dilis*
11.	*Epinephelus corallicola*	Spotted grouper	*Lapu-lapu*
12.	*Leingathus equulus*	Common pony fish	*sapsap*
13.	*Makaira mazara*	Indo-pacific blue marlin	*Malasugi (P)*
14.	*Mugil cephalus*	Flathead grey mullet	*Banak*
15.	*Mugil melinopterus*	Black-finned mullet	*Kapak*
16.	*Nemipterus balinensis*	Balinese threadfin bream	*Bisugo*
17.	*Nemipterus taeniopterus*	Threadfin bream	*Bisugo*
18.	*Polynemus microstoma*	Small mouthed threadfin	*Mamaleng bato*
19.	*Saurida tumbil*	Greater lizardfish	*Kalaso*
20.	*Selar crumenopthalmus*	Big-eyed scad	*Matangbaka*
21.	*Selaroides leptolepsis*	Yellow stripe scad	*Salay-salay, salay-salay ginto*
22.	*Siganus canaliculatus*	White spotted spine foot	*Samaral, danggit*
23.	*Siganus coralillinus*	Rabbit fish	*Samaral, danggit*
24.	*Sillago sihama*	Silver sillagao	*Asohos*
25.	*Sphyraena barracuda*	Great barracuda	*Baracuda*
26.	*Sphyraena obstusata*	Obtuse/stripped barracuda	*Torsillo*
27.	*Stolephorus comersonii*	Commerson's anchovy	*Dilis, bolinao*
28.	*Stolephorus indicus*	Indian anchovy	*Tuakang*
29.	*Trichiurus haumela*	Hair tail	*Balila/Espada*

B.	**Fresh water species**		
1.	*Chanos chanos*	Milkfish	*Bangos*
2.	*Clarias batrachus*	Catfish	*Hito*
3.	*Opicephalus striatus*	Murrel/mud fish	*Dalag/Bulig*
4.	*Osphronemus goramy*	Gourami	*Gourami*
5.	*Tilapia mossambica*	Tilapia	*Tilapia*

* Other species of fish not listed above may also be used provided that it conforms to standards stated herein.

Reference:

1. Avery, A.C. 1950. **Fish Processing Handbook of the Philippines.** US Government Printing Office: Washington, D.C.
2. Ganaden, S.R and F. Lavapie. 1999. **Common and Local Names of Marine Fishes of the Philippines**. Bureau of Fisheries and Aquatic Resources, Philippines. 386 p.
3. Gonzalez, B. 2000. **Palawan Foodfishes**. Palawan Sustainable Development Communications. 82 p.

Annex B

Standard parameters and values for drinking water*

Table B.1 – Standard values for bacteriological quality

Source and mode of supply	Bacteria	Standard value (no./100mL)
a. All drinking water supplies under all circumstances (Level I, II, III bottled water and emergency water supplies)	*E.coli* or thermotolerant (fecal) coliform bacteria	0
b. Treated water entering the distribution system	*E.coli* or thermotolerant (fecal) coliform bacteria	0
c. Treated water in the distribution system	*E.coli* or thermotolerant (fecal) coliform bacteria	0
	Total coliforms	Must not be detectable in any 100mL sample. In any case of large quantities where sufficient samples are examined, it must not be present in 95% of samples taken throughout any 12-month period.

Table B.2 – Standard values for physical and chemical quality: aesthetic quality

Constituent maximum or characteristics	Level (mgL)
Taste	Unobjectionable
Odor	Unobjectionable
Color	5 TCU
Turbidity	5 NTU
Aluminum	0.2
Chloride	250
Copper	1
Hardness	300 (as $CaCO_3$)
Hydrogen sulfide	0.05
Iron	1
Manganese	0.5
pH	6.5 – 8.5
Sodium	200
Sulfate	250
Total dissolved solids	500
Zinc	5

* Sec.2 **Philippine National Standards for Drinking Water**. Department of Health, Manila.

Annex C

Preparation of brine of required strength

The amount of salt to be dissolved in water to obtain required brine strength: brine strength measured at 16°C (61°F)

Specific gravity	% Salt by weight	Baume' Degrees U.S. Standard	Salinometer °S	Salt (kg) to be dissolved in 100 L water
1.007	1	1.0	3.8	1.0
1.014	2	2.0	7.6	2.0
1.022	3	3.1	11.4	3.1
1.029	4	4.1	15.2	4.3
1.037	5	5.2	19.0	5.3
1.044	6	6.1	22.7	6.4
1.051	7	7.0	26.5	7.5
1.058	8	7.9	30.3	8.7
1.066	9	8.9	34.1	9.9
1.073	10	9.8	37.9	11.1
1.081	11	10.9	41.7	12.4
1.089	12	11.9	45.5	13.6
1.096	13	12.7	49.3	14.9
1.104	14	13.7	53.1	16.3
1.112	15	14.6	56.8	17.6
1.119	16	15.4	60.6	19.0
1.127	17	16.3	64.6	20.5
1.135	18	17.2	72.0	22.0
1.143	19	18.1	75.8	23.5
1.151	20	19.0	79.6	25.0
1.159	21	19.9	83.4	26.6
1.168	22	20.9	87.2	28.2
1.176	23	21.7	91.0	29.9
1.184	24	22.5	94.8	31.6
1.192	25	23.4	98.5	33.3
1.201	26	24.3	100.0	35.1
1.204	26.4	24.6	-	35.9

Reference: **Recommended International Code of Practice for Salted Fish**. 1979 (CAC/RCP 26-1979).

Annex D

Acidification procedures

To produce products which have a pH of 4.6 or less, acidification must be properly carried out. Here are some methods to obtain properly acidified foods:

D.1 Blanch the food ingredients in an acidified aqueous solution – Food particulates could be blanched in a hot acid bath. The ability to obtain a properly acidified product is dependent upon blanch time and temperature, as well as the concentration of acid.

D.2 Immersed the blanch foods in an acid solution – The product is blanched in the steam or water blancher, then dipped into an acid solution, removed from the acid solution and placed into containers. The proper acidification depends upon how well the product is blanched, concentration of the acid and contact time.

