



EAST AFRICAN STANDARD

Canned hake (Cape cod) — Specification

EAST AFRICAN COMMUNITY

Foreword

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

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

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

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

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

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Introduction

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

SANS 562:1956, *Canned hake (Cape cod)*

IS 4303-1:1975, *Code of hygienic conditions for fish industry — Part 1: Pre-processing stage*

IS 4303-2:1975, *Code of hygienic conditions for fish industry — Part 2: Canning stage*

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

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

USDA Agricultural Marketing Service website: <http://www.ams.usda.gov/AMSv1.0/Standards>

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

Assistance derived from these sources is hereby acknowledged.

Draft for comments only — Not to be cited as East African Standard

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Canned hake (Cape cod) — Specification

1 Scope

This specification covers the manufacture, production, processing or treatment of canned hake of the types described herein.

2 Normative references

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

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

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

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

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

CAC/GL 48, *Model certificate for fish and fishery products*

CAC/RCP 52:2003(Rev. 4:2008), *Code of practice for fish and fishery products*

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

EAS 38, *Labelling of prepackaged foods — Specification*

3 Definitions

For the purposes of this specification, unless the context indicates otherwise, the following definitions shall apply.

Canned hake

The palatable foodstuff, prepared from edible hake (Cape cod) or cuts of edible hake (Cape cod) smoked (as smoked haddock) or unsmoked, packed (with or without vegetables or cereals or both or any other suitable ingredients) in hermetically sealed containers, and then processed by heat treatment to preserve it.

Container

A can made of tinplate or aluminium or, unless inconsistent with the context, a jar made of glass.

Count

The number of units of fish present in the container.

Cross filling

The packing of units of fish in positions markedly divergent in direction from that of the general direction of the units in the can.

Drained weight

The weight of the contents of the container when determined in accordance with 11.3.

Exhausting

The removal of air from the contents of a container either by means of heat treatment or by

vacuumization.

Net headspace

The vertical distance, when determined in accordance with 11.2, between the underside of the top of the container and the upper level of its contents.

Slack filling

Excessive lateral free space between individual units of fish or between units of fish and the walls of the container, or both.

Time-temperature process

The continuous heat treatment, expressed in terms of time and temperature, applied in the processing of the product after the container has been sealed.

4 General requirements for the factory and employees

4.1 General requirements for the factory

To ensure that there is no contamination at any stage in the manufacture of the product, the factory, equipment and water used in the preparation of the product shall comply with the following requirements.

4.1.1 Construction of and conditions in the factory

4.1.1.1 The roof shall be weatherproof.

4.1.1.2 The floor shall be constructed of impervious material, shall be sufficiently smooth to ensure proper cleaning and shall be adequately graded to gullies connected to sewers or drains. The floor shall be washed thoroughly each day that the cannery is in operation and the drains shall be kept clean by regular flushing with water. Where necessary, duckboards shall be provided for workers.

4.1.1.3 The inside surfaces of the walls of processing rooms shall be impervious to moisture and shall have a smooth, light-coloured, washable finish to a height of at least 1.8 m above floor level. They shall, where necessary, be washed thoroughly immediately after each day's operations.

4.1.1.4 Where litter, waste and overflow occur, provision shall be made for their removal in an efficient and sanitary manner, preferably by mechanical means.

4.1.1.5 Adequate general illumination shall be maintained to promote effective processing and cleaning.

4.1.1.6 Proper ventilation shall be maintained in order to remove excess steam, thereby preventing the growth of mould and condensate falling into raw materials or onto equipment used in the preparation and processing of the product. Natural ventilation shall be augmented, if necessary, by mechanical means.

4.1.1.7 Adequate measures shall be taken to inhibit or remove mould growth on structures in processing and storage rooms.

4.1.1.8 Effective measures shall be taken to keep the factory free from flies and other insects.

4.1.1.9 All premises on which raw materials and ingredients are stored and in which the product is manufactured shall be rodent-proofed and kept free of rodents.

4.1.1.10 Insecticides and rodenticides shall not be used while processing is in operation and precautions shall be taken to ensure that working surfaces are at all times free from insecticidal and rodenticidal residues. The insecticides and rodenticides shall at no time come into contact with containers or raw materials.

