



## **EAST AFRICAN STANDARD**

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**Code of hygienic practice for lobsters**

**EAST AFRICAN COMMUNITY**

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## 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:

CAC/RCP 24:1979, *Recommended International Code of Hygienic Practice for Lobsters*

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

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/pestdes/jsp/pest\\_q-e.jsp](http://www.codexalimentarius.net/mrls/pestdes/jsp/pest_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>

USDA Plant Inspectorate Service website: [http://www.aphis.usda.gov/import\\_export/plants](http://www.aphis.usda.gov/import_export/plants)

European Union: [http://ec.europa.eu/sanco\\_pesticides/public](http://ec.europa.eu/sanco_pesticides/public)

Assistance derived from these sources is hereby acknowledged.

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

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## Recommended International Code of Practice for Lobsters

CAC/RCP 24-1979

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### SCOPE

This Code of Practice applies to lobsters, rock lobsters, spiny lobsters and slipper lobsters from the genus *Homarus* of the family Nephropidae and from the families Palinuridae and Scyllaridae intended for human consumption. It may also apply to other similar species but does not apply to Nephrops. It contains the technological guidelines and the essential requirements of hygiene for harvesting, processing and handling of lobsters at sea and on shore. No attempt has been made to identify regional practices or species.

The technology of canning lobster is not covered in this Code.

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### DEFINITIONS

For the purpose of this Code:

"black spot"

is the development of dark pigments between the segments of the tail;

"butt end of the tail"

is that part of the tail muscle which extends into the cephalothorax;

"cephalothorax"

is the body region of crustacea which is formed anatomically by the fusion of head and thorax;

"chilling"

is the process of cooling lobster to a temperature approaching that of melting ice;

"clean sea water"

is sea water which meets the same microbiological standards as potable water and is free

from objectionable substances;

"cleaning"

means the removal of objectionable matter from surfaces;

"contamination"

means direct or indirect transmission of objectionable matters to the product;

"devein"

is to remove the intestine from the tail;

"disinfection"

means the application of hygienically satisfactory chemical or physical agents and processes to clean surfaces, with the intention of eliminating micro-organisms;

"droptail"

is a condition observed in cooked lobsters which have died or deteriorated before processing. The tail does not curl up under the lobster and there is a gap between the tail and cephalothorax. Black spot often occurs between the tail segments;

"food additive"

means 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 organoleptic) purpose in the manufacture, processing, preparation, treatment, packing, packaging, transport or holding of such food results, or may be reasonably expected to result, (directly or indirectly) in it or its by-product becoming a component of or otherwise affecting the characteristics of such foods. The term does not include "contaminants" or substances added to food for maintaining or improving nutritional qualities.

"hind gut"

is the intestine in the tail;

"intestine"

is used in this Code to mean the posterior portion of the alimentary tract;

"lobster"

means species from the genus homarus of the family Nephropidae; and rock lobster, spiny

lobster, and slipper lobster from the families Palinuridae and Scyllaridae;

"loose neck"

has the same meaning in some areas as "droptail";

"plant or establishment"

means the building or buildings, or parts thereof, used for, or in connection with, the manufacture or holding of food for human consumption;

"potable water"

is fresh water fit for human consumption. Standards of potability should not be lower than those contained in the latest edition of the "International Standard for Drinking Water", World Health Organization;

"refrigerated sea water"

is a clean sea water cooled by the addition of ice prepared from potable water or clean sea water and/or by a suitable refrigeration system. Its salt content is normally about 3%;

"shucking"

is the process of removing the meat from the shell and appendages of the lobsters;

"suitable corrosion-resistant material"

means impervious material which is free from pits, crevices, and scale, is non-toxic and unaffected by sea water, ice, slime, or any other corrosive substance with which it is likely to come into contact. Its surface must be smooth and it must be capable of withstanding exposure to repeated cleaning, including the use of detergents;

"tail"

in crustacea is the abdomen or posterior part of the body;

"tailing"

is the process of separating the tail from the cephalothorax.

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## **RAW MATERIAL REQUIREMENTS**

### **3.1**

#### **General Considerations**

LIVE LOBSTERS ARE EXTREMELY DELICATE ANIMALS, AND SHOULD BE

HANDLED AT ALL TIMES WITH GREAT CARE.

The natural environmental condition of lobsters is quickly changed when they are brought to the surface from the sea bottom. Healthy lobsters can gradually adapt themselves to these changes but the lobsters' vitality is considerably weakened, and care in handling at this point is extremely important if heavy losses are to be avoided. Lobsters should not be exposed to direct sunlight or to the drying effect of winds, but should be carefully packed in crates or in a clean open-weave bag and kept cool as required for varying species. Any careless treatment will result in a high mortality rate and deterioration in the raw material

WHERE HARVESTING OPERATIONS PERMIT, LOBSTERS SHOULD BE KEPT VIGOROUSLY ALIVE UNTIL THE TIME OF PROCESSING.

Lobsters will survive in captivity for long periods if held under the right conditions. Even when removed from water they can live for more than twenty-four hours.

Lobsters deteriorate more rapidly after death than most fish and quality can best be maintained by keeping them alive until processing. If this is not possible they should be killed and the tails carefully separated and cleaned before freezing or chilling, which should be done as rapidly as possible. These precautions will inhibit multiplication of micro-organisms and enzymatic deterioration.

WHERE LOBSTERS ARE HARVESTED LIVE ANY DEAD OR MUTILATED LOBSTER SHOULD BE REMOVED FROM THE CATCH IMMEDIATELY FOR SCREENING.

Dead or mutilated lobsters if not removed will cause deterioration of the rest of the catch. Weak or dead lobsters should be processed immediately except for dead lobsters which are decomposed or contain toxic or extraneous substances. These should be rejected. Soft shell lobsters (those in moult) must be handled with extreme care, since they will die quickly under over-crowded conditions.

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## **HANDLING OF LOBSTERS AT SEA - FISHING VESSEL FACILITIES AND OPERATING REQUIREMENTS**

4.1

### **General Considerations**

THE FISHING VESSEL SHOULD BE DESIGNED FOR RAPID AND EFFICIENT HANDLING OF LOBSTERS, EASE OF CLEANING AND DISINFECTION, AND SHOULD BE OF SUCH MATERIAL AND CONSTRUCTION AS TO MINIMIZE ANY DAMAGE OR CONTAMINATION OF THE CATCH.

In designing a lobster fishing vessel many other factors, apart from the vessel's performance as a harvesting unit, should be considered. Contamination of lobsters with bilge water, sewage, smoke, fuel, oil, grease or other objectionable substances must be avoided. The catch should be protected against physical damage, exposure to high temperatures and drying effects of sun and

wind.

Vessels engaged in lobster fishing differ considerably in size and function depending on the type of fishery. A boat handling only live lobsters has different operational and structural requirements from one processing and freezing lobster tails on board. The Code is attempting to cover all practices used in lobster handling at sea, therefore only some of the following sections may be relevant to a particular fishery.

Vessels on which lobsters are processed should meet the requirements of shore establishment in design, layout, construction and equipment and processing should be carried out under similar hygienic and sanitary conditions.

All surfaces with which the lobsters might come in contact should be of suitable corrosion-resistant material which is smooth and easily cleanable.

4.2

### **Lobster Vessel Construction and Sanitary Design**

DECK POUNDS OR PENS, STANCHIONS, DIVIDING BOARDS AND HOLDING TANKS SHOULD BE CONSTRUCTED OF SUITABLE CORROSION-RESISTANT MATERIAL. THEY SHOULD BE ADEQUATE IN NUMBER AND HEIGHT TO PREVENT CRUSHING OF THE LOBSTER DUE TO EXCESS WEIGHT OR TO THE VESSEL'S MOTION, AND TO HOLD THE ESTIMATED CATCH.

In practice, wood is still used in many fisheries for deck pound boards and steel for stanchions and other fixtures. Where this is the case, the wood should be treated to prevent the entry of moisture and should be coated with a durable non-toxic light coloured paint or other non-toxic surface coating that is smooth and readily cleanable. Steelwork should be coated with anti-corrosion and non-toxic paint. Whenever possible, suitable corrosion-resistant materials should be used. On vessels which hold live lobsters, only small deck pounds are required as the lobsters should be sorted and conveyed with care to the tank, well or bag as soon as possible after being brought on board.

VESSEL HOLDS FOR STORAGE OF ICED LOBSTER TAILS SHOULD BE ADEQUATELY INSULATED WITH A SUITABLE MATERIAL. ANY PIPES, CHAINS OR CONDUITS PASSING THROUGH THE HOLD SHOULD, IF POSSIBLE, BE SUNK FLUSH OR NEATLY BOXED IN AND INSULATED.

Adequate insulation will reduce the amount of heat entering the hold and consequently the rate of ice meltage. If the quality and structure of the insulation is poor, considerable ice meltage will take place near bulkheads and shipside.

HOLD OR TANK LININGS SHOULD BE COMPLETELY WATER-TIGHT. THE INSULATION LAYER SHOULD BE PROTECTED BY A LINING MADE OF CORROSION-RESISTANT METAL SHEETS OR ANY OTHER EQUALLY SUITABLE NON-TOXIC MATERIAL HAVING WATER-TIGHT JOINTS.

The insulation should be covered with corrosion-resistant metal sheets, having water-tight

joints to ensure protection from contamination.

**WOODEN HOLDING TANKS OR HOLDS SHOULD BE LINED WITH A SUITABLE MATERIAL.**

The linings of wooden holding tanks or holds should be similar to those described in sub-Subject 1 section 4.2. They should be sealed and coated with a suitable impervious and non-toxic material which is easy to keep clean and not difficult to repair.

**THERE SHOULD BE NO SHARP CORNERS OR PROJECTIONS IN THE HOLD OR TANK, AS THESE WILL MAKE CLEANING DIFFICULT AND MAY DAMAGE THE LOBSTERS.**

Contamination with lobster debris, blood and offal will build up rapidly on surfaces, in corners or around projections which are not smooth and impervious.

Any ledges or projections resulting from the encasement of pipes, wires, chains and conduits, that are passing through the vessel hold, should be so constructed as to minimize any physical damage to the lobsters and to allow free drainage and ease of cleaning.

**PORTABLE BOARDS OF SUITABLE CORROSION-RESISTANT MATERIAL OR IMPREGNATED AND PAINTED WOOD SHOULD BE USED FOR MAKING SHELVES AND VERTICAL DIVISIONS IN THE HOLDS.**

The use of portable boards, which are a good fit in the stanchions, allows the shelf and dividing structure to be dismantled and removed for cleaning. Wooden boards should be treated to prevent the entry of moisture and should be coated with a durable non-toxic paint or other equally suitable surface coating that is smooth, readily cleanable and repairable. Wherever possible, the shelving and the partitioning boards should be interchangeable in size.

**SHELVING BOARDS SHOULD BE DESIGNED TO ALLOW ADEQUATE DRAINAGE.**

A continuous trickle of melt water will help to carry away lobster debris, blood and micro-organisms which should not be allowed to collect on the shelves. Corrugated boards of corrosion-resistant material are most suitable for this purpose.

**THERE SHOULD ALWAYS BE AMPLE DRAINAGE SPACE BETWEEN THE LOWEST SHELVES AND THE FLOOR OF THE HOLD. THIS SPACE SHOULD BE OPEN TO A CENTRAL DRAIN, DISCHARGING DIRECTLY INTO ONE OR MORE SUMPS OR WELLS, LOCATED SO THAT THE HOLD CAN BE EFFICIENTLY DRAINED AT ALL TIMES. BILGE PUMP CONNECTIONS TO THESE SUMPS SHOULD BE FITTED WITH COARSE SCREEN FILTERS.**

Proper drainage facilities can prevent a build-up of large quantities of melt water, blood and lobster debris. If drainage is inadequate, the bottom layers of the lobsters in the hold may be contaminated by this dirty liquid, especially during the periods of severe motion of the vessel. Pumps, slush wells, bilges, etc. from the fish room should be completely separate from the

engine-room bilge system to prevent contamination.

**TANKS AND WELLS USED FOR HOLDING LIVE LOBSTERS SHOULD BE SO PLACED AND CONSTRUCTED AS TO ENSURE SURVIVAL OF THE LOBSTERS AND TO PROTECT THEM FROM DAMAGE.**

A tank for storing lobsters should have forced circulation of clean sea water by pumping from the bottom to the top of the tank. Care should be taken to avoid "dead spots" in the tank. This can be accomplished by the use of a grating in the bottom of the tank. The tank should not be too large and when full of lobsters, the rate of change of water should be at least four times per hour. The tanks should be

divided into compartments for the purpose of segregating the catch and can also be provided with baskets of impervious corrosion-resistant materials for ease of unloading. Baskets of one metre cubed have been found to be satisfactory but experimentation on packing density is necessary for each fishery.

Where wet wells are used, the holes in the hull of the boat should be large enough to provide effective exchange of water. It should be remembered that the motion of the boat is an essential factor to successful circulation unless auxiliary aids are used, such as pumps. If the water stagnates, the lobsters will die.

**PROPERLY DESIGNED FACILITIES SHOULD BE PROVIDED FOR HAULING TRAPS, POTS AND NETS TO PREVENT DAMAGE DURING CATCHING.**

This will enable undersize lobsters to be returned to the sea where required, and minimize damage to the commercial part of the catch. Lobsters are fragile and legs and other appendages are easily broken. This causes loss of blood and the risk of infection with consequent weakening of the lobster. The market value of damaged lobsters may also be reduced.

4.3

### **Hygienic Facilities**

**AREAS OF THE DECK WHERE LOBSTERS ARE UNLOADED AND HANDLED, OR THE HOLD WHERE LOBSTER TAILS ARE STOWED SHOULD BE KEPT CLEAN.**

Storage of fuel and other petroleum products or of different cleaning and disinfecting agents should be so arranged that there is no possibility of contamination of surfaces with which lobsters come into contact.

**DECK HOSES SHOULD BE SUPPLIED WITH CLEAN SEA WATER, AT ADEQUATE PRESSURE, BY A PUMP USED ONLY FOR CLEAN SEA WATER.**

A good supply of clean sea water, at adequate pressure, should be available.

The intake for sea water should be well forward of and on the opposite side of the vessel from the toilet waste and engine cooling discharge. Sea water should not be pumped while the vessel is in harbour nor in areas where there is a danger of it being polluted. Clean sea water should be

taken in while the vessel is in forward motion.

The piping for the clean sea water supply should have no cross-connections with the engine or condenser cooling system. It should be so constructed as to prevent any possibility of back-syphonage from the kitchen sink, washbasins or toilets.

**ICE SHOULD BE MADE FROM POTABLE WATER OR CLEAN SEA WATER AND SHOULD NOT BE CONTAMINATED WHEN MANUFACTURED, HANDLED OR STORED.**

Ice made from water which is neither potable water nor clean sea water may contaminate the lobster with water-borne micro-organisms or other objectionable or even harmful substances. Such contamination will result in the loss of quality, reduced keeping time or might create a definite health hazard.

Ice storage on board should be in an insulated hold and all unused ice should be discarded at the end of the trip.

**TOILET FACILITIES AND ALL PLUMBING AND WASTE DISPOSAL LINES SHOULD BE SO CONSTRUCTED AS NOT TO CONTAMINATE THE CATCH.**

All the plumbing and waste disposal lines servicing the vessel's toilets, hand wash basins or kitchen sinks should be large enough to carry peak loads, be watertight and preferably should not go through the holds where lobsters are being handled or stored.