D.3 Direct batch acidification – Ingredients are mixed n a kettle, and acid is added directly to the batch. (An elevated temperature may improve the rate of acid penetration into solid particles.) The Ph of the batch is checked before the material is filled in containers.

D.4 Add acid foods to low-acid foods in controlled portions – The acid food is mixed with the low-acid food to get an acidified food product. The proportion of acid food to low-acid food is important to obtain uniform and accurate control of pH of the finished product.

D.5 Directly add a predetermined amount of acid to individual containers during production – This involves addition of acid pellets, known volumes of fluid acid, or some other means of direct acidification of each container.

Reference: Gavin, A. and L.M. Weddig. Ed. 1995. **Canned Foods: Principles of Thermal Process Control, Acidification and Container Closure Evaluation**. 6th ed. The Food Processors Institute. 1401 New York Ave., N.W., Washington, D.C. 2005.

Annex E

Critical control points in the production of acidified foods

For proper production of an acidified shelf-stable product, these are some critical control points that should be checked to ensure that the acidification procedure is under control.

E.1 Every container of food must be acidified in the same proportions.

1. When producing a solid-liquid mixture which will be acidified in the container by direct acidification, it is necessary to know and control the amount of solid material in each container. This permits the addition of the appropriate amount of acid to obtain a pH less than 4.6.
2. Know the buffering capacity of the food.
3. It is necessary to control the unit operations of peeling, blanching, exhausting, brining and closure. For example, some products are lye-peeled, and if the lye carry-over is not controlled, the product will have a higher initial pH than accounted for in the formulation. The end result will be a product that is not in control, and which has a higher pH value than required. The operations that, according to the process schedule, will affect the pH of the finished product must be controlled and recorded.

E.2 Monitor acidification by pH measurement before and after equilibrium. The key is that the finished product pH must be 4.6 or less. Finished product pH means the pH of the product (components included) in the final container after thermal processing – not the raw product pH. The pH measurements must be recorded and the records reviewed at the appropriate time intervals.

E.3 Monitor the scheduled thermal process. The objective of the thermal process is to destroy vegetative cells of microorganisms of public health significance and those of non-health significance capable of reproducing in the food under normal conditions of storage and distribution.

E.4 Container handling. Processed containers should be handled in such a manner as to minimize damage to the seals and/or product recontamination.

E.5 Products found to have an equilibrium pH greater than 4.6 shall be reprocessed as low-acid food to render it safe, or destroyed.

Reference: Gavin, A. and L.M. Weddig. Ed. 1995. **Canned Foods: Principles of Thermal Process Control, Acidification and Container Closure Evaluation**. 6th ed. The Food Processors Institute. 1401 New York Ave., N.W., Washington, D.C. 2005.

Annex F

Operation of steam retort and pressure canner

F.1 Steam retort

Stage 1 – Preliminary checks and loading

1. Make sure the retort is empty and check that valves on air and water inlet lines are fully closed.
2. Don't jar the retort when loading. Heavy knocks can damage the thermometer as well as the cans.
3. Close and clamp the lid or door firmly. Tighten the bolts using your bar as an extension lever and not as a hammer.
4. Use the right/established process time and temperature for the cans and ensure that the recording controller has been set for the correct processing temperature.
5. When operating a rotary retort, switch on the drive motor and check the speed.

Stage 2 – Bringing up the retort – including venting

1. Fully open the drain, overflow the vent valves. If there are no permanent bleeds on the thermometer pocket and on the lid or roof of the retort, open the petcocks at these positions.
2. Turn on steam, making sure the main valve and by-pass valve, if fitted, are fully open. Write down the time at steam on. Do not leave the retort while the by-pass is open.
3. Close the drain as soon as the mercury thermometer reads 205°F. To stop condensate building upon the bottom of the retort, leave the drain valve "cracked open" during the rest of the come up period.
4. Wait for the mercury thermometer to read 212°F. Write down the time. Leave the vent valve fully open for the extra time stated in the processing schedule instructions. Remember: Any short cuts during venting will allow enough time for all the air to escape and the cans will not get their correct process. If in doubt about the right venting time for retorts, check with the management for details.
5. When the full venting time has been given, but not before, close the vent or overflow valve. Petcocks when lifted should be left open. They help to keep the steam moving in the retort.
6. Once the vent has been closed the retort temperature will rise rapidly towards process temperature. When the mercury thermometer reads about 5°F below processing temperature slowly close the by-pass, if in use.
7. Do not leave the retort until the processing temperature has been reached and the automatic controller is operating properly.

Stage 3 – Process or cook period

1. Check the mercury thermometer and recording controller chart for temperature agreement. If the readings do not agree, inform the supervisor. The pressure reading on the gauge should correspond with the temperature.

2. Start timing the process from the moment the mercury thermometer and the controller show processing temperature has been reached. Time the process to the nearest minute with a good clock. Do not use wristwatch or trust into memory. Write down the time that process temperature was reached and when the cook will be finished. Check the addition to ensure that the time has been worked out correctly.
3. Check the process temperature on the mercury thermometer regularly throughout the process. Depend on the mercury thermometer to tell the temperature accurately.
4. When the correct process temperature has been held for the full time all the bacteria will be dead. It is then the time to cool the cans as rapidly as possible.

Stage 4 – Cooling

1. Fill the retort with chlorinated cooling water and either leaving the cans in the retort with the overflow running or transferring them to a cooling canal.
2. For some types of cans, and certainly the larger diameter cans, the pressure in the retort must be allowed to drop too quickly during cooling or the cans will peak.
3. To avoid peaking cans, pressure cooling must be employed. For this, compressed air and water are used together to maintain the pressure in the retort during the early stages of cooling. When the retort is nearly full of water the pressure may be released completely and the lid opened on vertical retorts. Cooling is not finished until the can contents have reached the correct temperature. They must not be under cooled or they will lose quality when cased. Equally they must not be overcooled or they will be difficult to dry.