4.1.1.11 The entire fish discharge and conveyance system at the jetty and to the cannery, including

weighing devices, elevators and de-scalers, shall be cleaned and cleared of stagnant water and stale fish before use. Holding tanks shall be treated similarly.

4.1.1.12 No factory chimney, smoke-room or motor exhaust shall be so constructed or situated that smoke or fumes are emitted in a quantity or in a manner which is offensive, injurious or dangerous to health or so that it causes contamination at any stage in the preparation of the product.

4.1.1.13 By-product plants shall be separate from the cannery.

4.1.1.14 Wash-hand-basins, with hot and cold running water and supplied with soap and towels (preferably of paper) or hot-air dryers, shall be provided at every entrance to the preparation or processing areas of the factory used by the employees.

4.1.1.15 The factory shall be maintained at all times in a hygienic state. Animals shall not be allowed in any part of the factory where unprotected foods are stored, kept or manufactured.

4.1.1.16 No operation or condition which is detrimental to the manufacture, processing or treatment of canned hake shall be performed or be present in the canning factory.

4.1.2 Equipment

4.1.2.1 All equipment coming into contact with raw materials used in the preparation of the product shall be kept clean. Smoke-rooms and hanging equipment shall be cleaned regularly to ensure absolute cleanliness of fillets. An ample supply of steam and water, hose, brushes and other equipment necessary for the proper cleaning of machinery and equipment shall be available. The equipment may be sterilized by the application of hypochlorite or other suitable sterilizing solution. After chemical sterilization, equipment shall be rinsed with potable water or clean sea water to remove all traces of the sterilizing agent. Tests shall be performed to ensure compliance with this requirement.

4.1.2.2 Baskets, trays and other containers used to transport or store raw materials shall be of stainless metal and of sanitary design, and shall be kept clean. They shall be scalded regularly with hot water or steam and shall be maintained in a state of good repair. The containers, when filled, or partially filled with food materials, shall not be stacked in a manner which allows contamination of the food materials from the bottoms of containers stacked above.

4.1.2.3 Except in the case of cutting tables, where wood may be used, the tops of all cleaning, preparation and packing tables shall be made of or covered with smooth concrete, plastic, glass, marble, stainless steel or other material possessing similar surface characteristics. Where wood is used, it shall be tongued, grooved and end-matched and the surfaces shall be kept smooth and as impervious to moisture as possible in order to facilitate cleaning. The tops shall be so constructed as to facilitate rapid and effective drainage and shall be free from cracks and crevices. All joints shall be made watertight. Cleaning, preparation and packing tables shall be washed thoroughly immediately after the conclusion of each day's operations and shall be clean at the time of use.

4.1.2.4 Unless they are an integral pan of the bench, cleaning or cutting blocks shall be readily removable to facilitate cleaning, and shall be of solid one-piece construction.

4.1.2.5 Lead and lead-alloys other than solder shall not be used in the construction of equipment coming into contact with raw materials at any stage during the manufacture of the product. Galvanized or other readily corrodible material shall not come into contact with the product in the course of its preparation. Wherever possible, stainless metal shall be used in the construction of equipment coming into contact with the raw materials used in the preparation of the product.

4.1.2.6 Due regard shall be given to the maintenance of sanitary conditions of equipment. The entire processing system shall be cleaned at the end of the operation and flushed before re-use. Utensils used in the preparation of the product shall not be removed from the cannery by employees.

4.1.2.7 Piping, valves, unions and pumps for the transfer of brine or tomato sauce shall be made of suitable sanitary material and shall be of sanitary design. Any utensils used for the topping-up of cans

shall be of stainless metal, of sanitary design and provided with a suitable handle.

4.1.2.8 Tomato sauce and brine shall be prepared in a separate room reserved for the purpose. Where platforms and lofts are used, they shall be maintained in a scrupulously clean state

4.1.2.9 Stirrers and mesh screens shall be made of stainless metal and shall be kept in a hygienic condition.

4.1.2.10 Steam retorts shall be equipped with the following fittings, which shall be maintained in good order:

- (a) A controller, either manually or mechanically operated, to maintain the processing temperature accurately (this requirement is not compulsory for the first cook);
- (b) at least one indicating mercury-in-glass thermometer;
- (c) a recording thermometer, complete with time-temperature charts;
- (d) a pressure gauge;
- (e) a vent or vents with a tap or taps in the top of the retort;
- (f) a bleeder in each thermometer pocket;
- (g) at least one bleeder in the top of the retort ;
- (h) where an automatic controller is used, a steam by-pass around the controller to make a rapid rise to the processing temperature possible; and
- (i) an adequate safety valve.