**WHERE BAIT IS CARRIED, IT SHOULD BE HELD IN SUCH A MANNER THAT IT WILL NOT CONTAMINATE THE CATCH.**

On vessels which carry bait, a separate confined space or special container should be set aside for bait storage where the bait could be held well protected and away from the catch.

The ice used for bait preservation should never come in contact with the catch.

**THE FISHING VESSEL SHOULD BE EQUIPPED WITH BRUSHES, SCRAPERS, WATER HOSES, SPRAY NOZZLES AND OTHER SUITABLE WASHING AND DISINFECTION EQUIPMENT.**

Although there is a variety of cleaning and disinfecting equipment available on the market, good quality hand brushes of several sizes and shapes are still the most inexpensive and versatile tools for cleaning operations. Brushes should be kept in a clean and sound condition, disinfected after each use (dipping in 50 ppm chlorine solution is recommended) and when not used should be stored in a dry state. Brushes could spread dirt and micro-organisms. Micro-organisms will proliferate in a dirty brush when stored in a wet condition. The use of steel wool for scouring should be avoided as there is a constant danger of introducing small, sometimes hardly visible, bits of wire into the final product. If, for some reason, cleaning cannot be done effectively with a good brush, then plastic, brightly-coloured scouring pads might be used.

The use of high-pressure and high-frequency oscillating water or detergent-spraying equipment has been found to be quite effective in cleaning but it usually requires an experienced

operator to prevent damage to painted surfaces.

IF POISONOUS AND HARMFUL MATERIALS, INCLUDING CLEANING COMPOUNDS, DISINFECTING MATERIALS, AND PESTICIDES ARE STORED ON BOARD THE VESSEL, THEY SHOULD BE KEPT IN A SEPARATE COMPARTMENT RESERVED AND MARKED SPECIFICALLY FOR THIS PURPOSE.

Extreme caution must be exercised to prevent poisonous or harmful materials from contaminating the lobsters. All such materials should be prominently and distinctly labelled so that there can be no confusion between these and the edible materials used aboard the vessel. Compartments in which these poisonous or harmful materials are stored should be kept locked and the materials contained in them should be handled only by personnel trained in their use.

4.4

#### **Equipment and Utensils**

ALL CONTAINERS USED FOR ICE STOWING OF LOBSTER TAILS SHOULD BE OF UNIFORM AND SUITABLE SIZE, EASY TO HANDLE WHEN LOADED AND SHOULD BE CONSTRUCTED OF SUITABLE CORROSION-RESISTANT MATERIAL.

Such boxes, when fully loaded, should be easy to handle by one or two men without tilting, tipping or jerking.

The use of wooden boxes should be discouraged but if used, they should be of a smooth construction and of durable, non-toxic and waterproof finish.

Baskets which are difficult to clean and disinfect should not be used for handling lobster tails on board the vessel or on shore.

ALL LOBSTER STORAGE, HANDLING, CONVEYING, PROCESSING AND FREEZING EQUIPMENT USED ON BOARD FISHING VESSELS SHOULD BE DESIGNED FOR RAPID AND EFFICIENT HANDLING OF LOBSTERS, BE SUITABLE FOR EASY AND THOROUGH CLEANING AND BE CONSTRUCTED SO AS NOT TO CAUSE CONTAMINATION OF THE PRODUCT.

When obtaining equipment, only equipment which can be readily re-assembled for thorough cleaning should be considered.

FREEZING EQUIPMENT SHOULD BE RELIABLE AND SUITABLE FOR FREEZING LOBSTERS.

It is most important that all freezing be carried out in an orderly manner, using equipment that is of sufficient capacity and which is suitable for the product. The freezers should have proper defrosting facilities and be designed so that they are easy to clean. Refrigeration equipment needs to be reliable and of robust construction. It should be capable of running for long periods with little attention, and should have automatic devices for shutting down in an

emergency.

4.5

### **Hygienic Operating Requirements**

ALL TUBS, TANKS, BARRELS AND OTHER EQUIPMENT USED IN HANDLING, TAILING, DEVEINING, WASHING AND CONVEYING OPERATIONS SHOULD BE THOROUGHLY CLEANED, DISINFECTED AND RINSED AFTER EACH CYCLE OF OPERATIONS.

Any filth, lobster debris or blood allowed to dry and accumulate on surfaces with which lobsters come in contact will be very difficult to remove later and will thus contaminate the subsequent loads of lobster.

DURING FISHING TRIPS THE VESSEL'S HOLD BILGE SUMP SHOULD BE DRAINED REGULARLY. THE SUMP SHOULD BE ACCESSIBLE AT ALL TIMES.

Bilge water containing blood and lobster debris, if not regularly pumped out, will provide a good medium for the multiplication of micro-organisms and give rise to offensive odours in the hold. The bilge sump should be cleaned and disinfected frequently.

ADEQUATE PRECAUTIONS SHOULD BE TAKEN TO ENSURE THAT HUMAN AND OTHER WASTES FROM THE FISHING VESSEL ARE DISPOSED OF IN SUCH A MANNER AS NOT TO CONSTITUTE A PUBLIC HEALTH AND HYGIENIC HAZARD.

With man's increased concern for the protection of his environment, in some countries the disposal of any waste from any boat into the surrounding water is restricted by law.

Fishermen should be fully aware of their responsibilities in this regard. Discharge of animal, human or any other wastes from the fishing vessel into the sheltered waters close to man-inhabited areas, or over shellfish growing areas, should not be practiced.

SEA WATER WHICH HAS BEEN USED FOR COOLING ENGINES, CONDENSERS OR SIMILAR EQUIPMENT SHOULD NOT BE USED FOR WASHING LOBSTERS, DECKS, HOLDS OR ANY EQUIPMENT WHICH MIGHT COME INTO CONTACT WITH LOBSTERS.

The water used for cooling engines is usually at a higher temperature than fresh sea water and might be contaminated with oil or other petroleum products or contain rust and other by-products of metal corrosion.

Such water, therefore, if used for washing will accelerate considerably the spoilage of lobsters by raising their temperature and might impart objectionable taste, odour or undesirable discoloration.

WHEN CLEANING AND HOSING OPERATIONS ARE CARRIED OUT WHILE THE VESSEL IS IN PORT, POTABLE WATER OR CLEAN SEA WATER SHOULD BE USED.

Cleaning water should be free from contamination in amounts harmful to man. The total number of micro-organisms in it should be low, and it ought not to contain any micro-organisms

of public health significance. Contamination of lobsters by waterborne micro-organisms and undesirable substances will result in loss of quality and might create a health hazard. Harbour water is usually heavily polluted and should never be used for cleaning purposes. This is also true for sea water in the close vicinity of towns, villages, industrial plants, fish-processing establishments and factory ships.

IMMEDIATELY AFTER THE CATCH IS UNLOADED, THE DECK AND ALL DECK EQUIPMENT SHOULD BE HOSED DOWN, BRUSHED, THOROUGHLY CLEANED WITH A SUITABLE CLEANING AGENT, DISINFECTED AND RINSED.

Blood, guts, lobster debris and other residue left on the deck will support multiplication of micro-organisms which may contaminate future catches. If allowed to dry, lobster debris and blood are very difficult to remove.

It is important to realize that thorough cleaning should always precede disinfection especially when chlorine is used as the disinfecting agent. Any organic matter which is not removed from the surfaces that are to be disinfected will rapidly combine with and neutralize the disinfective effectiveness of chlorine or any other disinfectant.

AT THE END OF EACH TRIP, ANY UNUSED ICE SHOULD BE DISCARDED AND REMOVED FROM THE VESSEL.

Despite all precautions unused ice in the hold will become contaminated and will contaminate the new catch. When vessels are taking ice to sea only fresh clean ice should be taken on board at the beginning of each voyage.

IMMEDIATELY AFTER THE CATCH IS LANDED, THE FISH HOLD AND BILGE SUMP SHOULD ALSO BE EMPTIED COMPLETELY. ALL SURFACES IN THE HOLD, POUND BOARDS AND SUMP SHOULD BE THOROUGHLY CLEANED WITH A SUITABLE CLEANING AGENT, DISINFECTED AND RINSED.

This is necessary to remove all lobster debris, blood and other residues as soon as the catch is landed, in order to avoid multiplication of micro-organisms, offensive odours and the drying of residues on the hold or other surfaces. Cleaning should be completed before fresh ice is taken on board for the next trip.

CLEANING, WASHING AND DISINFECTING PROCEDURES SHOULD BE EFFECTIVE.

Cleaning agents and disinfectant should conform to the requirements of the official agency having jurisdiction and should not be allowed to come into contact with lobsters. Any residue of cleaning agents used for washing of boats and the equipment should be removed by thorough rinsing with potable fresh or clean sea water before the area of equipment is used again for stowing or handling lobsters.

In choosing and applying cleaning agents and disinfectants, one should be fully aware of their properties and limitations. Many agents are effective only when prepared and used in strict accordance with the manufacturer's recommendations.

Temperature of the solution, its acidity or alkalinity, concentration of the active ingredient,

presence of other chemicals, kind of surface to be treated or type of soil (dirt) and mode of application are some of the factors that will determine the usefulness of the agent. Different agents should not be combined since one agent may neutralize the activity of another.

EMPTY VESSEL HOLDS OR LOBSTER STORAGE TANKS SHOULD BE VENTILATED.

Strong odours associated with mildew, stagnant humid air and decomposing organic matter will develop in the absence of ventilation. All the containers, pails, boxes and tubs, after cleaning, washing and disinfecting, should be stacked in such a way as to permit sufficient aeration.

EFFECTIVE MEASURES SHOULD BE TAKEN TO PROTECT THE FISHING VESSEL AGAINST INSECTS, RODENTS, BIRDS OR OTHER VERMIN.

Insects, rodents and birds are potential carriers of many diseases which could be transmitted to man by contamination of fish. Fishing vessels should be regularly examined for evidence of infestation and, when required, effective control measures should be taken.

All rodenticides, fumigants, insecticides and other harmful substances should be used only in accordance with the recommendations of the appropriate official agency having jurisdiction.

VESSELS MOORED TO DOCKS FOR MORE THAN TWO HOURS SHOULD, WHERE NECESSARY, HAVE RODENT GUARD DEVICES ATTACHED TO EACH MOORING LINE.

Round, conical-shaped metal devices on mooring lines are effective in preventing the passage of rodents from the shore to the vessel.

The use of these devices is strongly recommended during night-time operations due to the nocturnal nature of rodents.

Also the end of the gangway and an area of approximately one square metre where the gangway rests upon the dock should be painted white. This is effective in preventing rodents from entering the gangway at night.

DOGS, CATS AND OTHER ANIMALS SHOULD BE EXCLUDED FROM AREAS OF THE VESSEL WHERE LOBSTERS ARE RECEIVED, HANDLED, PROCESSED AND STORED.

Because of public health hazards and for aesthetic reasons, no surface of the fishing vessel and of the equipment thereon which comes into contact with lobsters should be exposed to contamination with animal hair or excreta.

FOOD SUPPLIES FOR THE VESSEL'S KITCHEN OR FOR THE CREW'S MESS SHOULD NEVER BE STORED IN ICE BINS WHERE LOBSTERS ARE KEPT.

Storage of such materials in ice intended for lobsters might contaminate the ice and the

lobsters.

4.6

### **Handling the Catch on Board**

4.6.1

#### **Holding live lobsters**

LIVE STORAGE IS STRONGLY RECOMMENDED FOR PRODUCTION OF HIGH QUALITY PRODUCTS.

As mentioned before, lobsters can be held alive either on board vessels or at shoreside establishments in tanks, wet wells or floating cages. They can also be held for short periods in air in clean open weave bags. Live storage is not practicable in all fisheries and therefore other methods of storage involving part-processing on board should be considered, e.g. tailing and chill storage of the tails. These storage methods should also be used in fisheries where the lobsters are killed during catching such as spearing (through the thorax only) or by trawling.

SPECIES WHICH MUTILATE EACH OTHER SHOULD HAVE THE CLAWS BANDED AS SOON AS POSSIBLE AFTER CATCHING.

Cutting sinews or driving pegs into the claws should be avoided as this will weaken the lobster and make it vulnerable to infection.

LIVE LOBSTERS SHOULD BE HELD AT AS LOW A TEMPERATURE AS PRACTICABLE BUT NOT BELOW 4°C (39°F).

STORAGE TIMES AND STOCKING DENSITY SHOULD BE CONTROLLED.

Holding tanks are regarded as a better method of storage for long-term handling than well storage. In some fisheries lobsters are kept in tanks for six weeks.

In either method, lobsters should not be tightly packed and it is recommended that in a well, horizontal divisions should be no less than 70 cm apart. On the other hand, very loose packing in wells or tanks will permit the lobsters to damage each other.

Lobsters stored in air in bags should be tightly packed to prevent movement and damage. Maximum weight of bag must be determined for each fishery.

Bags cannot be recommended for storage over 24 hours, but where used, they should be thoroughly clean and of open weave construction. Slime or mud in the weave of the bag will cause rapid suffocation of the lobsters. Bags should not be stored at high humidity and should be kept dry to keep the lobsters inactive. The use of clean hessian or jute bags is preferred. In some fisheries bags made of woven synthetic material have been found to cause excessive mortality.

LOBSTERS SHOULD NOT BE EXPOSED TO STRONG SUNLIGHT, WIND OR

## EXTREME TEMPERATURE.

Exposure will cause rapid drying of the gills. When the gills dry the lobsters cannot breathe and die quickly. A temperature of between 4-10°C (39-50°F) is recommended. In the inshore fishery this may be achieved by the use of holding tanks with circulating sea water. The practice of using wetted canvas to cover the crates is followed in some areas.

WHERE APPROPRIATE A STOWAGE PLAN SHOULD BE KEPT ON ANY VESSEL FISHING LIVE LOBSTERS FOR MORE THAN A DAY OR TWO.

A well prepared stowage plan enables the various day's catches to be kept separate when unloading. Lobster from different day's catches should never be mixed together when stowed.

LOBSTERS SHOULD BE UNLOADED CAREFULLY AND ANY DEAD OR UNHEALTHY LOBSTERS SHOULD BE REMOVED AND DISCARDED.

This requirement applies in bringing lobsters on board or during the unloading of vessels. Excessive handling inevitably leads to increased mortality.

### 4.6.2

#### **Handling of lobsters killed on catching**

WHEN LOBSTERS ARE NOT LANDED ALIVE, THE TAIL (ABDOMEN) AND CEPHALOTHORAX SHOULD BE SEPARATED AFTER CATCHING.

This should be done as soon as they are brought on board. Whole lobsters which have died or have been killed deteriorate rapidly. They can easily be identified, even after cooking, by brown discoloration and soft texture of the butt end of the tail, formation of black spot between the segments and a condition known as "drop tail" or "loose neck".

ALL LOBSTERS SHOULD BE STORED OR PROCESSED AS SOON AS POSSIBLE.

The intestinal tract of the whole uncooked lobsters breaks down within hours of death and releases potent digestive enzymes over the butt end of the tail causing rapid autolysis.

TAILS SHOULD BE REMOVED IN A MANNER OUTLINED UNDER SECTION 5.4.2 OF THIS CODE.

