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EAS 39 (2001) (English): Hygiene in the food and drink manufacturing industry — Code of practice

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# EAST AFRICAN STANDARD

## Hygiene in the food and drink manufacturing industry — Code of practice

## 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 the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

In order to achieve this objective, the Community established an East African Standards Committee mandated to develop and issue East African Standards.

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.

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

The code stipulates the requirements of a food or drink manufacturing industry, which ensure that hygiene, health and safety aspects of hygiene are taken into account during production of foods and drinks.

The aspects covered in this code include need for establishing a company policy on hygiene, food safety, personal hygiene, pest control, cleaning, storage, distribution and transport, among others. The code also details the requirements concerning zoning of areas, provision of adequate services, location of premises and structures and equipment.

This code shall be applicable to all food and drink manufacturing industries irrespective of their size and volume of production.

The adoption of Irish Standard IS 3219: 1990 *Code of Practice for Hygiene in the Food and Drink Manufacturing Industry* as a East African Standard was done by the East African Standards Committee.

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# Hygiene in the food and drink manufacturing industry — Code of practice

## 1 Scope

This East African code of practice sets out the general guidelines for the hygiene requirements in the food and drink manufacturing industry. It does not replace the legal requirements for the various sectors of the food and drink industry.

This code of practice shall apply to all food and drink manufacturing companies.

## 2 Definitions

For the purpose of this specification, the following definitions shall apply:

**2.1**
**adequate**
**s**ufficient to accomplish the intended purposes of this specification and considered adequate by the respective National Standards Body

**2.2**
**approved**
approved by the respective National Standards Body

**2.3**
**cleaning**
**r**emoval of soil, food residues, dirt, grease or other objectionable matter

**2.4**
**contamination**
the occurrence of any substance not intentionally added to the food, which is present in such food as a result of the production, manufacture, processing, preparation, treatment, packaging, transport or holding of such food or as a result of environmental contamination. The term shall include insect fragments, rodent hairs and other extraneous matter.

**2.5**
**food establishment**
any building or area in which food is handled and the surroundings under the control of the same management

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**2.6**
**food**
food means any substance, whether processed, semi-processed or raw, which is intended for human consumption, and includes drinks, chewing gum and any substance which has been used in manufacture, preparation or treatment of "food" but does not include cosmetics or tobacco or substances used only as drugs

**2.7**
**potable water**
water meeting the requirements of EAS 12 *Drinking (potable) water — Specification*

**2.8**
**rough offal**
stomach and intestines (other than scalded and cleaned tripe or prepared casings), udders, reproductive organs, un-skinned head and feet of all species, crops and oil glands of poultry

# 3 Hygiene policy

## 3.1 Introduction

All food manufacturing companies shall maintain hygiene at an appropriate level. This level shall vary depending on the type of product or products produced but shall be such, so as to ensure that the food produced is safe to eat. Indeed this is a legal requirement. The requirements of this code are ancillary to this obligation and are included as a means of eliminating, in as far as possible, sources of possible contamination to food. As contaminated food can be a serious hazard to health it is necessary to have a defined policy for hygiene and to comply with good manufacturing practices.

## 3.2 General requirement

The management of food manufacturing companies shall define and document its policy and commitment to hygiene.

## 3.3 Specific requirements

These shall include the following:

a) food manufacturing companies shall have a written policy for hygiene and good manufacturing practices. (This may form part of a total policy statement);

b) the policy statement shall contain a commitment to maintain hygiene at an appropriately defined level to ensure the safety of the food produced and to devote adequate resources to achieve this;

c) the policy statement shall be signed by the person or persons who have the ultimate responsibility and authority for defining the company's policy.

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# 4 Food Safety

## 4.1 Introduction

By far the most frequent cause of food contamination is the presence in food of food spoilage or pathogenic (disease causing) micro-organisms and foreign bodies. The best-known pathogenic micro-organisms are species of bacteria, however some moulds, viruses and protozoa are also pathogenic.

It is the responsibility of all food manufacturers to take all reasonable precautions to prevent and control the risk of food contamination in locations or premises directly under their control. The most effective way to do this is to install documented system and procedures for the prevention and control of the risk of food contamination. On their own, inspection and testing of food products is insufficient to assure that food is free from contamination. To assess what is required to assure the safety of food, the HACCP system of evaluation may be used.

HACCP [Hazard Analysis and Critical Control Points] is the intelligent application of the principles of hazard analysis and the identification of Critical Control Points.