4.1.2.11 Stores liable to contaminate the product, and spare parts for machinery shall be kept away from the processing area. Edible raw materials other than fish shall be kept in a separate store.

4.1.3 Water

4.1.3.1 Water for processing and washing purposes — Water used in the preparation and processing of the product and in the washing of equipment shall be clean running water that is free from substances that are deleterious to the product or injurious to health. *E. coli* I shall not be detectable in 100 ml of the water.

4.1.3.2 Cooling water — Water for the cooling of containers shall be maintained in a clean condition. Where cooling water is re-used or recirculated, it shall be chlorinated to maintain a minimum residual chlorine concentration of 1 p.p.m.

4.1.4 Comfort Features

Employees engaged in the preparation and processing of the product shall be provided with ample dressing rooms and lavatory accommodation which shall be furnished with hot and cold running water, clean towels (preferably of paper) or hot-air dryers, nail brushes and an adequate supply of soap and toilet paper. The requirements of the Factories, Machinery and Building Work Act, Act No. 22 of 1941, shall be complied with.

4.2 Requirements for employees engaged in the preparation and processing of the final product

4.2.1 No employee who is suffering from a hand or face injury, suppurating skin infection or clinically recognizable infectious disease, or who is wearing a bandage, plaster or other protective covering for a hand injury or suppurating skin infection, shall be allowed to handle raw materials used in the preparation of the product or to handle the unprotected product.

4.2.2 Neither worker's personal effects nor their food shall be present in the processing areas of the factory. Meals shall not be taken in these areas.

4.2.3 Spitting and the use of tobacco in any form shall be prohibited within the processing areas of the premises. Notices to this effect shall be prominently displayed.

4.2.4 Employees shall always wear clean protective clothing and shall in addition wear clean, washable caps or other suitable headgear to cover their hair. Waterproof protective clothing shall be of plastic or rubber. Overalls shall have short sleeves. All protective clothing shall be maintained in good repair. Clothing shall not be stored in workrooms; it shall be kept in change-rooms and not removed from the premises except for laundering. It shall be taken off and suitably stored during intervals between work and visits to latrines.

4.2.5 Employees shall keep their finger-nails short and clean, and shall wash their hands with soap and water or in a detergent solution before commencing work and after each absence from the factory processing area. Nail varnish or lacquer shall not be used.

5 Ingredient requirements

5.1 Condition of the ingredients

All hake and other ingredients shall be clean, sound, fresh, of good quality and in every way fit for human consumption. Soft fish and fish with unsightly hook or fork marks or other scars shall not be used in the preparation of the product.

5.2 Preparation of fish

All hake used in the preparation of the product shall be free from scales and shall be cleaned thoroughly under conditions which ensure freedom from contamination. Heads, tails, fins, backbones (except in the case of cutlets), viscera, and blood columns shall be removed except that fins and backbones may be present in cases where, because of the nature of the pack, they are not normally removed. Before slicing, the hake shall be washed thoroughly internally and externally. Slicing shall be cleanly and neatly done. Bones shall not protrude conspicuously from the cuts. Ragged pieces of flesh and skin shall be removed.

5.3 Salt

Salt used in the preparation of the product shall comply with EAS 35. Brine shall be filtered or otherwise clarified before use.

5.4 Citric acid and ascorbic acid

These ingredients, if used, shall comply with the relevant East African Standards.

5.5 Annatto colouring

Annatto colouring used in the preparation of smoked haddock (Cape cod) shall comply with the requirements of EAS 103.

5.6 Tomato purée

5.6.1 Canned tomato purée added to the product shall comply with the requirements of EAS 66-5. In addition, the purée shall be of a thick consistency, deep red in colour, of ripe tomato flavour free from traces of bitterness and shall not contain added sugar or colouring matter. The copper and iron contents shall not exceed 40 and 80 p.p.m. respectively, expressed on a dry basis. Mould filament, when determined in accordance with the Howard mould count test, shall not be present in more than 40 per cent of the microscopic fields.

5.6.2 Open cans of tomato puree shall not be stacked one on top of another. When puree which is not in sealed cans is stored overnight it shall be held under refrigeration. Tomato puree and sauce shall be handled hygienically at all times.