The spoilage rate of properly cleaned and deveined tails is substantially lower than that of whole dead lobsters.

### 4.6.3

#### **Freezing at sea**

TAILS SHOULD PREFERABLY BE FROZEN IMMEDIATELY.

Optimum quality can be maintained by immediate freezing after tailing. This can be accomplished on board in properly designed vessels.

FREEZING AND FROZEN STORAGE ON BOARD VESSELS SHOULD BE CARRIED

OUT IN ACCORDANCE WITH THE RECOMMENDATIONS SET OUT IN THIS SECTION AND Subsect2SUB-SECTION 5.4.5 OF THIS CODE.

The hygienic requirements on board vessels should be just as high as those required in shore processing plants.

FIRST-CAUGHT LOBSTER SHOULD BE FROZEN FIRST.

The sequence of operations should ensure that lobster caught and processed earlier do not accumulate while later-caught lobster are being frozen.

THE FREEZING PLANT SHOULD BE ADEQUATE TO DEAL WITH THE NORMAL CATCHING RATES OF THE VESSEL, SO THAT LOBSTER ARE NOT HELD FOR LONG PERIODS PRIOR TO FREEZING.

Lobsters are best frozen soon after capture. It is very important to maintain all raw material in a chilled condition prior to freezing. Delays in freezing may have serious effects on the quality and appearance of the thawed product.

PRECISE FREEZING TIMES FOR LOBSTER PRODUCTS SHOULD BE CAREFULLY DETERMINED.

The freezing time required for different products is influenced by many variables, such as product shape and size, the area exposed to the refrigerated surface or the refrigeration medium and the temperature of the refrigerant. A calculated freezing time may serve as a rough guide when planning production, but whenever a new product is frozen in a freezer, the exact freezing time should be determined by direct measurements of the product temperatures during the freezing process. In many countries, practical advice on how to measure product temperature accurately can be obtained from fishery research organizations.

THE FREEZING PROCESS SHOULD BE RAPID AND THE TEMPERATURE REDUCTION ADEQUATE TO AVOID QUALITY LOSSES ASSOCIATED WITH BADLY FROZEN LOBSTER.

Slow freezing, incomplete freezing and freezing to inadequately low temperatures promote changes in the lobster flesh which adversely affect its texture, flavour and keeping time. Since these changes are minimized by quick freezing and rapid reduction of temperature to freezer store level, an adequate freezing capacity of the freezers is necessary for the production of high quality frozen products.

BLAST FREEZERS SHOULD BE LOADED IN SUCH A WAY THAT THERE IS A SUFFICIENT FLOW OF COLD AIR AROUND THE PRODUCT.

In this process, heat is transferred from the lobsters to a cold air stream and carried to the cooling surfaces of the freezer. Adequate air circulation is essential and any obstruction to the flow of air around the product will result in poor freezing rates and variable product quality. If lobsters are placed too close together because of overloading the freezer, cold air circulation around the surfaces of individual lobsters will be obstructed and freezing times may be greatly

increased. Wrapping lobsters or placing them in cartons will also slow down the rate of freezing.

**ALL FREEZING PROCESSES SHOULD BE COMPLETED IN THE FREEZER BY ALLOWING THE FULL TIME FOR EACH CYCLE.**

The manufacturer of the refrigeration equipment should provide all necessary information for the correct operation of the plant, including the time required for each freezing cycle. If the plant is functioning properly and loading and unloading is done according to instructions, lobsters coming out of the freezers should be properly frozen. There is always a temptation to reduce the freezing time, or overfill freezers during periods of heavy catching. This should be avoided. If the freezing time is too short, the centre of the lobster will not be frozen, even though the surface may be hard. If many partly frozen lobsters are stored, the freezer store temperature may rise, placing an extra load on the refrigeration equipment and also causing temperature fluctuations that will adversely affect the quality of all the lobsters in storage.

On the other hand, if lobsters are left in the freezers long after they are properly frozen, freezer capacity is wasted and unnecessary delays in the freezing of lobsters will occur. In the case of air blast or sharp freezers, there will also be quality losses due to dehydration of the lobster surfaces.

**FREQUENT CHECKS SHOULD BE MADE ON THE PRESSURES AND TEMPERATURES IN THE REFRIGERATION SYSTEM TO ENSURE CORRECT OPERATION.**

If frequent checks are made and records of these maintained, there will be little chance of the refrigerant's temperatures being too high or the equipment not functioning correctly. Any defects noted should be rectified quickly. It is important to watch the temperature gauges for superheating at the compressor's delivery side and sub-cooling of the liquid before the expansion valves. Sometimes these two readings will indicate leaks of refrigerant before there is any serious loss of freezing capacity.

**ACCURATE RECORDS OF ALL FREEZING OPERATIONS SHOULD BE KEPT.**

An accurate record of all loading and unloading times of the freezer and number of lobsters frozen, including size and species, will greatly assist in efficient management and control of the operations.

**FROZEN LOBSTERS AND LOBSTER PRODUCTS SHOULD BE STORED ON BOARD THE VESSEL AT TEMPERATURES APPROPRIATE FOR THE SPECIES AND END-PRODUCT.**

It should be borne in mind that although frozen lobster may only be stored for relatively short periods aboard ship, the same frozen products may be stored for much longer periods ashore. Deterioration during the initial storage at sea cannot be corrected by later storage at a lower temperature. It is thus recommended that storage aboard fishing vessels be at the temperature needed to retain the intrinsic quality during the envisaged storage period but it should be at –

18°C (0°F) or lower.

4.6.4

### **Icing on board**

IF IT IS NOT POSSIBLE TO FREEZE ABOARD THE VESSEL THE TAILS SHOULD BE CHILLED QUICKLY TO THE TEMPERATURE OF MELTING ICE AND MAINTAINED IN A CHILLED CONDITION UNTIL THEY REACH THE PROCESSOR OR THE MARKET.

Temperature is the most important single factor influencing the keeping quality of fresh lobsters.

The effects of increasing temperature are cumulative; that is, some potential keeping time is lost each time the temperature of the lobsters rises. The extent of this loss depends both on the degree of rise and the length of time the lobsters remain at the higher temperature.

**LOBSTERS IN ICE SHOULD BE STOWED IN SHALLOW LAYERS.**

In bulk stowing, the lobsters should be well mixed with finely divided ice or iced in layers in depth not greater than 1 metre (3 feet). Adequately shelved holds, or pens, or proper containers, should be used for this purpose.

**LOBSTERS SHOULD BE SURROUNDED BY ADEQUATE QUANTITIES OF ICE. CHILLING OF LOBSTERS IN BULK BY TOP ICING ONLY IS NOT SUFFICIENT.**

Ice is necessary, not only to cool the lobsters, but to maintain them in a cool condition. There should be enough ice to cope with any heat leaking into the holding room. If, at the end of a voyage, the lobsters are no longer surrounded by ice, then insufficient ice has been used. It is difficult to lay down precise quantities required, but icing should be heaviest against ship sides and bulkheads. In warm waters it will be necessary to use more ice than in colder climates, and this will also depend on whether the hold is insulated. The correct quantities of ice require to be worked out for individual vessels by trial and error.

**FINELY DIVIDED ICE SHOULD BE USED.**

This gives close contact with the lobsters, reduces damage by crushing and gives rapid cooling.

**WHERE BOXES ARE USED FOR STOWING LOBSTER TAILS THEY SHOULD BE PROPERLY ICED AND NOT OVERFILLED.**

It is sometimes an advantage to pack lobster tails with ice into boxes at sea. The lobster tails, if adequately iced, can remain undisturbed in the boxes until they reach the processor or the market. Unloading the catch can be simpler and, if required, more ice can be added to the boxes on landing without disturbing the lobsters.

Each day's catch can also be separated more easily. Since boxes are stacked one on top of another in the hold, overfilling will result in damage to the lobsters. For efficient cooling, each box should contain a layer of ice on the bottom, then lobsters and ice mixed together, and lastly

a top layer of ice. Boxing should not be mixed with other methods of stowage during the same trip.

**STORAGE IN REFRIGERATED SEA WATER IS NOT RECOMMENDED FOR LOBSTER TAILS.**

Excessive salt penetration into the muscle will take place rapidly. However, refrigerated sea water systems can be used for rapid pre-cooling before freezing or storage in ice.

4.6.5

#### **Food Additives**

**IF FOOD ADDITIVES ARE TO BE USED, THE ADVICE OF A FOOD TECHNOLOGIST SHOULD BE SOUGHT AND THE APPROVAL OF THE OFFICIAL AGENCY HAVING JURISDICTION SHOULD BE OBTAINED.**

Food additives cannot be used indiscriminately. Some are effective only with certain types of food, and in all cases the concentration and the time of contact of the additive must be rigidly controlled in accordance with specialist advice and the official agency having jurisdiction. Food laws differ from one country to another and it is essential to seek specialist advice before using a particular additive, whether the product is for domestic use or for export.

4.7

#### **Unloading and Transport of the Catch**

**SUITABLE LANDING AREAS SHOULD BE PROVIDED.**

Landing directly on the beaches or uncontrolled areas can lead to contamination. Provision of wharf, quay or pier is most desirable.

**LANDING AREAS SHOULD BE KEPT CLEAN.**

Refuelling and handling of fuel, lubricants and other material which might contaminate the catch should be done in areas separate from those where the catch is unloaded. It should be the specific responsibility of an individual to keep the unloading areas clean.

**UNLOADING FACILITIES SHOULD EITHER BE PROVIDED ON THE WHARF OR INCORPORATED ON THE VESSEL.**

These should enable the catch to be transferred to the wharf smoothly and without causing damage.

**CONTAINERS USED FOR UNLOADING SHOULD BE CONSTRUCTED OF SUITABLE CORROSION-RESISTANT MATERIAL. THEY SHOULD BE CLEAN TO AVOID CONTAMINATION AND STRONG ENOUGH TO PREVENT PHYSICAL DAMAGE TO THE LOBSTERS DURING TRANSIT. WICKER BASKETS AND WOODEN BOXES SHOULD NOT BE USED.**

Live lobsters will grip any available part of a container and legs will often protrude. Care should be taken not to damage the lobsters during unloading, or removal from the container. If

lobster tails are iced in boxes, the boxes should be large enough to hold sufficient ice.

**LOBSTERS AFTER UNLOADING SHOULD BE TRANSFERRED WITHOUT DELAY INTO TRANSPORT VEHICLES.**

Landings will either be direct to a processing plant or some transport by truck, rail or air will be necessary.

**SURFACE TRANSPORT VEHICLES SHOULD BE INSULATED OR PREFERABLY REFRIGERATED TO KEEP LOBSTERS COOL.**

Live lobsters in bags or cages will survive best if carried at 4-7°C (39-45°F). Lobsters which have been tailed and iced at sea should be carried as close to melting ice temperature as may be practicable and re-iced as necessary. Lobster tails, frozen at sea, should not be allowed to thaw out in transit. A temperature rise of the product during transport from one freezer store to another to -15°C (5°F) due to unforeseen circumstances may be tolerated. Otherwise, any rise in temperature of the product higher than -18°C (0°F) should be reduced to this temperature or lower without unnecessary delay.

**AIR TRANSPORT FACILITIES AND SCHEDULES SHOULD BE DESIGNED AND ARRANGED TO PROTECT THE LOBSTERS AGAINST CONTAMINATION AND HIGH TEMPERATURES.**

Although air transport is expensive the extra cost can be justified when dealing with high priced products; as there may be difficulties in surface transportation due to distance or terrain. However, because of weight restrictions, ice and refrigeration may not be practicable for air transport. Schedules should therefore allow for the most rapid transit possible with the shortest possible exposure to high temperatures. In some fisheries transportation of live lobsters in lightweight polystyrene boxes has been found economically feasible and successful. However, such boxes should not be re-used.

**LIVE LOBSTERS SHOULD BE HELD UNDER CONDITIONS WHICH WILL PREVENT LOSSES DUE TO MORTALITY AND DISEASES.**

In order to market the lobsters in an orderly fashion, fishermen usually keep lobsters in floating crates until sold to a dealer, and the dealer may keep them at landing points until enough have accumulated for economic shipment to large depots where storage conditions and shipping facilities are better.

Longer term lobster storage sites should be protected from storm damage and have good water circulation for oxygen renewal. The water should be reasonably cool in summer, but should not freeze in winter and the salinity should remain fairly constant at about 3%. For short-term storage, lobsters should be held in ordinary crates, floating wooden crates or in tank units ashore supplied with running sea water. When such temporary facilities are used every effort should be made to ensure they are properly shaded or covered to exclude sunlight. Long-term storage of up to six months is usually restricted to tidal pounds.

Care should be taken to avoid disease in live holding installations. A bacterial lobster blood disease, gaffkaemia, is transmitted only through wounds and can occasionally cause mortalities,

especially when water temperatures are high in summer.

4.8

### **Hygiene Control Programme**

IT IS DESIRABLE THAT EACH FISHING VESSEL SHOULD DEVELOP ITS OWN SANITARY CONTROL PROGRAMME BY INVOLVING THE WHOLE CREW AND BY ASSIGNING TO EACH MEMBER A DEFINITE TASK IN CLEANING AND DISINFECTING THE BOAT.

A permanent cleaning and disinfection schedule should be drawn up to ensure that all parts of the boat and equipment thereon are cleaned appropriately and regularly.

The fishermen should be properly trained in the use of special cleaning tools, methods of dismantling equipment for cleaning, and should be knowledgeable of the significance of contamination and the hazards involved.

5

## **HANDLING OF LOBSTERS ON SHORE - PLANT FACILITIES AND OPERATING REQUIREMENTS**

5.1

### **Plant Construction and Layout**

5.1.1

#### **General considerations**

LOBSTER PROCESSING PLANTS SHOULD BE SPECIALLY DESIGNED FOR THE PURPOSE.

Lobster meat spoils even more rapidly than fish, because of the high non-protein nitrogen content. It is therefore essential that the processing is carried out rapidly in a plant designed to handle lobsters and that no build-up of part-processed products occurs.

5.1.2

#### **Plant construction and sanitary design**

THE PLANT AND SURROUNDING AREA SHOULD BE SUCH AS CAN BE KEPT REASONABLY FREE FROM OBJECTIONABLE ODOURS, SMOKE, DUST, OR OTHER CONTAMINATION. THE BUILDINGS SHOULD BE SUFFICIENT IN SIZE WITHOUT CROWDING OF EQUIPMENT OR PERSONNEL, WELL CONSTRUCTED AND KEPT IN GOOD REPAIR. THEY SHOULD BE OF SUCH DESIGN AND CONSTRUCTION AS TO PROTECT AGAINST THE ENTRANCE AND HARBOURING OF INSECTS, BIRDS OR OTHER VERMIN, AND TO PERMIT READY AND ADEQUATE CLEANING.

The location of a processing establishment, its design, layout, construction and equipment should be planned in detail with considerable emphasis on the hygienic aspect, sanitary facilities

and quality control.

National or local authorities should always be consulted in regard to building codes, hygienic requirements of the operation and sanitary disposal of sewage and plant waste.

Prior to the construction of a new plant or modification of the existing one, a proper flow pattern of operation should be considered (see

#### Appendix I

, "Flow Diagram for Handling Lobsters". Only a well organized work flow will assure the maximum efficiency of the operation and better quality product.

The food handling area should be completely separate from any part of the premises used as living quarters.