F.2 Pressure canner

1. Follow manufacturer's directions for use.
2. Have 2 to 3 inches of boiling water in the canner.
3. Arrange containers on a rack so steam can flow freely around each one.
4. Fasten canner lid securely so no steam escapes around the rim.
5. Watch for steam to escape steadily through the petcock. When steam has escaped for 10 minutes, close the petcock or place a weighted gauge on canner. This "exhausting" step is very important to remove all air from the canner. Air trapped in the canner will prevent containers from heating adequately. This step is needed even for those types of pressure canners labeled "self-exhausting".
6. When the correct pressure is reached, set a timer for the recommended processing time. Also write down the time when processing will be completed as a double check on timer accuracy. At sea level, use 10 pounds pressure for a weighted gauge; 11 pounds for a dial gauge. At altitudes above 1,000 to 2,000 feet, it is necessary to increase pounds of pressure to compensate for decreased atmospheric pressure.

Elevation	Pounds Pressure
Weighted gauge canner	
Sea level to 1,000 ft	10 lb
Above 1,000 ft	15 lb

Dial gauge canner	
Sea level to 2,000 ft	11 lb
2,001-4,000 ft	12 lb
4,001-6,000 ft	13 lb
6,001-8,000 ft	14 lb

7. Watch the canner continuously to be sure that pressure stays constant. If pressure fluctuates, regulate it immediately by adjusting the heat, not by opening the petcock or removing the weight. Fluctuating pressure may cause liquid to be drawn from the containers and cause some containers not to seal.

   When the timer sounds, remove the canner from heat. Do not cool the canner with water or cold towels. When the pressure returns to zero, slowly open the petcock or remove the weighted gauge. After 2 minutes, unfasten the cover and tilt the far side up so that steam does not burn the handler. Immediately remove the containers.

Annex G

FAO/WHO Alimentarius sampling plan for prepackaged foods (AQL=6.5) CAC/RM 42-1969

G.1 Scope

The sampling plans in Annex H of this document apply to the acceptance of defective units (defectives) in lots of prepackaged foods, as defined in individual Codex Standards, insofar as the Sampling Plans have been specifically included in such Codex Standards for the purpose of determining the acceptability or otherwise of the lot. They shall be used in accordance with the provisions dealing with the classification of defectives and lot acceptance in Codex Standards to which these sampling plans are stated to apply and within the limits of Section 2 of this document.

G.2 Field of application

G.2.1 Type of examination to which the sampling plans apply

The sampling plans in Annex H of this document are intended primarily to cover the quality provisions of Codex Commodity Standards where an AQL of 6.5 is appropriate for the defective unit as defined in Codex Standards. For the purposes of these sampling plans, "quality" refers to those factors or product characteristics which are evaluated by sensory or physical means, such as colour, flavor, texture, defects, size and appearance. They are not intended however, to cover factors which may represent a hazard to health or which are unwholesome or otherwise highly objectionable to the consumer on the basis of which responsible authorities would reject the lot. Examples of these latter categories are pesticide residues, contaminants, blown cans, foreign material such as stones and large insects. Other criteria and sampling plans must be used in dealing with factors of this type. While these sampling plans are intended primarily for quality evaluation, they may be found suitable for other determinations such as net weight, Brix values and drained weight, provided an acceptance criterion with an AQL of 6.5 is appropriate for these determinations. In this case a definition of "defective" for the specific determination under consideration would be required in the respective Codex Standard.

G.2.2 Size of lot and point of application

The sampling plans and acceptance procedures contained in this document are designed to cover lots that represent substantial portions of factory production or relatively large block of merchandise. The plans may also be used for small lots, but Governments may elect to use sampling procedures of their own choosing for enforcement at the retail level. This is done in recognition of the high ratio of sample size to lot size when dealing with small lots and the probability that once the production of defective or non-conforming product is no longer likely to be uniform between and within the smaller lots.

G.2.3 Principles of acceptance sampling

For detailed explanation of the statistical basis for these sampling plans, see Annex H of this document.

G.3 Description

The sampling plans – Annex H of this document – are a tabular presentation appropriate for acceptance sampling of prepackaged foods where an AQL of 6.5 has been accepted for certain products characteristics. The plans include:

1. Inspection levels;
2. Sample sizes in relation to lot size and container size; and
3. Acceptance numbers.

A sample is drawn from the lot according to the appropriate schedule in the sampling plans. Each sample unit is examined according to the requirements of the individual Codex Standard and classified as either "acceptable" or as "defective". Based on the total number of "defectives" in the sample, the lot either "meets" or "fails" the requirements of the Codex standard, to which these sampling plans apply, according to the following criteria:

- Meets if the number of "defectives" is equal to, or less than, the acceptance number of the appropriate plan.
- Fails if the number of "defectives" exceeds the acceptance number of the appropriate plan.

G.4 Definitions

G.4.1 Acceptable quality level (AQL)

The maximum percent defective units (defectives) permitted in a lot which will be accepted approximately 95% of the time. For example, a sampling plan at an AQL of 6.5 will accept a lot or production which has 6.5 percent defective approximately 95% of the time.

G.4.2 Acceptance number (c)

The number in a sampling plan which indicates the maximum number of defectives permitted in the sample in order to consider the lot as meeting the requirements of a Codex Standard.

G.4.3 Buyer's risk

The risk a buyer takes that a lot will be accepted on the basis of these sampling plans even though such a lot may fail to conform to the requirements of the Codex Standard.

G.4.4 Producer's risk

The risk a producer takes that a lot will fail on the basis of these sampling plans even though such a lot in reality may meet the requirements of the Codex Standard.

G.4.5 Defective

A "defective" is a sample unit which does not conform with a certain specified requirement (or requirements) of a Codex Standard (on the basis of total "demerit points", individual tolerances for "defects", etc.). The criteria on the basis of which a sample unit is classified as "defective" are specified in individual Codex standards to which these sampling plans apply (see also G.2.1 and G.2.2 of this document). Although a defective is a sample unit which fails to meet certain specified requirements in Codex standards, it does so only to an extent which is slightly below those requirements and which would not make the product objectionable to the consumer as specified in G.2 – Field of Application, G.2.1.