Hazard analysis for a food manufacturer is the rational process of estimating the risks associated with the processing and marketing of a foodstuff. Risks associated with processing include contamination by micro-organisms and foreign bodies. The risk of microbiological contamination of a food is generally greatest after the food has been processed and before it is packaged. When marketing a foodstuff, foods that shall be maintained at temperatures other than ambient are most susceptible to abuse during distribution and retailing.

Critical Control Points in food processing operations are the vital key points in the process that shall be controlled to safeguard the health of the consumer. Such points would include pasteurisation, cooking and the exclusion of foreign bodies. The maintenance of the cold chain is also critical to assure the safety of chilled and frozen.

In determining the level of prevention and control that is required to protect the consumer from food borne illness, food including food ingredients may be categorized as follows.

### 4.1.1 High risk

These are foods that are a potential source of pathogenic micro-organisms and are either intended for

a) consumption by the consumer without a cooking step, immediately prior to consumption, which is adequate to kill pathogenic micro-organisms;

b) consumption by people with low immunity, infants, geriatrics and hospital patients; and

c) use as an ingredient in the pharmaceutical or medical industry.

### 4.1.2 Medium risk

These are foods which are a potential source of pathogenic micro-organisms and are intended for consumption by the consumer with a cooking step, immediately prior to consumption, which is adequate to kill pathogenic micro-organisms; or foods which do not belong to the other two categories.

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#### 4.1.3 Low risk

These are foods not previously known to be a source of pathogenic micro-organisms and in which harmful residues or chemicals have rarely been found.

### 4.2 General requirement

It shall be the responsibility of the manufacturer, to identify and list the chemical, functional, organoleptic and microbiological tests, the procedures used, and, frequencies that are required to identify, sanitation failures or food contamination. The manufacturer shall establish specifications for raw materials, in process materials and finished product and shall take adequate precautions to ensure that food is free of foreign bodies. Special precautions shall be taken in processing high-risk foods. All contaminated food shall be rejected, or treated or re-processed to eliminate the contamination where this can be achieved.

### 4.3 Specific requirements for food safety

**4.3.1** It shall be the responsibility of the manufacturer to identify, list, and establish appropriate chemical, functional, microbiological and organoleptic specifications for all raw materials (including additives, ingredients and processing aids) and in process materials.

**4.3.2** It shall be the responsibility of the manufacturer to establish appropriate chemical, functional, microbiological and organoleptic specifications for finished products.

**4.3.3** It shall be the responsibility of the manufacturer to test, or have tested, raw materials, in process materials and finished product at a frequency commensurate with the risk to the safety of the finished product. These tests shall be carried out in accordance with defined procedures. Supplier guarantees shall be adequate to eliminate or reduce the testing requirement for raw materials.

**4.3.4** Environmental sampling and microbiological analysis of these samples shall be carried out, at a level commensurate with identifying the risk to the safety of the finished product.

**4.3.5** It shall be the responsibility of the manufacturer to identify, monitor and record all critical parameters in the process to ensure that the finished product is microbiologically safe. Critical parameters shall include any heat processing required to pasteurize or sterilize the product, hygiene and cleaning procedures, the strength of active ingredients and the temperature for each washing cycle and post heat treatment handling.

NOTE Measuring instruments used to monitor critical parameters should be calibrated at appropriate intervals; to ensure that the accuracy of the measurement instruments is within defined limits.

**4.3.6** Records of all processes required to assure the safety of food shall be inspected a least daily by a suitably qualified person. The records shall be signed to show that the inspection has taken place. The purpose of this is to demonstrate that the process has been carried out under the required conditions.

**4.3.7** In the event that microbiological results are outside the defined microbiological criteria (i.e. Action Limits) for raw materials, in process materials, finished product or the environment, timely action shall be taken to identify and rectify the cause so as to prevent the manufacture of product outside the established microbiological specification.

**4.3.8** There shall be a written procedure defining what action is to be taken to ensure that finished product, produced during or after failure in the control of a critical parameter, is not released for sale or consumption until it is established that the product is safe. The only permitted exception to this

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requirement is where the product is sold for further treatment or processing which shall eliminate the contamination.

**4.3.9** Food contaminated by pathogenic organisms shall be rejected, or treated, or processed, to eliminate the contamination where this is possible. It shall not be blended with uncontaminated product, as a means of bringing the food within specification.