**FLOORS SHOULD BE HARD SURFACED, NON-ABSORBENT AND ADEQUATELY DRAINED.**

Floors should be constructed of durable, waterproof, non-toxic, non-absorbent material which is easy to clean and disinfect. They should be non-slip and without crevices and should slope evenly and sufficiently for liquids to drain off to trapped outlets fitted with a removable grill.

If floors are ribbed or grooved to facilitate traction, any grooving of this nature should always run towards the drainage channel.

The junctions between the floors and walls should be impervious to water and, if possible, should be coved or rounded for ease of cleaning.

Concrete, if not properly finished, is porous and can be affected by animal oils, strong brines, various detergents and disinfectants. If used, it should be dense, of a good quality and with a well finished waterproof surface.

**DRAINS SHOULD BE OF AN ADEQUATE SIZE, SUITABLE TYPE, EQUIPPED WITH TRAPS AND WITH REMOVABLE GRATINGS TO PERMIT CLEANING.**

Suitable and adequate drainage facilities are essential for removal of liquid or semi-liquid wastes from the plant. There should be no floor area where water might collect in stagnant pools. Drains should be constructed of smooth and impervious

material and should be designed to cope with the maximum flow of liquid without any overflowing and flooding. Drainage systems inlets should be provided with deep seal traps which are appropriately located and easy to clean.

Drainage lines carrying waste effluent, except for open drains, should be properly vented, have a minimum internal diameter of 10 cm (4 in) and, if required, run to a catch basin for removal of solid waste material. Such a basin should be located outside the processing area and should be constructed of waterproof concrete or other similar material designed to the local

specifications and should meet the requirements of the official agency having jurisdiction.

**INTERNAL WALLS SHOULD BE SMOOTH, WATERPROOF, RESISTANT TO FRACTURE, LIGHT COLOURED AND READILY CLEANABLE.**

Acceptable materials for finishing walls inside are cement render, ceramic tiles of an industrial type, various kinds of corrosion-resistant metallic sheeting, such as stainless steel or aluminium alloys and a variety of non-metallic sheetings which have adequate impact resistance, desirable surface qualities and are easily repairable.

All sheeting joints should be sealed with a mastic or other compound resistant to hot water, and cover strips should be applied where necessary.

Wall-to-wall and wall-to-floor junctions should be coved or rounded to facilitate cleaning.

Walls should be free from projections and all pipes and cables should be sunk flush with the wall surface or neatly boxed in and sealed to the wall or neatly boxed in and mounted at least 10 cm (4 in) from the wall to allow for adequate cleaning and prevention of insect harborage.

**WINDOW SILLS SHOULD BE KEPT TO A MINIMUM SIZE, BE SLOPED INWARD AT LEAST 45°, AND BE AT LEAST 1 METRE (3 FEET) FROM THE FLOOR.**

Window sills and frames should be made of a smooth, waterproof material and, if of wood, should be kept well painted. Internal window sills should be sloped to prevent storage of miscellaneous materials or accumulation of dust and should be constructed to facilitate cleaning.

Windows should be filled with whole panes and those which open should be screened. The screens should be constructed so as to be easily removable for cleaning and should be made from suitable corrosion-resistant material.

**ALL DOORS THROUGH WHICH LOBSTERS OR THEIR PRODUCTS ARE MOVED SHOULD BE SUFFICIENTLY WIDE, WELL CONSTRUCTED OF A SUITABLE MATERIAL AND SHOULD BE OF A SELF-CLOSING TYPE.**

Doors through which lobster or lobster products are moved should be either covered with or made of a corrosion-resistant metal or other suitable material with adequate impact resistance and, unless provided with an effective air screen, should be of self-closing type.

Doors and frames of the doorways should have a smooth and readily cleanable surface.

Doors through which the product is not moved, such as those providing staff access, should be appropriately surfaced, at least on the processing area side, to allow for ease of cleaning.

**CEILINGS SHOULD BE SO DESIGNED, CONSTRUCTED AND FINISHED AS TO PREVENT ACCUMULATION OF DIRT AND MINIMIZE CONDENSATION, MOULD DEVELOPMENT AND FLAKING AND SHOULD BE EASY TO CLEAN.**

Ceilings should preferably be 3 metres (10 feet) in height, free from cracks and open joints

and should be of a smooth, waterproof, light coloured finish.

In buildings where beams, trusses, pipes or other structural elements are exposed, the fitting of a suspended ceiling just below is desirable.

Where the roof beams and trusses cannot be covered, the underside of the roof may constitute a satisfactory ceiling providing all joints are sealed and the supporting structures are of a smooth, well-painted and light coloured surface, easily cleanable and constructed to protect the lobster products from falling debris and dust.

PREMISES SHOULD BE WELL VENTILATED TO PREVENT EXCESSIVE HEAT, CONDENSATION AND CONTAMINATION WITH OBNOXIOUS ODOURS, DUST, VAPOUR OR SMOKE.

Special attention should be given to the venting of areas and equipment producing excessive heat, steam, obnoxious fumes, vapours or contaminating aerosols. The air-flow in the premises should be from the more hygienic areas to the less hygienic areas. Good ventilation is important to prevent condensation and growth of moulds in overhead structures. Ventilation openings should be screened and, if required, equipped with proper air filters. Windows which open for ventilation purposes should be screened. The screens should be made easily removable for cleaning and should be made from suitable corrosion-resistant material.

A MINIMUM ILLUMINATION OF 220 LUX (20-FOOT CANDLES) IN GENERAL WORKING AREAS AND NOT LESS THAN 540 LUX (50-FOOT CANDLES) AT POINTS REQUIRING CLOSE EXAMINATION OF THE PRODUCT SHOULD BE PROVIDED AND SHOULD NOT ALTER COLOURS.

Light bulbs and fixtures suspended over the working areas where lobsters are handled at any stage of preparation should be of the safety type or otherwise protected to prevent food contamination in case of breakage.

It is highly desirable to have the light fixtures either recessed flush with the ceiling or with the upper surfaces of the light fixtures fitting flush with the ceiling in order to prevent the accumulation of dust on them.

5.1.3

### **Hygienic facilities**

AREAS WHERE LOBSTERS ARE RECEIVED OR STORED SHOULD BE SO SEPARATED FROM AREAS IN WHICH FINAL PRODUCT PREPARATIONS OR PACKAGING ARE CONDUCTED AS TO PREVENT CONTAMINATION OF THE FINISHED PRODUCT.

Separate rooms or preferably well defined areas of adequate size should be provided for (i) receiving and storing raw materials; and (ii) operations like washing, cooking, peeling or other processing and packaging.

Manufacture or handling of products intended for human consumption should be entirely

separate and distinct from the areas used for inedible materials.

The food handling area should be completely divorced from any part of the premises used as living quarters.

Receiving and storage areas should be clean and readily capable of being maintained in a clean condition and should provide protection for the lobsters from deterioration and contamination.

**WHERE BAIT IS PREPARED, IT SHOULD BE HANDLED AND STORED IN SUCH A MANNER THAT IT WILL NOT CONTAMINATE THE PRODUCT OR PREMISES.**

All bait must be handled in such a manner that there is no risk of contamination of lobsters, lobster products or the premises. If it is derived from fish it may be prepared on the premises from raw material which has been handled in a hygienic manner, in an area physically separated from the area where lobsters and lobster products are processed. It may be stored in the same room as packaged lobster or lobster products, providing that the bait is adequately enclosed in clean containers which ensure that there is no risk of contamination or transfer of off odours to other packaged products or to the premises.

**A SEPARATE REFUSE ROOM OR OTHER EQUALLY ADEQUATE OFFAL STORAGE FACILITIES SHOULD BE PROVIDED ON THE PREMISES.**

If offal or other refuse is to be collected and held before removal, adequate precautions should be taken to protect it against rodents, birds, insects and exposure to warm temperatures.

A separate refuse room for storing waste in watertight containers or offal bins should be provided. The walls, floor and ceiling of such a storage room, and the area under the elevated bins, should be constructed of impervious material which can be readily cleaned.

Where waste material is held in containers outside the establishment, the containers should be lidded. A separate enclosure should be provided for their storage with easy access for vehicles loading and unloading. Stands for the containers should be of solid, hard and impervious material which can be easily cleaned and properly drained. If containers are used in large numbers, a mechanical washing plant might be advisable to provide for routine washing. Containers should be capable of withstanding repeated exposure to normal cleaning processes.

Refuse rooms or other offal storage facilities should be cleaned and disinfected regularly.

**ANY BY-PRODUCT PLANT SHOULD BE ENTIRELY SEPARATE FROM A PLANT WHICH IS PROCESSING LOBSTER FOR HUMAN CONSUMPTION.**

The processing of by-products or non-fish products not fit for human consumption should be conducted in separate buildings or in areas which are physically separated in such a way that there is no possibility of contamination of lobster products.

**AN AMPLE SUPPLY OF COLD AND HOT POTABLE WATER AND/OR CLEAN SEA WATER, UNDER ADEQUATE PRESSURE SHOULD BE AVAILABLE AT NUMEROUS POINTS THROUGHOUT THE PREMISES AT ALL TIMES DURING THE WORKING**

## HOURS.

All water available for use in those parts of establishments where lobsters are received, held, processed, packaged and stored should be potable water or clean sea water and should be supplied at a pressure of no less than 1.4 kg/cm<sup>2</sup> (20 lb/in<sup>2</sup>).

An adequate supply of hot water of potable quality should be available at all times during working hours.

Facilities should be provided so that at all times when required during working hours an adequate supply of hot water of potable quality at a minimum temperature of 65°C (149°F) should be available. Further provisions should be made to reduce the temperature of the water supply for other purposes such as hand washing.

The cold water supply used for cleaning purposes should be fitted with an inline chlorination system allowing the residual chlorine content of the water to be varied at will in order to reduce the number of micro-organisms and prevent the build-up of odours.

Water used for washing or conveying raw materials should not be re-circulated unless it is restored to a level of potable quality.

**WHEN IN-PLANT CHLORINATION OF WATER IS USED THE RESIDUAL CONTENT OF FREE CHLORINE SHOULD BE MAINTAINED AT NO MORE THAN THE MINIMUM EFFECTIVE LEVEL FOR THE USE INTENDED.**

Chlorination systems should not be relied upon to solve all hygiene problems. The indiscriminate use of chlorine cannot compensate for hygienic conditions in a processing plant. Water which has been in contact with fish or lobsters should not be re-used to avoid taint problems.

**ICE SHOULD BE MADE FROM POTABLE WATER OR CLEAN SEA WATER AND SHOULD BE MANUFACTURED, HANDLED AND STORED SO AS TO PROTECT IT FROM CONTAMINATION.**

Ice used in the operation of the lobster processing establishment should be made from potable water or clean sea water.

A special room, or other suitable storage facilities, should be provided to protect the ice from contamination and excessive meltage. Dust, flakes of paint, bits of wood or sawdust, straw and rust, are the most frequent contaminants transferable by ice into the final product. Foot traffic should be kept to a minimum.

Care must be taken to ensure that ice used to chill lobster or lobster products does not contaminate them.

**WHERE A NON-POTABLE AUXILIARY WATER SUPPLY IS USED, THE WATER SHOULD BE STORED IN SEPARATE TANKS, CARRIED IN SEPARATE LINES, IDENTIFIED BY CONTRASTING COLOURS, LABELLED AND HAVE NO CROSS-CONNECTIONS OR BACK-SIPHONAGE WITH LINES CARRYING POTABLE WATER**

## OR CLEAN SEA WATER.

Non-potable water may be used for such purposes as producing steam, cooling heat exchangers and fire protection.

It is very important that the systems of storage and distribution of potable and non-potable water are entirely separate and there is no possibility for cross-connection or for inadvertent usage of non-potable water in the lobster processing areas. Only potable quality water should be used for the supply of hot water.

**ALL PLUMBING AND WASTE DISPOSAL LINES, INCLUDING SEWER SYSTEM, SHOULD BE LARGE ENOUGH TO CARRY PEAK LOADS AND SHOULD BE PROPERLY CONSTRUCTED.**

All lines should be water-tight and have adequate deep seal traps and vents. Disposal of waste should be effected in such a manner as not to permit contamination of potable water or clean sea water supplies.

Sumps or solid matter traps of the drainage system should preferably be located outside the processing area and so designed as to allow them to be emptied and thoroughly cleaned at the end of each working day or more often as needed.

When waste systems are installed overhead in processing rooms to service upper floors, the installation and location of these systems should be such as to preclude any chance of contaminating processing lines.

The plumbing and the manner of waste disposal should be approved by the official agency having jurisdiction.

**PROPER FACILITIES FOR WASHING AND DISINFECTION OF EQUIPMENT SHOULD BE PROVIDED.**

Facilities should be present in every lobster processing establishment for cleaning and disinfection of trays, removable cutting boards, containers and other similar equipment and working implements. Such facilities should be located in a separate room or in designated areas in the work rooms where there is an adequate supply of hot and cold water of potable quality, under good pressure, and where there is proper drainage.

Containers and equipment used for offal or contaminated materials should be washed in a separate area than that used for products intended for human consumption.

**ADEQUATE AND CONVENIENTLY LOCATED TOILET FACILITIES SHOULD BE PROVIDED.**

Adequate, suitable and conveniently located changing facilities and toilets should be provided in all establishments. Toilets should be so designed as to ensure hygienic removal of waste matter. These areas should be well lit, ventilated and where appropriate heated and should not open directly on to food handling areas. Hand washing facilities with warm or hot and cold potable water or clean sea water, a suitable hand-cleaning preparation, and with suitable hygienic means of drying hands, should be provided adjacent to toilets and in such a position

that the employee must pass them when returning to the processing area. Where hot and cold water are available mixing taps should be provided. Where paper towels are used, a sufficient number of dispensers and receptacles should be provided near to each washing facility. Taps of a non-hand operable type are desirable. Notices should be posted directing personnel to wash their hands after using the toilet.

Toilet rooms should have walls and ceilings of a smooth washable light coloured surface and floors constructed of impervious and readily cleanable material. The doors leading to the facilities should be of a self-closing type and should not open directly into the fish processing areas.

The following formula could be used as a guideline in assessing the adequacy of toilet facilities in relation to the number of employees:

- 1 to 9 employees = 1 toilet
- 10 to 24 employees = 2 toilets
- 25 to 49 employees = 3 toilets
- 50 to 100 employees = 5 toilets
- for every 30 employees over 100 = 1 toilet

Note: Urinals may be substituted for toilets, but only to the extent of one-third of total toilets required.

**FACILITIES SHOULD BE AVAILABLE IN THE PROCESSING AREAS FOR EMPLOYEES TO WASH AND DRY THEIR HANDS AND FOR DISINFECTION OF PROTECTIVE HAND COVERINGS.**

Adequate and conveniently located facilities for hand washing and drying should be provided wherever the process demands. Where appropriate, facilities for hand disinfection should also be provided. Warm or hot and cold potable water or clean sea water and a suitable hand-cleaning preparation should be provided. Where hot and cold water are available mixing taps should be provided. There should be suitable hygienic means of drying hands. Where paper towels are used, a sufficient number of dispensers and receptacles should be provided adjacent to each washing facility. Taps of a non-hand operable type are desirable. The facilities should be furnished with properly trapped waste pipes leading to drains.