5.7 Packing oils

Suitable edible oils may be used. The oils shall be bland, non-rancid, clear at 15.6 °C and, where applicable, comply with the requirements of the relevant East African Standards.

5.8 Vegetables

Vegetables used in the manufacture of the product shall be suitably prepared from fresh, young, succulent vegetables of good texture which are free from insect infestation and contamination and from harmful insecticidal or fungicidal spray residues. Canned, dehydrated, and frozen vegetables may be used.

5.9 Curry and mustard

Curry and mustard used in the product shall be of good quality and shall have a characteristic colour and flavour.

6 Physical and microbiological requirements for the product

6.1 Physical requirements

6.1.1 Smoking of product

In the case of smoked fillet of hake (Cape cod) and smoked haddock (Cape cod) the smoking shall be conducted in such a manner and the materials used so chosen as to result in a characteristic and pleasant flavour in the product.

6.1.2 Packing media

Smoked fillet of hake and smoked haddock may be packed in brine. White fillets or cutlets of cod may be packed in brine, in a suitable sauce or with tomato as an ingredient. Where oil is used as a packing medium there shall be no excess of other liquid present.

6.1.3 Packing of the product

In the case of packs containing fish only, the fish shall be neatly packed and cross-filling and slack-filling shall not be present; parchment paper or similar suitable lining material may be used to prevent surface discoloration and adhesion of the fish to the can. Kedgerie shall contain at least 50 per cent of fish flesh and may contain cereal and other starchy material, egg, and garnish. Smoorfish shall contain at least 55 per cent of cured fish flesh, the remainder of the pack consisting of vegetables or cereals (or both) or other ingredients. In the case of both these products, bones shall be removed where practicable and no hard bones shall be present.

6.1.4 Colour and appearance

The manufacturing process shall ensure that the product is attractive in appearance and characteristic and uniform in colour. In plain packs, the surface flesh shall be free from discoloration, and the colour of the units in a container shall be practically uniform. Where the product is packed in tomato puree or sauce, the tomato ingredient shall have a full rich characteristic colour and be free from darkening, except that, if the tomato ingredient is homogenized with oil, a yellow-red colour shall be permissible.

6.1.5 Flavour and odour

The manufacturing process shall ensure that the flavour and odour of the product are fresh and characteristic and that off-flavours and odours are absent. Excessive saltiness shall not be present.

6.1.6 Texture

The fish packed shall be such that the texture of the product is characteristically firm and uniform and that mushiness, sogginess, and (where applicable) excessive friability and crumbling are not present. The product shall be so prepared that any bones present are soft.

6.1.7 Drained weight

The product packed without vegetable or cereal shall be so prepared that the drained weight is at least 70 per cent of the declared net weight of the contents of the container in the case of unsmoked products and at least 75 per cent thereof in the case of smoked fillets with or without sauce. The drained weight of fish and vegetable (or cereal) packs shall be at least 75 per cent and the drained weight of the fish present at least 50 per cent of the declared net weight. Packs of kedgerree and smoorfish shall be solid packs.

6.1.8 Count and uniformity of size

6.1.8.1 Count

Not less than two and not more than eight white or smoked fillets shall be packed in 454 g oval cans. An additional small piece may be included for weight adjustment provided it is placed between the fillets.

6.1.8.2 Uniformity of size

The white or smoked fillets in any one container shall be reasonably uniform in size.

6.1.9 Fill of container

The containers shall be filled as full as is practicable, overfilling being avoided.

6.1.10 Net Headspace

The net headspace in cylindrical containers, when determined in accordance with 11.2, shall be not more than 7 mm.

6.1.11 Anti-oxidants and preservatives

Anti-oxidants and chemical preservatives other than ascorbic and citric acids shall not be used.

6.1.12 Colouring

The product may be coloured with annatto or any suitable dyestuff permitted in EAS 103.

6.1.13 Freedom from defects

In the manufacturing process residual clotted blood, abraded material, fibre, sand, grit, dirt including black specks from the smoking process, parasitic infestation and other extraneous contaminants shall be excluded from the product. Vegetable units showing blemishes, scale, and evidence of insect or rodent damage or infestation shall not be present.