G.4.6 Inspection

The process of measuring, examining, testing or otherwise comparing a container or unit of product (**sample unit**) with the requirements of a Codex standard.

G.4.7 Inspection level

The term used to indicate the relative amount of sampling performed on lots of a given product or class of products.

G.4.8 Lot or inspection lot

Collection of primary containers, or sample units, of the same size, type and style which have been manufactured or processed under essentially the same conditions.

G.4.9 Lot size (N)

The number of primary containers, or sample units, in the lot.

G.4.10 Sample unit

The individual container (primary container), a portion of the contents of the primary container or a composite mixture of product that is examined or tested as a single unit.

G.4.11 Sample

Any number of sample units which are used for inspection. Generally the sample comprises all of the containers or sample units drawn for examination or testing purposes from a particular lot.

G.4.12 Sampling

The process of drawing or selecting containers or sample units from a lot or production.

G.4.13 Sample size (n)

The number of containers, or sample units comprising the total sample drawn from a lot or production.

G.4.14 Sampling plan

A sampling scheme which includes sample size, inspection levels, acceptance and/or rejection numbers so that a decision can be made to accept or reject the lot or production based on the results of inspection and testing of the sample.

G.5 Application of the sampling plans

G.5.1 Information required

In using the sampling plans in Annex H of this document, the following information shall be known:

a. Container size (net weight in kg or lb)
b. Inspection level (see G.4.7)
c. Lot size (N) (see G.4.9)
d. Requirements of the Codex Standard with respect to product quality (i.e. classification of defectives and requirements for acceptance of the lot).

G.5.2 Inspection

The following steps are taken:

a. The appropriate inspection level is selected as follows:
   Inspection level I - Normal sampling
   Inspection level II - Disputes (Codex referee purposes sample size), enforcement or need for better lot estimate.
b. Determine the lot size (N), i.e. number of primary containers or sample units.
c. Determine the number of sample units (sample size (n)) to be drawn from the inspection lot, consideration being giving to container size, lot size, and inspection level.
d. Draw at random the required number of sample units from the lot giving proper consideration to code or other identifying marks in selection of the sample.
e. Examine the product in accordance with the requirements of the Codex Standard. Classify any container or sample unit which fails to meet the specified quality level of the standard as a defective on the basis of the classification of defectives contained in the Codex Standard.
f. Refer to the appropriate sampling plan in Appendix I.
g. Consider the lot acceptable if the number of defectives is equal to or less than the acceptance number (c) of the appropriate sampling plan contained in Appendix I of this document.
h. Consider the lot as failing if the number of defectives exceeds the acceptance number (c) of the appropriate sampling plan contained in Annex H of this document.

G.5.3 Examples for the application of the sampling plans

a. **Inspection level I** (see G.5.2 (a))

   A lot consists of 1200 cases, packed in 12 x 2.5 lb primary containers per case. A decision is made to use inspection level I since the goods are not in dispute and

there is no history of controversy over quality. A container is defined in the Codex Standards or is taken to be the sample unit.

Lot size (N)	=	1200 x 12 or 14,400 units
Container size	=	2.5 lb
Inspection level	=	I (see sampling Plan 1, Appendix II)
Sample size (n)	=	13
Acceptance number (c)	=	2

In this example if there are no more than two (2) "defectives" in a sample size of 13 containers the lot is considered acceptable. If, however, there are three (3) or more "defectives" in the sample the lot is considered as failing to meet the requirements. A "defective" as used in the Sampling Plans is defined in the Codex Standard.

b. **Inspection level II** (see G.5.2 (a))

If in the foregoing example (G.5.3 (a)) the quality of the goods is in dispute and a referee method is required for the examination or re-examination of the lot, an increased sample size is taken at inspection level II, selecting at least 21 containers.

Lot size (N)	= 1200 x 12 or 14,400 units
Inspection level	= II (see sampling plan 2, Appendix II)
Sample size (n)	= 21
Acceptance number (c)	= 3

G.5.4 Notes on sample size

It is not necessary to restrict the sample size to the minimum corresponding to the appropriate lot size and inspection level. In all cases a larger sample may be drawn. In the example at G.5.3(b) an even more reliable estimate of lot quality could be made by taking a sample of 29 or even 48 and applying the corresponding acceptance numbers of 4 and 6 respectively.

Annex H

1 Sampling plan 1 (Inspection level I, AQL = 6.5)

1.1 Net weight is equal to or less than 1 kg (2.2 lb)

Lot size (N)	Sample size (n)	Acceptance no. (c)
4,800 or less	6	1
4,801 –24,000	13	2
24,001 – 48,000	21	3
48,001 – 84,000	29	4
84,001 – 144,000	48	6
144,001 – 240,000	84	9
More than 240,000	126	13

1.2 Net weight is greater than 1 kg (2.2 lb) but not more than 4.5 kg (10 lb)

Lot size (N)	Sample size (n)	Acceptance no. (c)
2,400 or less	6	1
2,841 –15,000	13	2
15,001 – 24,000	21	3
24,001 – 42,000	29	4
44,001 – 72,000	48	6
72,001 – 120,000	84	9
More than 120,000	126	13

1.3 Net weight greater than 4.5 kg (10 lb)

Lot size (N)	Sample size (n)	Acceptance no. (c)
600 or less	6	1
601 –2,000	13	2
2,001 – 7,200	21	3
7,201 – 15,000	29	4
15,001 – 24,000	48	6
24,001 – 42,000	84	9
More than 42,000	126	13

2 Sampling plan 2 (Inspection level II, AQL = 6.5)

2.1 Net weight is equal to or less than 1 kg (2.2 lb)

Lot size (N)	Sample size (n)	Acceptance no. (c)
4,800 or less	13	2
4,801 –24,000	21	3
24,001 – 48,000	29	4
48,001 – 84,000	48	6
84,001 – 144,000	84	9
144,001 – 240,000	126	13
More than 240,000	200	19