**STAFF AMENITIES CONSISTING OF LUNCHROOMS AND CHANGING ROOMS OR ROOMS CONTAINING SHOWER OR WASHING FACILITIES SHOULD BE PROVIDED.**

Where workers of both sexes are employed, separate facilities should be present for each except that the lunchrooms may be shared. As a general guide, the lunchrooms should provide seating accommodation for all employees and the changing rooms should provide enough space for lockers for each employee without causing undue congestion. Clothing and footwear not worn during working hours must not be kept in any processing area.

**STORAGE FACILITIES SHOULD BE AVAILABLE FOR THE PROPER DRY STORAGE OF PACKAGING MATERIALS.**

Separate facilities for the storage of cartons, wrappings or other packaging materials should

be provided in order to protect them against moisture, dust or other contamination.

IF POISONOUS OR HARMFUL MATERIALS, INCLUDING CLEANING COMPOUNDS, DISINFECTANTS AND PESTICIDES ARE STORED, THEY SHOULD BE KEPT IN A SEPARATE ROOM DESIGNED AND MARKED SPECIFICALLY FOR THIS PURPOSE.

All such materials must be prominently and distinctly labelled so that they can be easily identified. The room should be kept locked and the materials contained in it should be handled only by personnel trained in their use.

5.2

### **Equipment, Utensils and Working Surfaces**

ALL WORKING SURFACES, EQUIPMENT AND UTENSILS USED IN FOOD HANDLING AREAS AND WHICH MAY CONTACT FOOD SHOULD BE MADE OF MATERIAL WHICH DOES NOT TRANSMIT TOXIC SUBSTANCES, ODOUR OR TASTES, IS NON-ABSORBENT, IS RESISTANT TO CORROSION AND IS CAPABLE OF WITHSTANDING REPEATED CLEANING AND DISINFECTION. SURFACES SHOULD BE SMOOTH AND FREE FROM PITS AND CREVICES. THE USE OF WOOD AND OTHER MATERIALS WHICH CANNOT BE ADEQUATELY CLEANED AND DISINFECTED SHOULD BE AVOIDED EXCEPT WHEN THEIR USE WOULD CLEARLY NOT BE A SOURCE OF CONTAMINATION. THE USE OF DIFFERENT MATERIALS IN SUCH A WAY THAT CONTACT CORROSION CAN OCCUR SHOULD BE AVOIDED.

Contamination of lobsters during processing can be caused by contact with unsatisfactory surfaces. All food contact surfaces should be smooth, free from pits, crevices and loose scale, substances harmful to humans, unaffected by salt, fish juices or other ingredients used and capable of withstanding repeated cleaning and disinfection. Wood could be used for cutting surfaces only when no other suitable material is available. Machines and equipment should be so designed that they can be easily dismantled to facilitate thorough cleaning and disinfection.

Containers used for holding lobsters should preferably be constructed of washable plastic or corrosion-resistant metal, and if of wood, they should be treated to prevent the entry of moisture and coated with a durable, non-toxic paint or other surface coating that is smooth and readily washable. Any container, the surface of which is pitted, corroded, scaled, or has peeling paint should not be used for holding lobster products. Wicker baskets should not be used.

Stationary equipment should be installed in such a manner as will permit easy access and thorough cleaning and disinfection.

Lobster washing tanks should be designed to provide a constant change of water with good circulation, and to have provisions for drainage and to be easily cleaned.

Equipment and utensils used for inedible or contaminated materials should be identified as such and should not be used for handling of lobsters and products intended for human consumption.

ADEQUATE FACILITIES SHOULD BE AVAILABLE, AT THE PROCESSING PLANT,

TO MAINTAIN LOBSTERS LIVE OR THEIR PRODUCTS IN A CHILLED CONDITION, AT NO TIME SHOULD COOKED PRODUCTS BE STORED WITH UNCOOKED PRODUCTS AND LIVE LOBSTERS.

Where lobsters cannot be processed on arrival, or when the final product cannot be distributed soon after packing, adequate facilities are required to keep the lobsters live or their products cool. Chill rooms should not be used to cool the lobster products but only to maintain them chilled after they have been cooled by ice or other means.

It is poor practice, therefore, to load the chill room with large quantities of lobster products that were not prechilled effectively to the temperature of melting ice.

The chill room should be equipped with a recording thermometer and an automatic temperature control and should be so designed that it could be kept in a clean, hygienic condition at all times. The chill room should also be equipped with an automatic alarm system to alert the proper personnel when the temperature drops below 0°C (32°F), when storing lobster products, or falls below 4°C (39°F) or rises above 10°C (50°F) for live lobster storage. As the temperature requirements for the chilling of live lobsters and for the chilling of lobster products differ, separate chillrooms should be provided for these purposes.

A system of tanks through which cool clean sea water is pumped and aerated is recommended for short-term live storage, either in a building or in the open, but covered to protect lobsters from the sun.

CRACKING BLOCKS AND MALLETS SHOULD BE CONSTRUCTED OF NON-ABSORBENT AND CREVICE-FREE MATERIAL.

Cracking blocks and mallets should be constructed of a suitable corrosion-resistant material which is non-absorbent and crevice-free so that they will not become saturated with juices containing bacteria which would give rise to off-odours and be a source of contamination. Corrodible materials are objectionable because the products of corrosion may contaminate the product. Hard rubber and certain forms of plastic have been found suitable. These blocks and mallets should be suitably maintained. Wooden blocks or mallets should not be used.

TABLES SHOULD BE SO CONSTRUCTED THAT THEY, AND THE AREAS BENEATH, CAN BE READILY CLEANED.

Tables should be so constructed that there will be no inaccessible points which may be omitted in establishment clean-up. Stands for workers along the processing lines should be constructed of metal, should be well maintained and should be movable or so constructed that the stands and the floor beneath can be properly cleaned.

REFRIGERATION AND FREEZING EQUIPMENT SHOULD BE PROPERLY DESIGNED AND CONSTRUCTED AND SHOULD BE OF ADEQUATE CAPACITY.

The freezing equipment should be designed and operated in accordance with the requirements stated in the "Recommended International Code of Practice for Frozen Fish" (Ref. No. CAC/RCP 9-1976), so that freezing of lobsters is accomplished rapidly.

ALL FREEZER AND COLD STORAGE FACILITIES SHOULD BE ADEQUATE FOR

THE INTENDED PRODUCTION AND SHOULD BE FITTED WITH AUTOMATIC TEMPERATURE CONTROLLING AND RECORDING DEVICES.

Frozen lobsters and lobster products should be stored at a uniformly low temperature if a considerable quality loss is to be avoided. Freezer stores should be able to operate at  $-29^{\circ}\text{C}$  ( $-20^{\circ}\text{F}$ ). Thermometers, or other temperature recording devices, should be capable of being read easily within a two-degree accuracy.

THE FREEZER STORE SHOULD BE ADEQUATE FOR THE INTENDED PRODUCTION, TIME AND TEMPERATURE OF STORAGE, DESIGNED BY AN EXPERT AND CONSTRUCTED BY CRAFTSMEN COMPETENT AND EXPERIENCED IN THIS FIELD.

The freezer store should be designed taking into account the size of intended production, the type of lobster and lobster products, the intended time of storage and the optimal temperature requirements.

It is also desirable that the location and the design of the freezer store be integrated into the general layout of the whole establishment and its operation should be incorporated into the flow pattern of the overall operation. The freezer boats or the incoming trucks should be able to transfer their frozen lobster into the on-shore freezer store with the minimal exposure to ambient temperature and with the least possible handling. The same requirements should also apply to the loading of refrigerated vehicles or railway cars.

A GOOD VAPOUR SEAL IS REQUIRED ON THE OUTSIDE SURFACES OF THE FREEZER STORE AND PRECAUTIONS SHOULD BE TAKEN TO AVOID DANGER OF FROST HEAVE FROM THE SUBSOIL.

It is extremely important to have an effective water vapour barrier totally enveloping the warm face of the insulation layer in the freezer store walls, ceiling and floor. In the absence of such a barrier, the water vapour from the warm outside air will diffuse into the insulating material and freeze upon reaching the  $0^{\circ}\text{C}$  ( $32^{\circ}\text{F}$ ) boundary. Freezing of this kind will bring about a gradual build-up of ice within the insulation layer, thus reducing its insulating efficiency and eventually could result in a serious structural deterioration of the whole building.

THE INFLOW OF OUTSIDE AIR INTO THE FREEZER STORE SHOULD BE MINIMIZED AS MUCH AS POSSIBLE. WHERE A FREEZER STORE DOOR MUST BE OPENED FREQUENTLY, THE FLOW OF AIR THROUGH THE DOOR SHOULD BE RESTRICTED BY THE USE OF AN AIR LOCK CHAMBER, A COLD AIR CURTAIN, SELF CLOSING SHUTTERS OR SOME OTHER SIMILAR DEVICE.

When a freezer store door is opened to the outside atmosphere, a strong convection current will rapidly exchange the cold air in the store with warm air from outside. This in turn will raise the temperature of the store appreciably and put an additional load on the cooling equipment. The moisture brought in with the outside air will also freeze on the cooling surfaces and reduce their efficiency. If a freezer store has more than one entrance, only one door should be open at a time; otherwise, air current may greatly increase the inflow of warm outside air.

The proper installation and use of air lock chambers, cold air curtains, self-closing shutters or similar devices will greatly reduce the flow of warm air into a freezer store during loading

and unloading operations.

THE RELATIVE HUMIDITY IN THE FREEZER STORE SHOULD BE AS HIGH AS POSSIBLE AND EXCESSIVE AIR CIRCULATION SHOULD BE AVOIDED.

The bigger the difference between the temperature of the store and the product, the faster dehydration will be. The drying of products in a freezer store is, however, a complex matter depending on many factors, such as movement of air, its humidity, incidental leakage of heat into the store (frequent opening of the doors), fluctuation in storage temperature and condition of the glaze or type of packaging material used for the products. Even with the best conditions of storage and packaging, frozen fish will dry slowly if held too long.

PROVISION SHOULD BE MADE FOR AN EFFECTIVE AND REGULAR DEFROSTING OF THE FREEZER STORE COOLING SURFACES.

All freezer store cooling surfaces should be regularly defrosted in order to prevent an excessive build-up of ice or frost which could seriously affect the efficiency of the cooling system and may unnecessarily overload refrigeration equipment.

Defrosting in modern plants is done automatically while in some older installations it could be done either manually by scraping and brushing off, or by a hot defrost.

During the defrosting operations care should be taken to prevent any frost, ice or melt water falling on to the stored fish or fish products.

ALL FREEZER STORES SHOULD BE FITTED WITH AN ALARM DEVICE, OPERATED FROM INSIDE, SO THAT ANYONE TRAPPED INSIDE CAN OBTAIN ASSISTANCE QUICKLY.

It should always be possible to open freezer store doors from within. An efficient system of signalling for aid is however necessary in case a person is trapped inside a freezer store. The alarm should sound in an area of the plant where there is always someone on duty. Workers should not enter freezer stores alone without advising someone else of their intention to do so.

Doors leading to the freezer store should preferably be of a sliding type and mechanically operated. A gasket heater should be present to facilitate the opening of the door.

TRANSPORT VEHICLES SHOULD BE DESIGNED TO PROTECT LOBSTERS FROM WARMING UP DURING TRANSPORT AND SHOULD BE OF SUCH MATERIAL AND CONSTRUCTION AS TO PERMIT EASY AND THOROUGH CLEANING.

Vehicles used for transporting lobsters and lobster products should be designed to provide some means of refrigeration and constructed to ensure constant protection against contamination by dust and the drying effect of sun or wind. Even where ice is very cheap and journey times or distances are relatively short, the use of an insulated vehicle provides an additional insurance against inadequate icing or unforeseen delays. The walls, roof and the floor of the vehicle should be insulated. The thickness of insulation employed will depend on the outside temperatures normally encountered. It should be remembered that insulation cannot help to cool the lobsters but helps to keep them at the temperature at which they were put into

the vehicle.

Vehicles used for transporting frozen lobsters should be capable of maintaining the product at or below a temperature of  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ).

For the purpose of cleaning, the vehicles transporting lobsters should have the wall, floor and roof linings made of a suitable, corrosion-resistant material with smooth and non-absorbent surfaces. Floors should be adequately drained.

5.3

### **Hygienic Operating Requirements**

ALL WHARVES, QUAYS, MARKETS AND SIMILAR AREAS WHERE LOBSTERS ARE UNLOADED OR DISPLAYED FOR SALE SHOULD BE KEPT CLEAN AND DISINFECTED.

Lobsters, as a food for human consumption, should be treated as such in clean surroundings. Any dirty surfaces in the vicinity of the unloading area involves the risk that lobsters will be contaminated with filth and micro-organisms of public health significance.

THE BUILDING, EQUIPMENT, UTENSILS AND OTHER PHYSICAL FACILITIES OF THE PLANT SHOULD BE KEPT CLEAN, IN GOOD REPAIR AND SHOULD BE MAINTAINED IN AN ORDERLY AND HYGIENIC CONDITION.

All surfaces which come in contact with lobsters or lobster products should be hosed down with cold potable water or clean sea water as frequently as necessary to ensure cleanliness. It is important that the cleaning method used will remove all residues and the disinfecting method will reduce the microbial population of the surface being cleaned. A preliminary rinse in potable cold water or clean sea water, followed by a wash in water of a sufficient temperature providing for effective cleaning is recommended. An ample supply of potable water or clean sea water at adequate pressure is the first requirement and cleaning will be much easier if done immediately and the surfaces are not allowed to dry.

The use of cold or hot potable water or clean sea water alone is generally not sufficient to accomplish the required result. It is desirable, if not essential, that aids such as suitable cleaning and disinfecting agents together with manual or mechanical scrubbing, wherever appropriate, be used to assist in achieving the desired objective. After the application of cleaning and disinfecting agents the surfaces which come in contact with fish should be rinsed thoroughly with cold potable water or clean sea water before use.

Cleaning agents and disinfectants used should be appropriate for the purpose and should be so used as to present no hazard to public health and should meet the requirements of the official agency having jurisdiction. The use of sponges and towels to wipe table or container surfaces which come in contact with lobsters should not be allowed.

UTENSILS AND FOOD-CONTACT SURFACES OF EQUIPMENT SHOULD BE PROTECTED FROM CONTAMINATION.

Cleaned and disinfected portable equipment and utensils should be stored above the floor in a clean, dry location. Suitable space and facilities should be provided for such storage so that

food-contact surfaces are protected from splash, dust, and other contamination.

The same requirements should also apply to the exposed food-contact surfaces of the fixed equipment.

Utensils should be air dried before being stored or should be stored in a self-draining position on hooks or racks constructed of corrosion-resistant material. When the storage in protective liquids or other solutions is practised, the equipment and utensils so stored should subsequently be washed, disinfected and rinsed prior to re-use. Wherever practicable, stored containers and utensils should be covered or inverted.

ALL MACHINES USED FOR SORTING, WASHING, TAILING, COOKING, COOLING OR OTHER PROCESSING EQUIPMENT USED IN SIMILAR OPERATIONS SHOULD BE THOROUGHLY CLEANED, DISINFECTED AND RINSED DURING REST OR MEAL BREAKS AND BEFORE RESUMPTION OF PRODUCTION FOLLOWING OTHER WORK STOPPAGES.