6.2 Microbiological requirements

6.2.1 Microbiological Spoilage

An incubated container (12.1) shall be considered to have undergone microbiological spoilage if it:

- (a) shows a positive pressure,
- (b) leaks, or

- (c) whether having a positive pressure or not, shows evidence of bacterial proliferation as judged by a significant change in pH value or by disintegration, decomposition or discolouration of the product when compared with unincubated samples. Evidence of bacterial proliferation shall be supported by microscopical or cultural evidence or both.

6.2.2 Requirement

Containers tested in accordance with Clause 12 shall show no evidence of microbiological spoilage or off the presence of pathogenic organisms.

7 Containers

Cans shall be suitable for the packing of the product and, if lacquered, the lacquer shall be such that it does not peel off during processing and storage of the product.

8 Packing and processing

8.1 Filling under hygienic conditions

The product shall be prepared and filled into sound, clean containers under conditions which ensure freedom from contamination. Lids shall be clean at the time of use.

8.2 Exhausting, seaming and processing

8.2.1 The filled containers shall be exhausted, seamed and processed by heat.

8.2.2 The exhausting, seaming and processing shall be done in such a manner that

- (a) in the case of cylindrical cans the ends remain concave,
- (b) in the case of oval cans the normal contours of the can are maintained, and
- (c) in the case of non-acid products, a minimum shelf-life of 18 months is ensured under normal transport and storage conditions.

8.2.3 The time-temperature process shall ensure

- (a) the destruction of pathogenic organisms, and
- (b) freedom from microbiological spoilage.

8.3 Condition of containers

All containers shall be hermetically sealed and all closures strongly and accurately made. Containers shall be clean before labelling and packaging.

9 Labelling and marking

9.1 Details required on each container or label

The following information shall appear clearly and legibly on each container or label in type of the size and prominence prescribed by statutory regulations:

- (a) Name of product and, where applicable, a true description of the contents;
- (b) the full name and business address of the manufacturer, or in the case of containers packed for any other person, the full name and business address of that person, preceded by words indicating that the contents were packed for that person;

- (c) the kind of sauce (if used) and where present, the kinds of vegetables and other ingredients (in order of decreasing amounts present);
- (d) the net weight of the contents;
- (e) the date of canning and, if used, the batch number embossed or otherwise indelibly marked on the container (a mark or code may be used in lieu of the date); and
- (f) words indicating the country of origin.

9.2 Attaching labels and condition of labelled containers

9.2.1 Labels on containers shall be clean, neat and securely attached and shall not be superimposed on other labels. They shall not be applied by any person other than the manufacturer or his authorized agent.

9.2.2 Label glue which is liable to deterioration under humid conditions of storage of the canned product, shall not be used.

9.3 Marking of packages

If the containers are placed in packages, such packages shall be clean, neat and unbroken, and on every such package the number and size or net weight of the containers and the information required by 9.1 (a), (b), (d) and (f) shall be printed or stencilled. The business address of the manufacturer required under 9.1 (b) need not be the full business address, but the minimum necessary for identification purposes.

10 Sampling and criteria for conformity

10.1 Definitions

For the purposes of this section the following definitions shall apply:

Lot

That quantity of canned product from the same manufacturer, submitted at any time for inspection and test.

Sub-lot

That quantity of canned product from the same lot of the same kind, type and container size.

Batch

That quantity of canned product from the same sub-lot bearing the same identification number, mark or code.

Defective

A container or its contents that fails in one or more respects to comply with the appropriate requirements of the specification

10.2 Sampling

The following procedure shall be applied to determine whether or not a lot complies with the requirements of the specification.

10.2.1 Batching

Divide the lot into sub-lots and the sub-lots into batches of 1,200 or more containers. If one or more batches consist of less than 1,200 containers, group the items involved, in consecutive order of production whenever possible, to form a batch or number of batches of not more than 3,000 containers.

10.2.2 Sampling for physical tests

Take, at random, from the batches taken from each sub-lot, a sample consisting of a minimum of 115 containers to represent that sub-lot. Draw the containers from the batches in quantities proportional to the sizes of the batches. Should less than ten containers be drawn thus from any particular batch or batches, take, at random, additional containers therefrom, so that at least ten containers are drawn from each batch.

The sample so drawn shall be taken as representative of the sub-lot.

10.2.3 Sampling for incubation

Take, at random, 13 per cent of the containers, but not less than 30 containers, from each batch. These constitute the sample for incubation.