**4.3.10** Packaging material used in contact with food, shall be free of contamination, shall not taint the food and shall comply with the relevant East African Standard Packaging Code.

## 4.4 Specific requirements for foreign matter

**4.4.1** It shall be the responsibility of the manufacturer to take all necessary precautions to ensure that the food is free of foreign matter other than unavoidable defects. Precautions shall include inspection of raw materials, keeping the production area free from extraneous material and the proper control of birds, rodents or insects.

**4.4.2** It shall be the responsibility of the manufacturer to establish procedures for maintaining unavoidable defects at a minimum, at all stages of production. The level of these defects in the food shall not present a health hazard.

**4.4.3** Where glass containers are used for packaging, the manufacturer shall establish suitable handling procedures, to eliminate the possible contamination of the food by glass fragments or splinters.

**4.4.4** No glass containers, other than glass containers to be used for finished product packaging, shall be brought into the production area. These shall include, ingredients in glass containers, measuring jugs, analytical equipment and glass thermometers other than those encased in metal.

**4.4.5** Glass pipes, flow meters and glass equipment should be avoided, but if used there shall be a documented procedure for routine inspection for cracks and splinters.

**4.4.6** Glass windows if broken shall be reported immediately to the designated person, whose responsibility it is to identify and have destroyed any food that could possibly have been contaminated by glass. These windows shall be replaced as soon as possible but not during production unless adequate screens are installed.

**4.4.7** A metal detector shall be installed, where appropriate, on all consumer lines, located so as to inspect the finished consumer pack or packs, where this is technically possible. The detector shall be capable of detecting 2-mm spheres of ferrous and 2.5 mm spheres of non-ferrous material unless the composition of the food makes this impossible. The sensitivity of the search head shall be checked at least once per 8-hour shift by a designated person/persons.

NOTE: The response time of the detector should be checked to ensure that the correct package is rejected.

## 4.5 Specific requirements for high risk foods

**4.5.1** High-risk areas shall be physically separated from other areas of the factory either by partition location or other effective means. High risk processing areas are defined as all areas where high risk foods are exposed if the subsequent processing does not contain a step which effectively destroys all harmful micro-organisms or areas where high risk foods are exposed after they have undergone a processing step which effectively destroys harmful micro-organisms.

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**4.5.2** Access to high risk processing areas shall be restricted to designated personnel, who shall wear readily identifiable protective clothing and footwear.

**4.5.3** Access to high-risk areas shall be via a changing room only, where personnel entering the area shall change to readily identifiable protective clothing including footwear.

**4.5.4** The air supply to high-risk areas shall be filtered to 2 microns and the area shall be kept under positive pressure. HEPA filters may be used to filter the air.

NOTE: HEPA is an acronym for "High Efficiency Particulate Arresting". HEPA filters effectively remove 99.97 % of all pollen, mould spores, animal hair and dander, dust mites, bacteria, smoke particles and dust that pass though the air purifier.

**4.5.5** No toilet facilities, other than wash hand basins, shall be located in high-risk areas.

**4.5.6** In cases where employees develop chronic pathogen infection, such employees shall not be permitted to have access to high risk processing areas. [Good employers should seek to place such employees in other areas of their business.]

### 4.6 Recommendation

**4.6.1** Emphasis should be placed on prevention rather than detection.

**4.6.2** For each production line a tracking system for microbiological contamination should be established. The reason is to track the location of possible sources of contamination. Environmental sampling and testing of the samples for pathogenic and food spoilage micro-organisms combined with microbiological analysis of the food at various critical stages in the production can establish these sources. For an effective tracking system, an appropriate minimum level of sampling and testing should be established. This level should be increased, as appropriate, if problems are encountered until effective action has been taken to address the problems.

**4.6.3** Raw materials, which could affect the safety of the finished product, should only be purchased from approved suppliers. A list of such suppliers should be maintained and their performance record should be monitored.

**4.6.4** In designing a food plant or replacing glass, it is recommended that transparent PVC or the equivalent be used in those areas where food is exposed or where there is a risk of contamination of food, in the event of the glass being broken.

**4.6.5** Metal detectors should be fitted with an automatic rejection mechanism, which rejects metal containing product into a locked inaccessible container. The reject mechanism, if present, shall be checked when the metal detector is being checked. Where automatic rejection is not feasible, automatic stopping of the line is a suitable alternative.