The use of machinery reduces the risk of contamination from human sources. If, however, these machines are not properly maintained and cleaned, they can become a serious source of contamination.

ALL MACHINERY AND EQUIPMENT SHOULD BE INSPECTED BEFORE PROCESSING BEGINS TO SEE THAT THEY HAVE BEEN CLEANED AND REASSEMBLED.

Dirty (soiled) surfaces and residues of the cleaning and disinfecting agents which have not been removed by rinsing will contaminate the product. It is better practice to start with a wet line rather than with a dry surface.

Mechanized or automated equipment should be regularly checked to prevent breakdowns.

ONLY PUTABLE WATER OR CLEAN SEA WATER SHOULD BE USED FOR WASHING, COOKING, COOLING AND CONVEYING OF LOBSTERS.

Cooked lobsters can be eaten without any further heat treatment and the presence of micro-organisms on this product could endanger the health of the consumer, or reduce the shelf-life of this product.

REMOVAL OF SOLID, SEMI-SOLID OR LIQUID WASTES FROM LOBSTER UNLOADING, HOLDING AND PROCESSING AREAS SHOULD BE ON A CONTINUOUS OR NEAR CONTINUOUS BASIS USING WATER AND/OR APPROPRIATE EQUIPMENT SO THAT THESE AREAS ARE KEPT CLEAN AND THERE IS NO DANGER OF CONTAMINATING THE PRODUCT.

All waste materials resulting from the operation of a processing plant should be disposed of as soon as possible in a way that they cannot be used for human food and in a manner that they cannot contaminate food and water supplies or offer harbourage or breeding places for rodents, insects or other vermin.

Containers, flumes, conveyors, bins or storage bays used for removal, collection or storage

of offal and other waste should be cleaned frequently with potable water or clean sea water containing an appropriate amount of free chlorine or other suitable disinfectant.

All waste materials from containers and vehicles should be removed in such a way as not to cause any contamination and not to create a nuisance.

Arrangements for the frequent removal and disposal of waste material should be approved by the appropriate official agency having jurisdiction.

**EFFECTIVE MEASURES SHOULD BE TAKEN TO PROTECT AGAINST THE ENTRANCE INTO THE PREMISES AND THE HARBOURAGE ON THE PREMISES OF INSECTS, RODENTS, BIRDS OR OTHER VERMIN.**

An effective and continuous programme for the control of insects, rodents, birds or other vermin within the establishment should be maintained. The plant and surrounding area should be regularly examined for evidence of infestation. Where control measures are necessary, treatment should be under the direct supervision of personnel with a thorough understanding of the hazards involved, including the possibility of harmful residues being retained by the lobsters or their products. The chemical, biological or physical agents used should meet the requirements of the official agency having jurisdiction.

The use of insecticides during the plant operation, without any provision for collection of dead insects, should be discouraged. Instead, the use of adhesive insect traps or very efficient "black light insecticutor" lamps with the attached collecting trays, is recommended. Insect traps should not be located directly over the processing areas and should be away from windows and doors.

All rodenticides, fumigants, insecticides or other harmful substances should be of a type approved by the official agency having jurisdiction and should be stored in separate locked rooms or cabinets used only for that purpose and handled only by properly trained personnel.

**DOGS, CATS AND OTHER ANIMALS SHOULD BE EXCLUDED FROM AREAS WHERE LOBSTERS ARE RECEIVED, HANDLED, PROCESSED OR STORED.**

Dogs, cats and other animals are potential carriers of diseases and they should not be allowed to enter or to live in rooms or areas where lobsters or their products are handled, prepared, processed or stored.

**ALL PERSONS WORKING IN A LOBSTER PROCESSING PLANT SHOULD MAINTAIN A HIGH DEGREE OF PERSONAL CLEANLINESS WHILE ON DUTY AND SHOULD TAKE ALL NECESSARY PRECAUTIONS TO PREVENT THE CONTAMINATION OF THE LOBSTERS OF THEIR PRODUCTS OR INGREDIENTS WITH ANY FOREIGN SUBSTANCE.**

All employees should wear, appropriate to the nature of their work, clean, light-coloured protective clothing including a head covering and footwear all of which articles are either washable or disposable. The use of waterproof aprons, where appropriate, is recommended. Light colours are required to assess visually the cleanliness of the garment. It is desirable that, except for workers operating in freezers or cold rooms, the sleeves of clothing should not extend

below the elbows, unless waterproof protective sleevelets are used to cover the arms.

Gloves used in the handling of lobsters should be maintained in a sound, clean and hygienic condition and should be made of an impermeable material except where their usage would be incompatible with the work involved. Hands should be washed thoroughly with soap or another cleaning agent and warm water before commencing work, on every occasion after visiting a toilet, before resuming work, and whenever otherwise necessary. The wearing of gloves does not exempt the operator from having thoroughly washed hands.

Any behaviour which can potentially contaminate the lobsters such as eating, smoking, chewing of tobacco or other materials and spitting should be prohibited in any part of the lobster handling areas.

NO PERSON WHO IS KNOWN OR SUSPECTED TO BE SUFFERING FROM, OR WHO IS A CARRIER OF A DISEASE LIKELY TO BE TRANSMITTED THROUGH FOOD OR HAS AN INFECTED WOUND OR OPEN LESION SHOULD BE ENGAGED IN THE PREPARATION, HANDLING OR TRANSPORTING OF LOBSTERS OR THEIR PRODUCTS.

The management should take care to ensure that no person, while known or suspected to be suffering from, or to be a carrier of a disease likely to be transmitted through food or while afflicted with infected wounds, skin infection, sores, or with diarrhoea, is permitted to work in any food handling area in any capacity in which there is any likelihood of such a person directly or indirectly contaminating food with pathogenic micro-organisms. Any person so affected should immediately report to the management that he is ill.

Any person who has a cut or wound should not continue to handle food or food contact surfaces until the injury is completely protected by a water-proof covering which is firmly secured, and which is conspicuous in colour. Adequate first-aid facilities should be provided for this purpose.

BAGS, CONTAINERS AND ALL RETURNABLE BOXES SHOULD BE THOROUGHLY CLEANED AND TREATED WITH DISINFECTANT IMMEDIATELY AFTER EACH USE.

The use of properly designed washing machines is recommended wherever practicable.

Good washing by hand can be achieved by scrubbing with stiff brushes and by using high pressure water jets with detergent added to the water.

5.4

## **Operating Practices and Production Requirements**

5.4.1

### **General considerations**

ONLY GOOD QUALITY RAW MATERIALS SHOULD BE ACCEPTED FOR

## PROCESSING.

The raw material should be rejected if it is known to contain decomposed lobster or to contain harmful or extraneous substances which will not be removed to acceptable levels by normal procedures of sorting or preparation.

LOBSTERS SHOULD BE HANDLED AND PROCESSED WITH CARE AND A MINIMUM OF DELAY.

Live lobsters should be kept so until they are shipped to the market or processed.

Lobsters will live for varying lengths of time depending on conditions under which they are held. If held in sea water, the factors, which vary with the season are temperature, salinity, oxygen content and load.

For short-term storage, live lobsters are held in ordinary crates or in land-based tank units supplied with running sea water. Long-term storage of up to six months is usually restricted to tidal pounds commonly made by damming off natural coves. If no circulation is provided, oxygen content of the water will be controlled by surface area and water temperature.

PLANTS SHOULD REGULATE THE VOLUME OF RAW MATERIAL THEY RECEIVE AND/OR HOLD SO THAT THEIR SUPPLIES DO NOT BECOME TOO LARGE TO BE PROCESSED WHILE THE LOBSTERS ARE IN PRIME CONDITION.

The length of time the raw material can be satisfactorily held at the plant before processing will depend on the length of time already elapsed since capture, and on the care with which they were handled during transport to the plant.

Where the volume of raw material available for processing is subject to large fluctuations, the feasibility of boiling, shucking, and freezing and storing the surplus for packing during slack periods might be considered.

IF FOOD ADDITIVES ARE TO BE USED, THE ADVICE OF A FOOD TECHNOLOGIST SHOULD BE SOUGHT AND THE APPROVAL OF THE OFFICIAL AGENCY HAVING JURISDICTION SHOULD BE OBTAINED.

Food additives cannot be used indiscriminately. Some are effective only with certain types of food, and in all cases the concentration and the time of contact of the additive must be rigidly controlled in accordance with specialist advice and the official agency having jurisdiction. Food laws differ from one country to another and it is essential to seek specialist advice before using a particular additive, whether the product is for domestic use or for export.

5.4.2

### **Preparatory operations**

PREPARATORY OPERATIONS FOR PRESERVATION SUCH AS: SORTING, COOKING, COOLING, SHUCKING, AND WASHING SHOULD BE DONE IN A CLEAN AND HYGIENIC MANNER AND SHOULD BE CARRIED OUT CAREFULLY TO AVOID

## SPOILING THE QUALITY OF THE PRODUCT AND/OR WASTING MATERIAL.

Preparatory operations leading to the finished product should be so timed as to permit expeditious handling of consecutive units in production under conditions which would prevent contamination, deterioration, spoilage or the development of infectious or toxigenic micro-organisms.

Shucking, deveining, and washing should be done very thoroughly so that no viscera, blood clots or shell pieces are left to spoil the appearance or the flavour of the final product.

### ALL LOBSTERS SHOULD BE EXAMINED BEFORE PROCESSING STARTS.

In fisheries which process live lobsters any dead animals should be rejected. Where iced tails are processed any defective or deteriorated tails should be removed, such as tails having excessive blackening, yellowing or other abnormal discolouration, off odours and taints, and physical damage.

5.4.2.1

### **Tailing**

TAILING SHOULD BE CARRIED OUT AS CAREFULLY AS POSSIBLE AND CARE SHOULD BE TAKEN THAT THE CUT BE WELL PLACED AND EVEN TO OBTAIN MAXIMUM YIELD.

There are many types of tailing knife available but all should be constructed of suitable impervious corrosion-resistant material and be free from crevices where blood and debris can accumulate.

### THE INTESTINE SHOULD BE REMOVED IMMEDIATELY.

Removal of the intestine (deveining) should be carried out in a manner to minimize contamination. The intestine is either ejected by water pressure or sucked out by vacuum.

### THE LOBSTER TAILS SHOULD BE WASHED ON ALL SURFACES.

Particular attention should be paid to removing blood from the butt end of the tail as this will coagulate and cause blue discolourations. Sand and debris may be caught between the segments. Washing is most effective in equipment which provides a swirling action.

Effective washing will ensure that no remnants of the gut or its contents remain as this detracts from the appearance of the flesh and leads to deterioration due to microbial or enzyme activity.

A CHILLING TANK, MADE OF SUITABLE CORROSION-RESISTANT IMPERVIOUS MATERIAL, SHOULD BE PROVIDED FOR RAPID CHILLING.

The tank should be inspected regularly during use and cleaned frequently. Flake ice and water is an effective chilling medium. Immediate chilling retains quality and substantially

increases yield.

THE TIME FROM TAILING TO FREEZING SHOULD BE AS SHORT AS POSSIBLE.

Quality and yield will be reduced if handling is slow.

5.4.2.2

### **Cooking**

THE METHOD USED TO PREPARE COOKED LOBSTERS FOR FRESH MARKET OR FURTHER PROCESSING SHOULD BE CHOSEN TO BRING ABOUT THE DESIRED EFFECT WITH A MINIMUM AMOUNT OF DELAY AND HANDLING.

Some species (not *Homarus*) are prepared for cooking by drowning (suffocation in water with a low oxygen content) in a drowning tank. If they are not drowned before cooking the shock of the hot water causes excessive breakage of legs and appendages. Lobsters are usually lowered into the drowning tank packed in stainless baskets which are also used for cooking and cooling. Lobsters should be cooked immediately after drowning to prevent deterioration.

COOKING SHOULD BE DONE BY BOILING OR STEAMING THE LOBSTERS.

A disadvantage with boiling is that the water (potable water to which 3-4% salt has been added or clean sea water) quickly becomes dirty and unfit for use and also affects the flavour. It is recommended that no more than two batches be cooked in the same water. If the vat is more than half full there is a strong possibility that the lobsters in the bottom of the vat will be overcooked while those on the top will be undercooked.

Steaming is an alternative and cleaner method for cooking lobsters but it is more difficult to control the uniformity of cooking. The lobsters are placed in wire baskets and lowered into the steaming vat. There is no dirty water, no loss of heat by discarding boiling water, easy handling and easy cleaning of the vat. As soon as one batch leaves the vat, another can be put in without delay.

Cooking operations should be stopped in time to allow the staff to pack off all cooked lobsters before any stoppage of work. It is not advisable to hold cooked lobsters overnight.

COOKING SHOULD BE CONTROLLED SO AS TO BE ADEQUATE FOR THE PURPOSE FOR WHICH THE PRODUCT IS INTENDED.

Cooking coagulates the lobster tissue and releases aqueous fluid which is lightly bound in the flesh. The extent to which this occurs depends largely on the temperature reached in the flesh. If the lobsters are not heated sufficiently the desired effect will not be achieved, but too much heat will reduce the quality of the product and also the yield.

In plants where all sizes of lobsters are packed, it is advantageous to sort the lobsters according to size at the same time as they are inspected for the dead and weak. Lobsters should be cooked for different periods of time according to size.

Lobsters should be cooked until the shell is uniformly red in colour, and where necessary until the meat can be easily removed from the shell. Too much cooking causes the meat to shrink

excessively and too little cooking makes it difficult to remove the meat from the shell.

It is difficult to specify cooking times throughout the industry, due to differences in size and other variables including physiological condition but cooking should be continued until complete. Cooking times should be established in each fishery. As a guideline, lobsters with a weight of approximately 500 g generally require a cooking period of 10 minutes.

#### 5.4.2.3

### **Cooling**

**COOLING OF COOKED LOBSTERS SHOULD BE DONE QUICKLY WITHOUT CONTAMINATION OF THE PRODUCT.**

Freshly cooked lobsters are practically free of micro-organisms but during a large part of the cooling period they are within the temperature range in which any micro-organisms present will multiply rapidly and may endanger the health of the consumer.

Cooling times should, therefore, be kept as short as possible and every effort should be made to avoid contamination of the product during this period.

Where lobsters have to be held after cooling they should be held in specially designated, clean, dust-free areas where there is a good circulation of air and from which vermin and other possible sources of contamination can be excluded.

It has been learnt from experience that cooling is one of the most important operations in lobster canning and lobster meat packing. The water used for cooling must be potable, and the same water should not be used for cooling more than one batch.

The reason for cooling the lobsters is to end cooking uniformly throughout the batch and to avoid holding at temperatures which would encourage the growth and multiplication of bacteria. Cooked lobsters should be removed simultaneously from the cooker and cooled as rapidly as possible with cold potable water or clean sea water.

**THE DROWNING TANK, COOKER AND COOLING TANK SHOULD BE LOCATED ADJACENT TO EACH OTHER WITH AN OVERHEAD HOIST OR GANTRY PROVIDED TO TRANSFER BASKETS FROM ONE TO THE OTHER.**

This enables lobsters packed in a basket for drowning to be cooked and cooled in the same container.

**AFTER COOLING THE LOBSTERS SHOULD BE TAKEN FROM THE CONTAINER AND ALL ADHERING COAGULATED PROTEIN REMOVED.**

Spray washing on a conveyor is sometimes sufficient but it may be necessary to brush by hand. These methods can be combined. Either potable or clean sea water should be used.