10.2.4 Sampling for microbiological examination

Take, at random, one third of the incubated containers for microbiological examination. The samples so drawn shall be taken as representative of the batch.

10.3 Compliance with specification

10.3.1 Compliance with physical requirements

A sub-lot shall be deemed to comply with the physical requirements of the specification if the sample taken therefrom and tested and examined in accordance with the relevant requirements, contains not more than two defectives.

10.3.2 Compliance with incubation and microbiological requirements

A batch shall be deemed to comply with the incubation and microbiological requirements of the specification if the samples taken therefrom and tested and examined in accordance with the relevant requirements, contain no defectives.

10.3.3 The lot shall be deemed to comply with the specification if all the sub-lots comply with the physical requirements and all the batches comply with the incubation and microbiological requirements.

11 Physical examination

11.1 General

All containers taken in accordance with 10.2.2 shall be examined for compliance with the relevant requirements for packing, processing, labelling and marking, colour and appearance, flavour and odour, texture, count, uniformity of size, fill of container, and freedom from defects, and shall also be tested as described in 11.2 and 11.3.

11.2 Determination of vacuum, net headspace and net weight of contents

11.2.1 Determine the gross weight by weighing the unopened container, and the vacuum by means of a vacuum gauge. Then, in the case of

- (a) a container with a lid attached by a double seam, partially cut out the lid without removing or altering the height of the double seam,
- (b) a glass jar, remove the lid.

11.2.2 Determine the average vertical distance in millimetres from the top level of the container to the top level of the contents by taking measurements in at least five points over the surface of the contents. This distance is

- (a) the net headspace in vacuum-sealed jars,
- (b) the gross headspace in containers with lids attached by double seams, in which case

$$\text{net headspace} = \text{gross headspace} - 4 \text{ mm.}$$

11.2.3 Transfer the contents of the container to a sieve which has apertures of nominal size 2 mm. Wash, dry and weigh the container complete with lid. The difference between the gross weight (11.2.1) and the weight of the container and lid gives the net weight of the contents.

11.3 Determination of drained weight of contents

Drain the residue on the sieve (11.2.3) for 2 minutes and weigh. Calculate the drained weight as a percentage of the declared net weight.

12 Incubation and microbiological examination

12.1 Incubation and inspection of containers

Incubate the containers taken in accordance with 10.2.3, for 14 days at 37 °C. Examine these containers externally for evidence of spoilage.

12.2 Microbiological examination

12.2.1 Glassware

All glassware used in the microbiological examination of canned hake shall be sterile. After cleaning, plug all test and sampling tubes with cotton wool before sterilization. It is preferable that sterilization be achieved by the application of dry heat at 170°C for 1 hour.

12.2.2 Media

The following tubed media are required for the cultural examination of each container to be examined:

Glucose nutrient broth	3
Cooked meat medium	3
Liver broth	3

12.2.3 Preparation of media

12.2.3.1 Glucose nutrient broth

To 1000 ml of distilled water, add 3 g of beef-extract, 5 g of peptone and 2 g of glucose (dextrose). Warm to obtain a homogeneous solution, pipette 10-ml quantities into tubes and autoclave the latter at 121 °C for 15 minutes.

12.2.3.2 Cooked meat medium

Cut 500 g of lean ox or calf heart into small cubes and cover with distilled water. Bring to the boil, simmer for 1 hour and strain off the liquid infusion through several thicknesses of muslin. Grind the meat three times by means of a meat grinder and separate the particles by rubbing them between the hands. Make up the volume of the liquid infusion to 2 litres with distilled water, and mix it with the meat. Add normal sodium hydroxide solution until the supernatant liquid has a pH value of 8.0. Weigh

the medium in a tared vessel and autoclave at 121°C for 15 minutes. Restore the weight with distilled water, and readjust the pH to 8.0. Boil for 10 minutes, restore the weight with distilled water and again adjust the pH to 8.0. Boil again for 10 minutes, restore the weight and, if the pH value is lower than 7.5, adjust to this value. Distribute into tubes, keeping the mixture well stirred during the process to ensure a uniform deposit of meat particles in each tube. Cover with a layer of sterile petroleum jelly and autoclave at 121°C for 15 minutes. Check the final pH value which should be 7.1 ± 0.1 .