**4.6.6** Thermometers containing mercury should not be used or brought into processing areas.

## 5 Personnel Hygiene

### 5.1 Introduction

People are a potential source of disease producing micro-organisms, as these micro-organisms live in certain parts of the body; mainly the hair, nose, mouth, throat, bowel and in sores. They can easily be

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transferred to the hands as hands are in contact with all parts of the body during the course of the day. Even blowing of the nose into a handkerchief can lead to contamination of hands.

Prevention of contamination of food by personnel depends on everyone being aware of the potential risks associated with bad hygiene practices and behaving in a manner that shall prevent these risks. Management has the specific responsibility for developing a good hygiene ethics in the workforce, which can only be achieved by example, the provision of good personnel facilities and constant vigilance.

To ensure the safety of food, therefore, it is necessary that employees, including temporary employees, are medically examined and certified as fit to work in a food company, are adequately trained in hygiene and hygiene practices and wear clean suitable protective clothing. These requirements relate to all employees, particularly those entering the production area and include, management staff, engineers, in addition to production workers. Visitors and contractors shall be required to wear suitable protective clothing when entering production areas, and shall be effectively managed, to prevent them from being a source of contamination of the food.

It is now generally accepted that medical screening and stool testing are not reliable as procedures to identify all potential carriers of pathogenic micro-organisms. Hence all food handlers shall be regarded as a potential source of micro-organisms, and shall be adequately trained in good hygiene practices.

## 5.2 Medical examination

### 5.2.1 General requirements

No applicant for work as a food handler shall be engaged in such work until he/she has been medically examined and passed fit for work on the prescribed medical certificate (see Annex A) and shall be in compliance with Food Hygiene Regulations in force. The examination shall include x-ray of the chest for tuberculosis, stool for protozoal and helminthic infestation for those parasites that are transmitted by ingestion, and for the presence of *Salmonella, Shigella* species and *Vibrio cholerae* and any other relevant tests.

A medical certificate in the form prescribed shall be submitted by every applicant for employment and thereafter regularly as may be deemed necessary by the Medical Officer of Health designated by the Medical Authority or after suffering from water or food bore illness, or an absence of more than three days by every employee whose duties include the handling of the product or the raw materials.

### 5.2.2 Specific requirements

**5.2.2.1** All staff members (including temporary staff) shall be examined by a medical practitioner prior to employment.

**5.2.2.2** Staff members suffering from respiratory track infections or infectious illness (particularly gastrointestinal disorders, vomiting, diarrhoea, etc.) shall not be permitted to work in areas where food is exposed or where they may come in contact with food.

**5.2.2.3** All staff, including supervisory staff shall be made aware of and shall be responsible for ensuring that, the requirements of 5.3.1.2 are met.

**5.2.2.4** Cuts, sores and grazes shall be covered after treatment with a conspicuously coloured waterproof dressing, which contains a metal strip. The colour of the dressing should be different where possible, from the colour of the food produced.

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## 5.3 Training

**5.3.1** All staff including management staff shall be given appropriate induction and on going training in hygiene. This training shall be carried out by personnel who are competent in this field.

**5.3.2** Training records shall be kept.

## 5.4 Protective clothing

**5.4.1** All persons entering the processing areas including visitors and sub-contractors shall wear clean protective clothing.

**5.4.2** Particular attention shall be paid to maintenance staff and contractors to ensure that they do not carry dirt on the clothing into production areas, particularly where product is sensitive to contamination.

**5.4.3** Personal garments shall not be worn over protective clothing.

**5.4.4** Clean overalls and coats, and covering hair including beards, shall be worn by all personnel entering or working in the production area. Coats or overalls shall be fitted with no external pockets above the waistline, to prevent the contents from entering the product, and shall be securely fastened; studs or 'velcro' should ideally be used for this purpose.

**5.4.5** Footwear shall be clean and workers shall have separate footwear for use in the factory, to protect against the introduction of pathogenic micro-organisms into the food such as *Salmonella* and *Listeria.*

**5.4.6** Protective clothing shall be maintained in a clean condition and shall not be used outside the factory or factory grounds or worn to or from work, as protective clothing is required to protect the food from the individual.

## 5.5 Facilities

**5.5.1** Personnel facilities shall be kept in good condition and shall be maintained clean and free from odours so as to create the correct hygiene ethics amongst all personnel working in the factory. This requirement is also necessary to prevent the establishment of sites for the harbourage or breeding of insects, rodents or birds.