**AFTER WASHING THE LOBSTERS SHOULD BE ADEQUATELY DRAINED IN AN AREA SET ASIDE FOR THE PURPOSE.**

In some species the body cavity contains a considerable amount of water. Whilst adequate

drainage is desirable, the lobsters should not be allowed to drain unnecessarily.

5.4.2.4

### **Shucking and deveining**

THE SHUCKING OR SHELLING AND DEVEINING OF COOKED LOBSTERS INTENDED FOR FURTHER PROCESSING SHOULD BE DONE QUICKLY AND CAREFULLY.

It is essential that the processing operation is carefully controlled in order to provide an attractive product and prevent microbial spoilage.

After cooling, the lobsters pass to the breaking-off table where the claws, tail and bodies are separated and each passes in containers to a different operation.

The tail meat should be removed in one piece by using a stainless steel double-pronged fork. The tail is split along the underside and the intestine removed. Care should be taken not to cut through to the pigmented side as this will spoil the appearance of the meat.

5.4.2.5

### **Washing**

LOBSTER MEAT SHOULD BE THOROUGHLY WASHED ON ALL SURFACES.

Meat picked by hand is especially vulnerable to contamination with pathogens from human carriers. After being shucked, all lobster meat should be washed in cold potable water. The use of a well constructed rotary-type washer, made in the shape of a drum from perforated stainless steel, is now common in most plants.

The main object of washing the meat is to remove all debris that has been spread over the meat during breaking and shelling of the cooked lobsters particularly "green liver" (tomalley), gut contents and all white or blue blood clots.

5.4.3

### **Holding**

WHERE COOKED LOBSTERS ARE HELD BEFORE DISTRIBUTION, FREEZING OR FURTHER PROCESSING THEY SHOULD BE CHILLED. COOKED LOBSTER MEAT WHICH IS TO BE SOLD DIRECTLY SHOULD BE HANDLED AND STORED IN SUCH A MANNER AS TO INHIBIT DETERIORATION OF THE PRODUCT.

There should be no unnecessary delay between the time lobsters enter the production line and the preservation process is finished. Where the final product is to be marketed as chilled lobster meat the cooked lobsters in the shell or the shucked washed meat should be chilled to a temperature approaching that of melting ice and marketed within 18 hours.

5.4.4

### **Packaging**

PACKAGING MATERIALS SHOULD BE OF A TYPE APPROVED BY THE OFFICIAL

AGENCY HAVING JURISDICTION AND BE CLEAN AND STORED IN A HYGIENIC MANNER. PACKAGING SHOULD BE CARRIED OUT UNDER CONDITIONS THAT PREVENT CONTAMINATION OF THE PRODUCT.

All packaging material should be stored in a clean and sanitary manner. The material should be appropriate for the product to be packed and for expected conditions of storage and should not transmit to the product objectionable substances beyond the limits acceptable to the official agency having jurisdiction. The packaging material should be sound and should provide appropriate protection from contamination.

Packaging in metal containers is used for the purpose of freezing or for retorting. Care should be taken that empty containers be removed from the packing room and conveyors to the filling machines before the plant is washed down in order to avoid splatter with dirty water or debris.

THERE SHOULD BE NO BUILD-UP OF RAW MATERIAL OR PART-PROCESSED PRODUCTS DURING THE PROCESSING.

Since any delay in processing will have an adverse effect on quality, there should be no large backlog of raw material or filled containers in the plant. The packers should package the lobster in the order in which it comes to them.

CARTONS, WRAPPINGS AND OTHER PACKAGING MATERIALS SHOULD NOT BE STORED IN THE PROCESSING AREA.

Delivery wrappings of packaging materials should be removed outside the processing area and only those packages required for immediate use at any given time should be introduced to the area.

LOBSTERS AND LOBSTER PRODUCTS SHOULD BE INSPECTED FOR QUALITY AS WELL AS WORKMANSHIP OF THE PACKER AT THE TIME OF PACKING.

This inspection should take place just before final closing of containers. Each packer's output should be inspected regularly so that faults can be corrected and a high standard of workmanship achieved.

FINAL CONTAINERS IN WHICH LOBSTERS AND LOBSTER PRODUCTS ARE PACKED SHOULD BE INDELIBLY MARKED WITH A LOT IDENTIFICATION.

This is good commercial practice as it enables the manufacturer to withdraw defective products if necessary.

VACUUM PACKAGING IS RECOMMENDED FOR COOKED FROZEN LOBSTER MEAT TO EXTEND THE STORAGE LIFE.

Vacuum packaging in cans or flexible packages of suitable, waterproof and gas – or moisture-vapour – impermeable material with care being taken to ensure efficient

sealing has been shown to give significant extension of high quality storage life. If used, care should be taken that vacuum is maintained and that the product remains frozen until use.

Polyethylene alone is not sufficient.  
5.4.5

### **Freezing, storage and distribution**

FREEZING SHOULD BE CARRIED OUT IN ACCORDANCE WITH RECOMMENDATIONS GIVEN IN THIS CODE FOR FREEZING LOBSTERS AT SEA AND THOSE CONTAINED IN THE "RECOMMENDED INTERNATIONAL CODE OF PRACTICE FOR FROZEN FISH".

Good commercial practices and proper equipment are essential factors for producing good quality frozen lobsters and lobster products irrespective of whether the lobsters are frozen at sea or on shore the recommendations given in the previous chapter of this Code, Subsection 4.6.3, should also apply to on-shore operation. Some of the most important things to remember when freezing the lobsters are the following:

- Freezing should be fast enough to prevent development of adverse quality changes in the product.
- Air-blast freezers should be loaded in such a way that there is always a sufficient flow of cold air around the product.
- Sharp freezers should not be overloaded with lobsters.
- In brine freezing, there should be rapid circulation of the cooling medium and the ratio of lobsters to brine should be carefully controlled.
- Freezing processes should be allowed to run their full allotted time to ensure their completion.
- Frequent checks should be made of refrigerant pressures and temperatures and accurate records maintained.

DURING FREEZING, THE TEMPERATURE OF THE PRODUCT SHOULD BE LOWERED TO SUCH AN EXTENT THAT AFTER THERMAL EQUALIZATION, THE TEMPERATURE OF THE PRODUCT IS THAT OF THE FREEZER STORE OR BELOW.

Products should not be placed in frozen storage until their temperature has been brought down to that of the freezer store.

The freezer store is designed to hold products at the proper frozen storage temperature and should not be used either for freezing lobsters or for reducing the temperature of a frozen product to the temperature level of the freezer store.

FREEZING SHOULD BE COMMENCED WITHIN ONE HOUR AFTER PACKING.

Spoilage of lobster meat in containers can take place fairly quickly at usual plant temperatures.

Therefore, lobster meat should be frozen as soon as possible after packaging in order to inactivate spoilage micro-organisms.

BLAST FREEZING SHOULD BE USED TO PRODUCE HIGH QUALITY WHOLE COOKED LOBSTER OR TAILS.

Blast freezing is the best method of producing a high quality finished pack. As the carapace

is rigid, lobsters products cannot be tightly packed; thus because of the air spaces there is no advantage to using a plate freezer. It is very difficult to pack Individually Quick Frozen (IQF) lobsters together in a carton without breakage. Brine immersion freezers can be used for whole lobsters but there is a risk of salt penetration and unless packed in a wire basket, with the same dimensions as the final carton, broken IQF products result.

**THE FREEZING AND STORAGE OF WHOLE UNCOOKED LOBSTERS IS NOT RECOMMENDED.**

During freezing the intestinal tract breaks down and when the lobsters are thawed the digestive enzymes immediately attack the meat causing autolysis, off-flavour, odours and unsightly browning. This practice should therefore be avoided if at all possible.

**IF PARTIALLY THAWED PRODUCTS ARE RECEIVED FOR FROZEN STORAGE THEY SHOULD BE RE-FROZEN IN PROPER FREEZING EQUIPMENT PRIOR TO THEIR STORAGE IN THE FREEZER STORE.**

In some cases, frozen products may become partially thawed during transfer or shipment. If these products are still considered to be of an acceptable quality for human food, they should be re-frozen rapidly in a proper freezing plant.

**FROZEN LOBSTER PRODUCTS SHOULD BE STORED AT TEMPERATURES APPROPRIATE FOR THE SPECIES, TYPE OF PRODUCT AND INTENDED TIME OF STORAGE.**

Inevitably, some deterioration of frozen lobster products will occur during frozen storage, but if proper temperatures and conditions are maintained, these changes will be slight, even after a relatively long time of storage.

Temperature during storage is the most important factor affecting the quality of the product. Lower temperatures retard adverse quality changes; in either words the rate of quality loss is a function of temperature and time of storage. Temperature fluctuation during the storage should be kept to the minimum.

Another factor influencing the choice of storage temperature is the capacity of air to hold moisture. The higher the temperature, the more moisture air can carry without becoming saturated. At higher temperatures therefore, there is a faster transfer of water vapour from the product to the cooling surfaces and thus a greater degree of product dehydration.

**THE TEMPERATURE OF THE FREEZER STORE SHOULD BE CONTROLLED CAREFULLY TO AVOID FLUCTUATIONS.**

Excessive product temperature fluctuations either in range or frequency are undesirable. Fluctuations of more than 2°C (4°F) in the freezer store temperature should be avoided. Moisture transfer from the product to the colder refrigeration surfaces is accelerated as the temperature difference is increased. Consequently, fluctuations of the freezer store temperature promote dehydration of the stored products. The air velocity in cold freezer stores should be moderate and no higher than necessary to achieve sufficiently uniform temperature within the

store.

**FREEZER STORE TEMPERATURES SHOULD BE CHECKED OFTEN, PREFERABLY BY THE USE OF TEMPERATURE RECORDING DEVICES, AND RECORDS SHOULD BE MAINTAINED.**

Frequent checks of store temperature allow prompt action to correct any malfunctioning. When deviations occur, the refrigeration equipment should have sufficient reserve capacity to regain quickly the correct temperature level.

Accurate temperature measurements by recording devices will quickly indicate whether proper conditions are being maintained. Care should be taken to place the sensitive element of the recording device in such a position that the reading obtained will be indicative of the actual store temperature. Usually it is necessary to fit a number of such elements and recording devices to obtain a more representative reading.

**THE PRODUCTS SHOULD BE STACKED IN THE FREEZER STORE SO THAT THERE IS ALWAYS A SPACE FOR COLD AIR TO CIRCULATE ALONG THE WALLS AND FLOOR.**

Although distances of 5-10 cm (2-4 in) from walls and floors are sometimes regarded as adequate, occasionally large gaps may be required. Where possible, pallet storage should be practised, allowing air spaces below and around the outside of the stacked products. If this is done, then heat which might break into the room will be absorbed by the circulating cool air instead of being absorbed by the product.

**WHEREVER POSSIBLE, FREEZER STORES SHOULD MOVE THE LONGEST STORED PRODUCTS INTO DISTRIBUTION FIRST.**

Products held in frozen storage should be clearly identified and records should be kept to prevent older stocks from being allowed to deteriorate in quality through lengthy storage while newer stocks are being passed into distribution channels. A first-in, first-out principle should be followed.

**ALL VEHICLES USED IN THE TRANSPORT OF FROZEN LOBSTERS SHOULD BE CAPABLE OF MAINTAINING THE LOW TEMPERATURE REQUIRED TO PRESERVE THE QUALITY OF THE PRODUCT.**

Under ideal conditions the temperature of frozen lobsters during transport should be the same as the freezer storage temperature. It is recommended that vehicles transporting frozen fish should be capable of maintaining temperature at  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) or lower by means of mechanical refrigeration systems, dry ice, or liquefied gases.

Frozen products should not be stacked directly against the floor, walls or roof of the carrier unless the carrier has a body of the jacketed type, but should be stacked in such a manner that cold air can circulate around the load to absorb heat which leaks into the vehicle. A minimum distance of 5 cm (2 in) between the load and the vehicle's floor, roof and walls is suggested.

Local multiple-stop deliveries from distributing warehouses to shops or restaurants may present problems quite different to those encountered in long distance transport between coastal

and inland freezer stores. In the absence of mechanical refrigeration, insulated containers with dry ice may be used to keep the temperature of the product from rising. Loading for multiple-stop deliveries should be planned in accordance with the delivery route. The opening of vehicle doors should be kept to a minimum to prevent loss of cold air. Such a loss may be further reduced by use of flexible self-closing inner doors.

Low temperature deliveries of small orders may also be made in individual insulated boxes which are packed in the freezer store prior to loading for distribution.

**CARE SHOULD BE TAKEN THAT FROZEN LOBSTER PRODUCTS ARE NOT EXPOSED TO HIGH TEMPERATURES DURING LOADING AND UNLOADING OF TRANSPORT VEHICLES.**

Frozen lobsters warm very quickly. The effects of any temperature fluctuations, even of short duration, are cumulative and detrimental.

The load should be assembled in the freezer store on pallets, and mechanical methods of loading should be used wherever possible. It is important that the products should not be allowed to stand in non-refrigerated areas. Vehicles should be pre-cooled to +10°C (50°F) or lower prior to loading and should be equipped with devices to record temperatures during transport. Loading into and unloading from vehicles and into and from freezer stores should be as fast as practicable and the methods used should minimize the rise in product temperature.

Some recently constructed freezer stores provide low temperature loading bays, with flexible connecting loading tunnels that fasten directly to the doors of transport vehicles.

**THE OPERATION OF THE REFRIGERATION UNITS ON TRANSPORT VEHICLES SHOULD BE CHECKED FREQUENTLY EN ROUTE.**

A temperature rise of the product during transport from one freezer store to another to -15°C (5°F) due to unforeseen circumstances may be tolerated. Otherwise, any rise in temperature of the product higher than -18°C (0°F) should be reduced to this temperature or lower without unnecessary delay.

Every frozen product transport vehicle should be fitted with a properly installed thermometer so that the temperature in the cargo space can be checked

regularly without having to open doors and a record of these temperature readings should be kept for future reference. An insulation test should be carried out at regular intervals; tests every two years are recommended in some countries.

**THE SUITABILITY OF REFRIGERATED TRANSPORT VEHICLES AND THE CARE WITH WHICH THEY ARE LOADED, OPERATED AND MAINTAINED SHOULD BE CHECKED OCCASIONALLY BY MEASURING PRODUCT TEMPERATURES AT THE BEGINNING AND END OF A JOURNEY.**

Occasional checks should be made by measuring the temperature of the product at the bottom, sides and top of the load when the vehicle is being loaded and again when it is unloaded.

If any excessive warming has occurred, the cause should be determined and the fault corrected.

Specially designed thermometers are used for this purpose.

5.5

### **Hygiene Control Programme**

IT IS DESIRABLE THAT EACH LOBSTER PROCESSING PLANT IN ITS OWN INTEREST DESIGNATES A SINGLE INDIVIDUAL WHOSE DUTIES ARE PREFERABLY DIVORCED FROM PRODUCTION TO BE HELD RESPONSIBLE FOR THE CLEANLINESS OF THE ESTABLISHMENT.

Such a person or his staff should be a permanent part of the organization or employed by the organization and should be well trained in the use of special cleaning tools, methods of dismantling equipment for cleaning and in the significance of contamination and the hazards involved. A permanent cleaning and disinfection schedule should be drawn up to ensure that all parts of the establishment are cleaned appropriately and that critical areas, equipment and material are designated for cleaning and/or disinfection daily or more frequently if required.