2.2 Net weight is greater than 1 kg (2.2 lb) but not more than 4.5 kg (10 lb)

Lot size (N)	Sample size (n)	Acceptance no. (c)
2,400 or less	13	2
2,841 –15,000	21	3
15,001 – 24,000	29	4
24,001 – 42,000	48	6
44,001 – 72,000	84	9
72,001 – 120,000	126	13
More than 120,000	200	19

2.3 Net weight greater than 4.5 kg (10 lb)

Lot size (N)	Sample size (n)	Acceptance no. (c)
600 or less	13	2
601 –2,000	21	3
2,001 – 7,200	29	4
7,201 – 15,000	48	6
15,001 – 24,000	84	9
24,001 – 42,000	126	13
More than 42,000	200	19

Annex I

Explanatory notes on acceptance sampling

1 Sampling

Sampling is the process of drawing or selecting containers or sample units from a lot or production. As a result of sampling, information is obtained by which an estimate can be made to accept, reject or negotiate the merchandise in question. Sampling procedures which contain both sample size and acceptance criteria are commonly referred to as "acceptance sampling".

There are many types of acceptance sampling systems in use today. A plan that is suitable for one product or type of inspection may be entirely unsuitable for another product or inspection system. The plan selected is determined to a large extent by the degree to which it satisfies the needs of the user.

In developing these acceptance sampling plans, initial consideration has been given to quality evaluation of the end product. This requires opening of containers with resultant loss of products. This type of inspection is referred to as "destructive sampling". Not only is the loss of product an important consideration, but also destructive sampling is generally quite time consuming. Consequently, both inspection time and economic loss of product through destructive inspection are significant limiting factors in developing sampling plans for the quality evaluation of processed foods. Sample size must necessarily be relatively small in order to make the plan practical in application.

2 Risks

The aim of any sampling plan should be to accept more "good" lots and reject more "bad" lots. Since probability and chance are involved, decisions will, of necessity, involve an element of risk. This risk factor has to be accepted as a part of any sampling procedure. One method of reducing the buyer's risk of accepting deliveries of non-conforming quality is to increase sample size. In other words, the larger the sample, the less risk involved in accepting "bad" lots. Inspection level is the term indicating the relative amount of sampling and inspection performed on lots of a given product or class of products. If the inspection lot is packed under close control and meets the requirements of the Codex Standard, changing inspection levels do not appreciably change the buyer-seller risk. In other words, this would be a "good" lot and should be passed practically all of the time by a good sampling plan. The effectiveness of a sampling plan in discriminating between "good" and "bad" lots can be estimated by examination of the OC curves (see Appendix III) for the various sample sizes. For example, if a lot is produced so that it does not contain more than 6.5 percent defectives, such lot will be passed at least 95 percent of the time by the sampling plans applicable for an AQL of 6.5. On the other hand, if the production contains an appreciable amount of defective material, a higher inspection level (i.e. a larger sample size) will reduce the risk of accepting these non-conforming lots. The effect of increased sample size is explained in greater detail under the discussion of OC curves.

3 AQL

One of the initial considerations in the development of a statistical acceptance sampling plan is the selection of an appropriate AQL or Acceptable Quality Level. This characteristic is defined as the maximum percent defective units in lots that will be accepted most of the time (approximately 95 percent of the time). Lots or production containing more defective material will be accepted less often - the ratio of rejection to acceptance increasing as the sample size increases and as the percent defective material in the lot increases.

In developing these sampling plans, an AQL of 6.5 was selected for lot acceptance with respect to quality evaluation. In other words, an AQL of 6.5 is used in these sampling plans (Appendix I) to determine whether or not the inspection lot meets minimum quality requirements of the Codex Standard. This value was selected on the basis of years of experience and the capability of industry to produce preserved fruits and vegetables and certain other processed foods at this level under good commercial practice. For other factors (such as Brix value and net weight) other AQLs may be selected. Sampling plans can be drawn up for a full range of AQLs from a very strict value of 0.10 to a rather lenient value of 25.0 and higher, depending either on the type of product and/or on the criteria involved.

4 Inspection level

These sampling plans provide for two inspection levels I and II. These two levels provide some discretion in the application of the Sampling Plans to the inspection of a commodity, depending upon circumstances. For normal trading purposes Level I is recommended. In the case of dispute or controversy, i.e. for Codex referee purposes, Level II is recommended. Smaller sample sizes than those provided by Levels I and II may be justified, e.g. when a delivery is being checked for labeling or for detection of non-permitted additives. However, the acceptance sampling criteria of the Plans, which permit 6.5 percent "defectives", do not apply to such an inspection.

5 OC Curves

The problem of buyer's and seller's risks in relation to sample size and lot quality is illustrated through the use of operating characteristic curves (OC Curves). Appendix III contains OC Curves for the sampling plans contained in Appendix I of this document. For purposes of destructive inspection sample sizes in excess of 84 are not practical, since any further inspection beyond this point will not generally provide sufficient additional data to warrant the time and expense of testing.

In studying the OC Curves for AQL 6.5 several conclusions can be drawn, namely:

1. All of the Curves have the same general slope although the curve for sample size 6 is flatter.
2. All curves intersect at a point represented by the coordinates of "6.5 percent defective" and approximately "95 percent probability of acceptance".
3. As the sample size increases, the curved become steeper and more discriminating, i.e. lots having "defectives" in excess of 6.5 percent are rejected with greater frequency.

4. The reliability of the larger sample size is not in direct proportion to the increased sample. For example, for a lot that is 20 percent defective a sample size of 6 (curve E) will accept such lot 65 percent of the time; whereas a sample size of 48 (curve L) will accept the same lot 22 percent of the time. In this example the ratio between probabilities of acceptance is only 3 to 1.