**5.5.2** A suitable canteen or rest room shall be provided and it shall not lead directly into the processing area. Food shall not be brought into the production area. A separate room or place for changing clothes shall be provided. The clothes shall not be hung in any processing room. Personal effects such as jewellery, watches, pins, or other items shall not be brought to the handling or processing area.

**5.5.3** Adequate toilet facilities and associated hand washing facilities shall be provided. The toilets shall not lead directly into the processing area and there shall be at least a lobby between the processing area and the toilet.

**5.5.4** The toilet facilities shall not open directly into the processing area. The doors to the toilet and the lobby shall be self-closing.

**5.5.5** Wash hand basins in both toilet and processing areas shall be supplied with either warm or hot and cold water. The taps shall be either, foot, knee or electronically operated to prevent re-contamination of hands after washing.

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NOTE Each factory may consider that possibility of not using hot water if appropriate.

**5.5.6** Hand sanitising solutions or sanitising liquid soap in appropriate dispensers, shall be provided at each hand washing point.

**5.5.7** To dry hands, paper towels with easily cleanable waste receptacles for used towels, cabinet roller towels, or air hand dryers shall be provided adjacent to all wash hand basins (hand washing troughs or fountains). However air hand dryers shall not be used in sensitive production areas, to avoid the possible spread of aerosolised bacteria.

## 5.6 Miscellaneous

**5.6.1** No jewellery, except plain wedding rings and sleeper earrings or studs shall be worn. This includes watches, bangles, etc., as these can be a source of mould and foreign bodies including glass.

**5.6.2** Personnel working in a food factory shall maintain a high level of personal hygiene, which shall include maintaining clean hands and nails, nails short and free of nail varnish, not using excessive perfume and not indulging in unhygienic practices. Hand and nails shall be washed before commencing or recommencing work and after using the toilet.

**5.6.3** Staff shall not engage in any behaviour that may contaminate materials or products. Eating, spitting, nose cleaning or the use of tobacco in any form including smoking or chewing betel leaves shall be prohibited within the processing, packing and storage area of the factory. Notice to this effect shall be prominently displayed and enforced. Smoking shall only be permitted in clearly designated areas, which shall not include production areas or toilets.

## 5.7 Recommendations

**5.7.1** The doors leading into the lobby and into toilets should be fitted with a push plate on the outside and a handle on the inside.

**5.7.2** The lobby of the toilets should be adequate to enable personnel using the toilets to hang up their protective clothing prior to entering the toilet. This is to prevent the possible contamination of the protective clothing.

**5.7.3** Lockers should ideally have sloped tops or they should be built into walls, to aid cleaning.

**5.7.4** There should be segregated areas for clean and soiled protective clothing.

**5.7.5** Precautions should be taken to ensure that clothing does not remain damp in lockers or that stale food is not left in lockers as this can lead to the growth of mould.

**5.7.6** Clocks should be located throughout the factory.

**5.7.7** Lockers should, with the agreement of the employees be inspected every three months to ensure that they are maintained in a clean condition and to ensure that they are not a site for the harbourage of insects and rodents.

**5.7.8** A room with adequate first aid facilities should be provided.

**5.7.9** Wash hand basins should be located close to workstations and/or close to personnel entrances to the processing area. The recommended number of wash hand basins required is 1 per 15 people in clean processing areas and 1 in 10 people in dirty processing areas.

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**5.7.10** Showers should be provided but of little use if not used. Hence the shower area should be heated, if appropriate, and should have provision for personnel to undress in private.

**5.7.11** In addition to the requirements of this specification the factory and employees shall comply with the requirements of any relevant government and local authority regulations and any additional requirements specified by the appropriate harmonised East African Standard Specification for the product.

# 6 Cleaning

## 6.1 Introduction

Food can be contaminated by a dirty plant and equipment and by an unhygienic environment. To prevent this risk, cleaning is required. Wet cleaning can be achieved by the removal of soil followed by commercial sterilisation or alternatively by using a detergent sterilizer solution. If steam or hot water is used for commercial sterilization great care shall be exercised, as their use can cause condensation on overhead structures, leading to re-contamination of cleaned surfaces. It shall be noted that wet surfaces can afford ideal conditions for microbial growth.

Care shall be taken with dry cleaning to ensure that dust particles are not released into the plant environment as these carry micro-organisms. For vacuum cleaners this may mean efficient separation of the air.