5.6

### **Laboratory Control**

IN ADDITION TO ANY CONTROL BY THE OFFICIAL AGENCY HAVING JURISDICTION, IT IS DESIRABLE THAT EACH LOBSTER PROCESSING PLANT IN ITS OWN INTEREST SHOULD HAVE ACCESS TO LABORATORY CONTROL TO ESTABLISH HYGIENE AND QUALITY OF THE PRODUCTS PROCESSED AND TO MONITOR THE HYGIENE OF PROCESSING.

The extent and type of such control will vary with the lobster product as well as the needs of management. Such control should reject all lobsters that are unfit for human consumption.

Analytical procedures used should follow recognized standard methods in order that the results may be readily interpreted.

6

## **END-PRODUCT SPECIFICATIONS**

Appropriate methods should be used for sampling and examination to determine compliance with the following specifications.

- Lobsters or lobster products should be free from micro-organisms in amounts harmful to humans, free from parasites harmful to humans, and should not contain any substances originating from micro-organisms in amounts which represent a hazard to health;
- Lobsters or lobster product should be free from chemical contaminants in amounts which may represent a hazard to health;
- Lobsters or lobster products should be, to the extent possible in good manufacturing practice, free from other objectionable matter and also parasites not harmful to humans; and
- Lobsters or lobster products should comply with the requirements set forth by the Codex Alimentarius Commission on pesticide residues and food additives as contained in Codex lists of maximum limits for pesticide residues of Codex Commodity Standards, or should

comply with the requirements on pesticide residues and food additives of the country in which the lobsters will be sold.

## APPENDIX I

### FLOW CHART FOR HANDLING LOBSTERS

#### Appendix II Cleaning and Disinfection

1

#### GENERAL PRINCIPLES

Good hygiene demands effective and regular cleaning of establishments, equipment and vehicles to remove food residues and dirt which may contain food poisoning and spoilage micro-organisms and act as a source of food contamination. This cleaning process may where necessary be followed by, or associated with, disinfection to reduce the number of any micro-organisms remaining after cleaning to a level which will not cause harmful contamination of food. Sometimes the cleaning and disinfection stages are combined by the use of a detergent-disinfectant mixture, although it is generally considered that this is less efficient than a two-stage cleaning and disinfection process.

The methods of cleaning and disinfection should be considered satisfactory by the official agency having jurisdiction.

Cleaning and disinfection procedures should be properly established by a hygiene specialist after consultation with production management, plant engineers and detergent and disinfectant manufacturers. The cleaning and disinfection procedures should be designed to meet the particular needs of the process and product concerned, and should be set down in written schedules which should be made available for the guidance of employees and management. Procedures should be established not only for cleaning and disinfecting the establishment, equipment and vehicles but also for cleaning and disinfection of the equipment which is itself used for cleaning, e.g. mops, swabs, buckets, etc. There must be adequate supervision by management to ensure that the procedures set down are carried out in an effective manner at the specified intervals of time.

A single individual, who should preferably be a permanent member of the staff of the establishment and whose duties preferably should be independent of production, should be appointed to be responsible for cleaning and disinfection procedures and for supervision.

Industrial detergents and disinfectants require careful handling. Alkaline and acidic products must not be mixed. Hypochlorite solutions must not be mixed with acidic products as chlorine gas will be released. Operators handling strongly alkaline or acid products must wear protective clothing and goggles and must be thoroughly instructed in handling techniques. Containers in which such substances are kept should be clearly marked and stored separately from food and

packaging materials. Manufacturers instructions should be carefully observed.

2

## CLEANING

### 2.1

#### Cleaning Procedures

Cleaning procedures will require:

The removal of gross debris from surfaces by brushing, vacuuming and scraping of deposits or other methods where necessary followed by the application of water in compliance with sub-section 7.3 of the "Recommended International Code of Practice – General Principles of Food Hygiene" (CAC/RCP 1-1969, Rev. 1). The temperature of the water used will depend upon the type of soil to be removed.

The application of detergent solution to loosen soil and bacterial film and hold them in solution or suspension.

Rinsing with water in compliance with sub-section 7.3 of the General Principles of Food Hygiene to remove loosened soil and residues of detergent.

Care should be taken that the use of abrasive material does not alter the character of the food contact surface and that fragments from brushes, scrapers, and other cleaning materials do not contaminate the food.

When these requirements have been met they may be followed by a disinfection process (see Sectionsection 3 – Disinfection).

### 2.2

#### Cleaning Methods

Cleaning is carried out by the separate or combined use of physical methods, e.g. scrubbing or turbulent flow, and/or chemical methods, e.g. the use of detergent, alkalis or acids. Heat is an important adjunct to the use of physical and chemical methods. Care must be employed in the selection of the temperatures depending on the detergents and the nature of the soil and working surfaces. Some synthetic organic materials can absorb constituents of food, such as milk fat, and the amount absorbed rises with the temperature.

One or more of the following methods is used according to the circumstances:

Manual: involving removal of soil by scrubbing in the presence of a detergent solution. For removable parts of machinery and for small items of equipment, soaking in a detergent solution in a separate receptacle may be necessary to loosen the soil prior to the scrubbing process.

In place cleaning: The cleaning of equipment including pipe runs, with water and detergent solution, without dismantling the equipment or pipe runs. The equipment must be properly designed for this cleaning method. A minimum fluid velocity of 1.5 metres per second (5 feet per second) with turbulent flow is required for effective cleaning of pipe runs. As far as possible

parts of equipment which cannot be satisfactorily cleaned by this method should be identified and eliminated. If this cannot be done satisfactorily, the parts should be dismantled for cleaning to prevent build up of contamination (General Principles of Food Hygiene, Subject I sub-section 4.5.).

Low pressure high volume spray: The application of a water or detergent solution in large volumes at pressures up to approximately 6.8 bar (100 psi).

High pressure low volume spray: The application of water or detergent solution in low volume at a high pressure, i.e. up to 68 bar (1,000 psi).

Foam cleaning: The application of a detergent in the form of a foam which is allowed to remain for 15 to 20 minutes and is then rinsed off with a water spray.

Washing machines: Some containers and equipment used in food processing can be washed by machines. These machines carry out the cleaning procedures set out above with the addition of disinfection by hot water rinse at the completion of the cleaning cycle. Good results can be obtained with such machines provided that the effectiveness and efficiency of the machine is maintained by adequate and regular servicing.

2.3

## Detergents

Detergents must have a good wetting capacity and the ability to remove soil from surfaces and to hold the soil in suspension. They must also have good rinsing properties so that residues of soil and detergent can be easily removed from equipment. There are many types of detergent and advice should be sought to ensure that the detergent used in any particular circumstances is suitable to remove the type of soil resulting from a particular food process and is used at the correct concentration and temperature. The detergent used should be non-corrosive and compatible with other materials including disinfectants used in the sanitation programme. Whilst cold solutions of detergent may be effective in some circumstances, removal of residues of fat requires the use of heat. The deposition of mineral salts on equipment may form a hard scale ("stone") especially in the presence of fats or proteins; the use of an acid or alkaline detergent or both sequentially may be necessary to remove such deposits. The "stone" can be a major source of bacterial contamination. It can be easily detected by its fluorescence under ultraviolet light which will detect deposits usually missed by ordinary visual inspection.

2.4

## Drying after Cleaning

If equipment is left wet after cleaning micro-organisms may grow in the water film. It is important to ensure that equipment is left dry as soon as possible after cleaning and where possible to allow equipment to air-dry naturally. Single use tissue or absorbent materials may be used for drying but they should be used once and discarded.

Adequate drainage points should be provided in equipment that cannot be dismantled and drying racks provided for small pieces of equipment that cannot be dismantled and drying racks provided for small pieces of equipment that are dismantled for the purpose of cleaning.

Any equipment that unavoidably remains wet for a period during which significant microbial

growth might occur should be disinfected immediately before use.

3

## **DISINFECTION**

### **3.1**

#### **General Considerations**

While disinfection results in the reduction of numbers of living microorganisms, it does not usually kill bacterial spores. Effective disinfection does not necessarily kill all micro-organisms present but reduces their numbers to a level at which they can be reasonably assumed to present no risk to health. No disinfection procedure can exert its full effect unless its use is preceded by thorough cleaning. Disinfectants should be chosen according to the micro-organisms to be killed, the type of food being processed and the material making up the food contact surfaces and where appropriate the criteria mentioned in Subject 1 sub-section 3.4 of this Appendix. Selection is also affected by the character of the water available and the method of cleaning used. The continued use of certain chemical disinfectants may lead to the selection of resistant micro-organisms. Chemical disinfectants should be used where use of heat would not be practicable. The methods used for cleaning under Subject 1 section 2.2 of this Appendix could also be used for the application of disinfectants.

### **3.2**

#### **Disinfection by Heat**

The application of moist heat to raise the surface temperature to at least 70°C (160°F) is one of the commonest and most useful forms of disinfection. High temperatures, however, will denature protein residues and bake them on to the surface of food equipment. It is therefore essential that all material such as residual food is removed by thorough cleaning before the application of heat for disinfection.

### **3.2.1**

#### **Hot water disinfection**

This is the method of choice and is commonly used throughout the food industry. Removable parts of machinery and smaller items of equipment can be submerged in a sink or tank containing water at disinfection temperature for a suitable time, e.g. at 80°C (176°F) for two minutes. The disinfectant rinse in mechanical washing machines should reach this disinfection temperature and the period of immersion should be sufficient to allow the equipment surfaces to reach this temperature. Water at disinfection temperature will scald bare hands so basket racks or some other type of receptacle will have to be used where the process is manual.

### **3.2.2**

#### **Steam disinfection**

Where steam is used the surface to be disinfected must be raised to a disinfecting temperature for a suitable time. It may not be practicable to have steam available for disinfection throughout the premises. Lances producing steam jets are useful to disinfect surfaces of machinery and other surfaces which are difficult to reach or which must be disinfected in situ on the factory floor. The heating of surfaces during the application of high temperature steam promotes their subsequent drying. The use of steam can present problems by creating condensation on other

equipment and other parts of the structure. High pressure steam can strip paint from painted surfaces and lubricants from the working parts of machinery. Moreover, some types of materials, such as plastics, are unsuitable for treatment with live steam. Steam jets should only be used by trained personnel as they can be dangerous in unskilled hands.

3.3

### **Chemical Disinfection**

The following factors affect the performance of chemical disinfectants:

3.3.1

#### **Inactivation by dirty conditions**

The effectiveness of all chemical disinfectants is reduced by the presence of dirt and other soiling matter. Disinfectants will not act at all where there is gross soiling. Disinfection with chemicals must, therefore, always follow or be combined with a cleaning process.

3.3.2

#### **Temperature of solution**

In general, the higher the temperature the more effective will be the disinfection. A warm or hot solution is therefore preferable to a cold solution of disinfectant. There are, however, limitation to the temperature that may be used, and the manufacturer's guidance should be followed. Iodophors release iodine at temperature above 43°C (110°F) which can result in staining of materials. The corrosive action of chlorine is increased when hot hypochlorite solutions are used.

3.3.3

#### **Time**

All chemical disinfectants need a minimum contact time to be effective. This minimum contact time will vary according to the activity of the disinfectant.

3.3.4

#### **Concentration**

The concentration of the chemical solution which is required will vary according to the conditions of use and must be suitable for the particular purpose and environment in which it is to be used. The solutions should therefore be made up strictly according to the manufacturer's instructions.

3.3.5

#### **Stability**

All disinfectant solutions should be freshly made in clean utensils. Topping up existing solutions or prolonged keeping of ready-to-use dilute solutions may render the disinfectant solution ineffective or may allow it to become a reservoir of resistant organisms. Disinfectants may be inactivated if mixed with detergents or other disinfectants. The strength of disinfectants should be checked regularly, particularly when diluted for use. Easy-to-use inexpensive test kits

are available for this purpose.

3.4

### **Chemicals suitable for Disinfection in Food Premises**

Chemical disinfectants that are liable to taint the food such as phenolics should not be used in food premises or vehicles. Care should be taken that chemical disinfectants do not cause harm to personnel and when used in places where animals are kept or transported, such as lairages and vehicles, do not cause distress to the animals. Among the disinfectants more commonly used in the food industry are those listed below.

After an adequate contact time all surfaces which have been disinfected should be subjected to a final rinse with water which complies with sub-section 7.3 of the General Principles of Food Hygiene.

3.4.1

### **Chlorine and chlorine based products including hypochlorite compounds**

Properly used, these substances are among the most suitable for food plants and vehicles. They can be obtained as liquid hypochlorite solutions containing 100,000 to 120,000 milligrammes of available chlorine per litre, or they can be combined with a detergent in a chlorinated crystal form. These disinfectants act

rapidly against a wide range of micro-organisms and are relatively cheap. They are the most suitable for general purpose disinfection in food premises. These disinfectants should be used at concentrations of 100 to 250 milligrammes of available chlorine per litre. This group of disinfectants is corrosive to metals and they also have a bleaching action. Surfaces disinfected with them should therefore be subjected to a final rinsing as soon as possible after an adequate contact time. Chlorine disinfectants with the exception of chlorine dioxide are readily inactivated by the presence of organic soil.

3.4.2

### **Iodophors**

These substances are always blended with a detergent in an acid medium and they are therefore particularly suitable in those circumstances where an acid cleaner is required. They have a rapid action and a wide range of antimicrobial activity. A solution of about 25-50 milligrammes per litre of available iodine at pH <4 is usually required for disinfection of clean surfaces. They are readily inactivated by organic matter. Iodophors give a visual indication of their effectiveness since they lose their colour when the residual iodine has dropped to ineffective levels. They are not toxic when used in normal concentrations but may add to the total dietary iodine load. They have little taste or smell, but may combine with substances in the food to cause taint. Iodophors may have a corrosive action on metals depending on the particular formulation of the iodophor and the nature of the surface to which the iodophor is being applied. For these reasons special care should be taken to rinse them away

after use.

### 3.4.3

#### **Quaternary ammonium compounds**

All these compounds also have good detergent characteristics. They are colourless and are relatively non-corrosive to metal and non-toxic but may have a bitter taste. They are not as effective against Gram-negative bacteria as are chlorine, chlorine-based disinfectants and iodophors. The solutions tend to adhere to surfaces and thorough rinsing is necessary. They should be used at a concentration of approximately 200-1200 milligrammes per litre. The higher concentrations are necessary when used with hard water. They are not compatible with soaps or anionic detergents.

### 3.4.4

#### **Amphoteric surfactants**

This comparatively recent type of disinfectant consists of active agents with detergent as well as bactericidal properties. They are of low toxicity, relatively non-corrosive, tasteless and odourless and are efficient disinfectants when used according to the manufacturer's recommendations. They are inactivated by organic matter.

### 3.4.5

#### **Strong acids and alkalis**

In addition to their detergent properties strong acids and alkalis have considerable antimicrobial activity. Particular care should be taken that they do not contaminate food.

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## **CHECKS ON EFFECTIVENESS OF PROCEDURES**

The effectiveness of cleaning and disinfection procedures should be verified by microbiological monitoring of the product and food contact surfaces. Similar regular microbiological monitoring of the product at all stages of production will also give information on the effectiveness of cleaning and disinfection procedures.

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