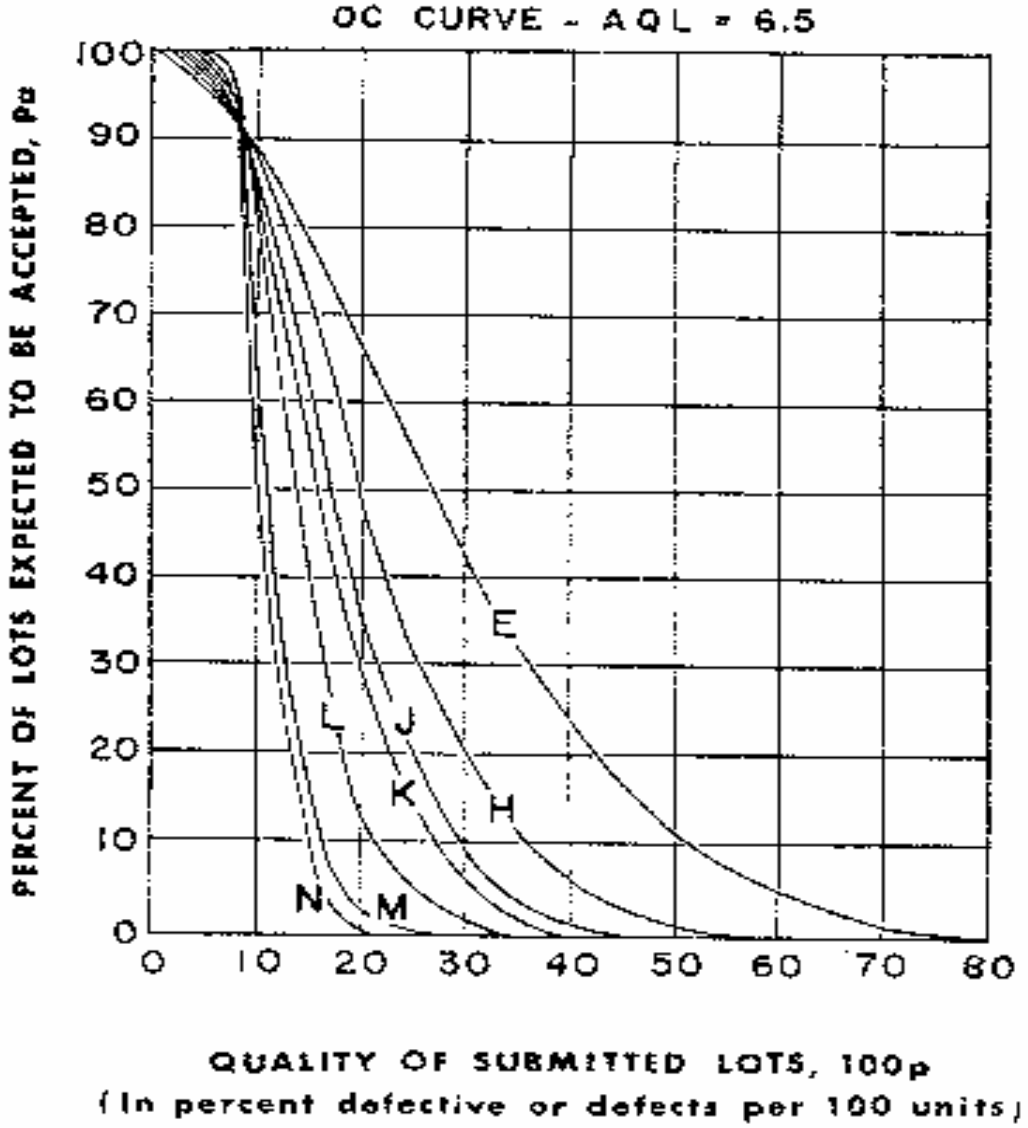
To illustrate the use of the OC Curves (AQL 6.5) let it be assumed that a lot is 10 percent defective. A lot with 6.5 percent defectives will be accepted 95 percent of the time, the frequency of acceptance increasing as the percent defective decreases. However, the 10 percent defective lot fails to measure up to requirements, and while it may be a marginal lot, it may not be acceptable. An examination of the OC curves shows that a sample size of 6 (curve E) will accept this marginal lot 88 percent of the time; a sample size of 84 (curve M) is somewhat better, accepting the lot 65 percent of the time.
If on the other hand, the lot is 30 percent defective, a sample size of 6 (curve E) will accept the lot only 42 percent of the time, whereas a sample size of 21 (curve J) will accept such a lot only 8 percent of the time and a sample size of 84 (curve M) will always fail such a lot.

Annex J

OPERATING CHARACTERISTIC CURVES

AQL = 6.5

Identification letter of OC curve																				
E			H			J			K			L			M			N		
n	c	r	n	c	r	n	c	r	n	c	r	n	c	r	n	c	r	n	c	r
6	1	2	13	2	3	21	3	4	29	4	5	48	6	7	84	9	10	126	13	14



Annex K

Determination of lead by the Atomic absorption spectrophotometric method

K.1 Apparatus

(a) Atomic absorption spectrophotometer. – Operated at 217 nm or 283.3 nm.
(b) Stirring motor. – With eccentric coupling for stirring centrifuge tubes.

K.2 Reagents

(a) Strontium solution. – 2%. Dissolve 6 g $SrCl_2.6H2O$ in 100 ml water.
(b) Ternary acid mixture. – Add 20 ml H_2SO_4 to 100 ml water, mix, add 100 ml HNO_3 and 40 ml $HClO_4$, and mix.
(c) Nitric acid. – Add 128 mL redistilled HNO_3 to 500 mL - 800 mL distilled or deionized water and dilute to 2 L. Redistilled HNO_3 may be diluted and used without redistillation.
(d) Lead standard solutions. – (1) Stock solution. – 1000mg/mL. Dissolve 1.5985 g $Pb(NO_3)_2$, recrystallized in ca 500 mL 1 N HNO_3 in 1 L volumetric flask and dilute to volume with 1 N HNO_3. (2) Working solutions. – Prepare 100 mg Pb/mL by diluting 10 mL stock solution to 100 mL with 1 N HNO_3. Dilute 1 mL, 3 mL, 5 mL, 10 mL, 15 mL and 25 mL aliquots of this solution to 100 mL with 1 N HNO_3 (1 mg Pb/mL, 3 mg Pb/mL, 5 mg Pb/mL, 10 mg Pb/mL, 15 mg Pb/mL and 25 mg Pb/mL, respectively).