12.2.3.3 Liver broth

Boil 500 g of minced ox liver in 1,000 ml of distilled water for 1 hour. Adjust the pH value to 7.0 with normal sodium hydroxide solution and boil for a further 10 minutes. Strain through several thicknesses of muslin and make up the volume to 1,000 ml. with distilled water. Add 10 g. of peptone and 1 g of di-potassium phosphate and again adjust the pH to 7.0. Pipette 10-ml quantities of the medium into tubes and add to each tube about 2 g of the liver panicles. Autoclave at 121°C for 15 minutes. Boil this medium for 10 to 15 minutes before use to remove dissolved air, and cool the tube before inoculation.

12.2.4 General

All containers taken in accordance with 10.2.4 shall be examined and tested as described in 12.2.5 and 12.2.6.

12.2.5 Examination and preparation of container

12.2.5.1 Note and record all identification marks appearing on the container or label.

12.2.5.2 Remove the label. Record any physical defects, such as rust, pinholing, dents, imperfect closure or defective seams. Mark clearly for subsequent inspection questionable points to be given further physical examination after the container has been opened.

12.2.5.3 Clean the container thoroughly with soap and water. If it is greasy, the application of a solvent such as petroleum ether or naphtha may prove helpful.

12.2.5.4 Sterilize the top of the container at the point where it is to be opened by grasping the container by hand and hold the previously cleaned top in the flame of a Bunsen burner, distributing the heat with a circular motion. **DO NOT PLAY THE FLAME DOWN ON THE TOP OF THE CONTAINER**, as concentration of heat may cause scorching of the contents. Blown containers, after washing with soap and water and removing grease by means of a solvent, should be cleaned thoroughly with 60 per cent alcohol. They must not be treated by flame.

12.2.6 Sampling of contents

12.2.6.1 Recording of vacuum or pressure. After sterilizing the top of the container (12.2.5.4), pierce the point of opening by means of a vacuum or pressure gauge tip under aseptic conditions and record the reading shown on the gauge. On removal of the gauge, cover the top of the container immediately with a sterile cover.

12.2.6.2 Opening of container. Enlarge the gauge puncture by means of an appropriate type of sterile instrument, preferably one of the type that will cut a circular disc around the central puncture, or a piercing instrument which will enlarge the puncture to a diameter of 20 ± 5 mm.

12.2.6.3 Removal of inoculum. Remove at least 15 g of the product from the container by means of sterile spoons, sterile cork borers or sterile glass sampling tubes. Force the plug of product from the sampling tube or cork borer into a sterile flask containing approximately 50 ml of sterile water and glass beads. Mix the material and water by shaking, the beads causing the material to break up. By means of sterile pipettes, introduce 2-ml. quantities of the mixture into each of the glucose broth, liver broth and cooked meat medium tubes (12.2.3). Before introducing the inoculum into the cooked meat medium, liquefy the petroleum jelly seal by heating the medium. Seal the liver broth tubes in accordance with 12.2.6.4.

12.2.6.4 Sealing of media tubes for anaerobic incubation. Seal the liver broth tubes by pipetting sterile petroleum jelly, liquid agar, liquid paraffin or paraffin wax onto the surface of the broth to a depth of at least 15 mm, and allow the seal to set.

12.2.6.5 Heating of cooked meat medium. After inoculation, subject the cooked meat medium to a temperature of 80 °C for 20 minutes and then allow it to cool. Allow the seal to set before incubation.

12.2.6.6 Incubation of the culture tubes. Incubate the culture tubes as follows:

Glucose nutrient broth: Three tubes aerobically at 37°C for 5 days

Liver broth: Three tubes anaerobically at 37°C for 5 days

Cooked meat medium: Three tubes anaerobically at 37°C for 5 days

In the case of blown containers, prepare a further set of tubes and incubate them anaerobically and aerobically at 20°C for 5 days.

12.2.6.7 After incubation examine the culture tubes and determine the nature of the organisms isolated.

12.2.6.8 After the contents of the container have been sampled for culturing, make the following examination of the contents and the container and record the findings:

- (a) Make a direct smear of the contents, stain it by Gram's method and examine it microscopically.
- (b) Determine the pH value.
- (c) Examine the contents for deterioration, discolouration, etc.
- (d) Examine the interior of the container for stain, rust, state of lacquer, etc.
- (e) Examine and measure the seams of the container for abnormalities.

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