K.3 Separation of lead

K.3.1 Accurately weigh sample containing 10 g dry matter and 3 mg Pb. Place in 500 ml boiling or Kjedhal flask and add 1 mL 2% Sr solution, and several glass beads. Prepare reagent blank and carry through same operations as sample. Add 15 mL ternary acid mixture, for each dry matter and let stand for 2 hours. Heat under hood or water vacuum manifold system until flask contains only H_2SO_4 and inorganic salts.

K.3.2 Cool digest for 1 few minutes. (Digest should be cool enough to add ca 15 ml water safely, but hot enough to boil when water is added.) Wash while still hot into 40 mL - 50 mL tapered-bottom centrifuge tube and swirl. Let cool, centrifuge 10 minutes at 350 x g, and decant liquid into waste beaker. (Film-like precipitate on surface may be discarded.) Dislodged precipitate by vigorously stirring with eccentric-coupled stirring motor. To complete transfer, add 20 mL water and 1 mL 1 N H_2SO_4 to original flask and heat. Do not omit this step even though it appears transfer was complete in first wash. Wash hot contents of original digestion flask into centrifuge tube containing precipitate. Swirl to mix, cool, centrifuge and decant liquid into waste beaker.

K.3.3 Dislodged precipitate by stirring vigorously, add 25 mL saturated $(NH4)_2CO_3$ solution (ca 20%) and stir until all precipitate is dispersed. Let stand for 1 hour, centrifuge and decant liquid into waste beaker. Repeat $(NH4)_2CO_3$ treatment.

K.3.4 After decanting, invert centrifuge tube on paper towel and drain all liquid. Add 5 mL HNO_3 (use larger volume 1 N HNO_3 in both sample and blank if >25 mg Pb is expected), stir vigorously to expel CO_2 or use ultrasonic bath for 2 minutes - 3 minutes, let stand for 30 minutes and centrifuge if precipitate remains.

K.4 Determination

Set instrument to previously established optimum conditions, using air-C_2H_2 oxidizing flame and 217 nm or 283.3 nm resonant wavelength. Determine A of sample and blank solutions and 5 standards within the optimum working range (10% - 80% T) before and after sample readings. Flush burner with 1 N HNO_3 and check 0 point between readings. Determine lead from standard curve of A against mg Pb/mL:

ppm Pb = [(mg Pb/mL) x (mL 1 N HNO_3)] / g sample

Annex L

Determination of tin by the Atomic absorption spectrophotometric method

L.1 Reagents and apparatus

(a) Atomic absorption spectrophotometer. – With simultaneous background correction and N_2O-C_2H_2 burner.

(b) Tin standard solutions. – (1) Stock solution. – 1 mg Sn/mL. Dissolve 1.000 g Sn (reagent grade) in ca 200 mL concentrated HCl. Add ca 200 mL water, cool to ambient temperature, and dilute to 1 L with water. (2) Working solutions. – 0 mg Sn/mL, 50 mg Sn/mL, 100 mg Sn/mL, 150 mg Sn/mL and 200 mg Sn/mL. Into each of five 100 mL volumetric flasks, pipette 10 mL concentrated HCl, 1.0 mL KCl solution, and 0 mL Sn, 5 mL Sn, 10 mL Sn, 15 mL Sn or 20 mL Sn stock solution. Dilute to volume with water.

(c) Potassium chloride solution. – 10 mg K/mL. Dissolve 1.91 g KCl and dilute to 100 mL with water.

(d) Nitric acid. - Concentrated. Test purity by diluting portion 1:4 volume/volume with water and aspirating into AA spectrophotometer. Absence of Sn signal indicates suitability for analysis.

L.2 Preparation of samples

L.2.1 Accurately weigh (±0.01 g) sample into 250 mL Erlenmeyer: 20 g foods containing 50% - 75% water, and 5 g - 10 g solids or semi-solids. Dry in oven at 120°.

L.2.2 Do not add HNO_3 to samples unless there is time to complete this stage of digestion in the same day. Add 30 mL concentrated HNO_3 to flask and, within 15 minutes, heat gently in hood to initiate digestion, avoiding excessive frothing. Gently boil until 3 mL - 6 mL digest remains or until sample just begins to dry on bottom. Do not let sample char. Remove flask from heat. Without delay, continue as follows, including 2 empty flasks for reagent blanks: Add 25 mL concentrated HCl, and heat gently ca 15 minutes until sample bumping from evolution of Cl_2 stops. Increase heat, and boil until 10 mL - 15 mL volume remains, using similar flask with 15 mL water to estimate volume. Add ca 40 mL water, swirl and pour into 100 mL volumetric flask, rinsing once with ca 10 mL water. When HCl is present in digest, samples may stand overnight or longer.

L.2.3 Pipette 1.0 mL KCl solution into each volumetric flask. Cool to ambient temperature and dilute to volume with water, adding more water to approximately compensate for volume of fat in flask. Mix well and filter ca 30 mL - 50 mL through dry, medium porosity paper into dry, polypropylene or polyethylene screw-cap bottle. Do not filter blanks. Cap bottles until analysis. Solutions are stable several months.

L.3 Determination

L.3.1 Using 200 mg/mL standard and 235.5 nm Sn line, optimize spectrophotometer, burner and flame according to manufacturer's instructions. Then increase N_2O flow or

decrease C_2H_2 flow to give oxidizing flame; red part should be ca 4 mm above burner slot. This reduces sensitivity but improves precision to 0 ±0.0004 A for blank and 0.201 ±0.001 A for mg/mL. Periodically monitor sensitivity decreases >20%, turn off flame and carefully clean burner slot.

L.3.2 Zero spectrophotometer while aspirating water but do not adjust zero until after determinations; autozero reduces precision. Aspirate water before and after each sample standard and blank solution. Take three 5 s readings for each solution, average and reference all A measurements to A of water.

L.3.3 Record A for standards, draw calibration curve, and visually check for inaccurate standards. Two times blank-corrected A for 50 mg/mL standard should differ by more than 3% from blank-corrected A for 100 mg/mL standard.

L.3.4 Block standard blank with 50 mg/mL standard, using ratio of A, calculate concentration of standard blank:

$$\textbf{Standard blank (mg/mL)} = [A_o/(A' - A_o)] \times 50$$

Where A' and A_o refer to blank and mean of readings for 50 mg/mL blocking standard, respectively.

L.3.5 Add standard blank concentration to nominal standard concentrations to obtain true standard concentrations.

L.3.6 Measure A of sample blanks as for standard blank and calculate:

$$\textbf{Sample blank (mg/mL)} = (A_o/A') \times \textbf{true concentration of 50 mg/mL standard}$$

Where A_o and A' refer to blank and 50 mg/mL standard, respectively. Calculate mean concentration of sample blanks, B.

L.3.7 Determine sample solution concentrations by one of 2 ways: (1) Measure A of sample solutions (maximum 3 samples) and 50 mg/mL standard, (or 100 mg/mL standard, depending on sample concentration level), blocking samples with standards. Calculate blank-corrected sample solution concentrations:

$$\textbf{Sample concentration (mg/mL)} = (A/A' \times \textbf{true standard concentration}) - B$$

Where A and A' refer to sample and standard, respectively.

L.3.8 When high accuracy is not required or when calibration curvature is extensive, use procedure (1) after confirmation that sensitivity changes and baseline drift are absent during analytical run. (2) Calibrate using blank and 50 mg/mL, 100 mg/mL and 150 mg/mL standards. Run sample blanks and samples, and calculate solution concentrations using either instrument microprocessor or calibration curve. Calculate mean of sample blank concentrations, B. Calculate blank-corrected solution concentrations (mg/mL) by subtracting B from solution concentrations.

For both (1) and (2), calculate sample concentrations:

$$\text{Sample (mg/g)} = \frac{[\text{blank-corrected solution concentration}}{\text{Sample weight (g)}} \times 100$$

Annex M

Determination of drained weight

M.1 Apparatus and sieves

(a) Balance with capacity of 2 kg and sensitivity of 0.1 g
(b) Sieves use 20 cm (8") diameter for containers 1.36 kg (3 lb) or 30 cm (12") diameter for containers 3 lb.

M.2 Determination

M.2.1 Weigh full can, open and pour entire contents on NO. 8 sieve.

M.2.2 Without shifting product, incline sieve at ca 17-20° to facilitate drainage.

M.2.3 Drain for 2 minutes, directly weigh either drained solids or free liquid and weigh dry empty can.

M.2.4 From weights obtained, determine % liquid and % drained solid contents.

Annex N

Determination of net weight and washed drained weight (For packs with sauces)

N.1 Determination of net weight

N.1.1 Net contents of all sample units shall be determined by the following procedure:

a) Weigh the unopened container;
b) Open the container and remove the contents;
c) Weigh the empty container, (including the end) after removing excess liquid and adhering meat; and
d) Subtract the weight of the empty container from the weight of the unopened container. The resultant figure will be the net content.

N.2 Determination of washed drained weight (For packs with sauces)

N.2.1 Maintain the container at a temperature between 20°C and 30°C for a minimum of 12 hours prior to examination.

N.2.2 Open and tilt the container and wash the covering sauce and then the full contents with hot tap water (approximately 40°C), using a wash bottle (e.g. plastic) on the tared circular sieve.

N.2.3 Wash the contents of the sieve with hot water until free of adhering sauce; where necessary separate optional ingredients (spices, vegetables, fruits) with pincers. Incline the sieve at an angle of approximately 17° - 20° and allow the fish to drain two minutes, measured from the time the washing procedure has finished.

N.2.4 Remove adhering water from the bottom of the sieve by use of paper towel. Weigh the sieve containing the washed drained fish.

N.2.5 The washed drained weight is obtained by subtracting the weight of the sieve from the weight of the sieve and drained product.

Annex O

Determination of presentation

O.1 The presentation of all sample units shall be determined by the following procedure.

O.1.1 Open the can and drain the contents.

O.1.2 Remove and place the contents onto a tared 1.2 cm mesh screen equipped with a collecting pan.

O.1.3 Separate the fish with a spatula being careful not to break the configuration of the pieces.

Ensure that the smaller pieces of fish are moved to the top of a mesh opening to allow them to fall through the screen onto the collecting pan.

O.1.4 Segregate the material on the pan according to flaked, grated (shredded) or paste and weigh the individual portions to establish the weight of each component.

O.1.5 If declared as a "chunk" pack weigh the screen with the fish retained and record the weight.

Subtract the weight of the sieve from this weight to establish the weight of solid and chunk fish.

O.1.6 If declared as "solid" pack, remove any small pieces (chunks) from the screen and reweigh.

Subtract the weight of the sieve from this weight to establish the weight of "solid" fish.

O.2 Calculations

O.2.1 Express the weight of flaked, grated (shredded and paste) as a percentage of the total drained weight of fish.

$$\% \text{ flakes} = \frac{\text{Total weight of drained fish}}{\text{Weight of flakes}} \times 100$$

O.2.2 Calculate the weight of solid and chunk fish retained on the screen by difference and express as a % of the total drained weight of fish.

$$\% \text{ solid \& chunk fish} = \frac{\text{Total weight of drained fish}}{\text{Weight of solid \&chunk fish}} \times 100$$

O.2.3 Calculate the weight of solid fish retained on the screen by difference and express as a % of the total drained weight of the fish.

$$\%\text{of solid fish} = \frac{\text{Total weight of drained fish}}{\text{Weight of solid fish}} \times 100$$

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FORMULATING BODY

Development of Standard for Selected Ethnic Food Products
Standard for Thermally Processed Fish Products

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