It is the responsibility of the manufacturer to identify, document, establish and monitor an appropriate cleaning programme for all food contact surfaces and for the environment in which the food is manufactured.

## 6.2 General requirement

A permanent cleaning and disinfection schedule shall be drawn up and documented for each establishment to ensure that all areas are appropriately cleaned and critical areas, equipment and materials are designated for special attention. A single individual who shall preferably be a permanent member of the management of the establishment and whose duties preferably should be independent of production, should be appointed to be responsible for the cleanliness of the establishment. He or she shall have a thorough understanding of the significance of contamination and hazards involved. All cleaning personnel shall be well trained in cleaning techniques.

## 6.3 Specific requirements

**6.3.1** There shall be an established, documented, cleaning procedure for cleaning, all food contact surfaces including plant and equipment, walls, floors, windows, gullies and ancillary structures. The cleaning programme shall include dry-cleaning, wet cleaning, commercial sterilization and sterilization as appropriate. This programme shall also include cleaning at a high level and the cleaning of overhead surfaces.

**6.3.2** There shall be a cleaning programme for each room, group of rooms or each production area and for the exterior of the plant and outside structures. This programme shall state the frequency with which each item (or groups of items) of equipment is cleaned, the contact time and temperature and strength of cleaning solutions. It shall also state the method and frequency of cleaning of walls, floors, windows, drains, etc. Record of cleaning shall be maintained and there shall be evidence that the cleaning programme has been adhered to.

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**6.3.3** A documented procedure shall also be in place to check the efficiency of cleaning, by microbiological analysis of rinse water, swabbing of surfaces, or other appropriate means.

**6.3.4** Plant and equipment shall be cleaned at least daily, or more often if required, to control the level of soil or the bacteriological load in the food. This shall not apply in food processes where it can be demonstrated that daily cleaning is not required. It shall be the responsibility of the manufacturer to establish a procedure to monitor that all cleaning has been carried out at the appropriate defined intervals.

**6.3.5** Sufficient tanks, suitable for the immersion of loose pieces of equipment, shall be available for cleaning purposes. Where these are used during the production cycle for washing, they shall be located in an area separated from the production area or the tanks shall be totally enclosed and designed so there is no risk of contamination of the food by detergents. The tanks shall be fitted with an outlet pipe to facilitate draining.

**6.3.6** Detergents and sterilizing materials shall be stored in a separate area to food and shall be clearly labelled or marked.

**6.3.7** As most detergents and sterilising materials are hazardous, personnel handling these materials shall be made aware of the danger and the appropriate treatment in the event of accidents. Where required to ensure safety, safety goggles or face shields and gloves shall be available and used when handling hazardous detergents and sterilizing materials.

**6.3.8** Where hazardous materials are being mixed or dispensed an eye washing and shower facility shall be located close to the point of mixing or dispensing.

**6.3.9** All brooms and hand brushes used to clean in the production area shall be made of material other than wood, shall have nylon bristles, ideally coloured to enable detection of detached bristles, shall be maintained clean and in good condition and when not in use shall be hung up with bristles facing downwards, to aid drying. Brushes used for floors shall not be used on equipment surfaces.

**6.3.10** Care shall be taken in using cleaning cloths and scouring pads to ensure that they are not a source of contamination i.e. being themselves contaminated or being a source of foreign materials in the food.

**6.3.11** Equipment such as sampling utensils, manual agitators, shall be cleaned before or after use, as appropriate

**6.3.12** A plant that operates under dry conditions shall be physically isolated from those parts of the plant that are wet cleaned during the cleaning process.

**6.3.13** Equipment that has been wet cleaned shall not be used until the equipment is dry where dampness could contaminate the product, for example, powder conveying lines.

**6.3.14** Where hot solutions are used for cleaning plant or equipment, there shall be adequate and suitable venting to prevent, in as far as possible, condensation on overhead structures.

**6.3.15** Vacuum cleaners shall be emptied outside the processing areas.

## 6.4 Recommendations

**6.4.1** In deciding on a cleaning programme the risk of contamination of the food shall be taken into account. The rate of microbial growth depends on the nature of the food, pH, temperature and water activity.

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NOTE: Under ideal conditions the number of micro-organisms in food may double every 20 min which means that one micro-organism can produce over 2 million micro-organisms in 7 h.

**6.4.2** Special attention should be paid in establishing a cleaning programme for powder conveying lines where the powder in hydroscopic, as build-up of damp contaminated powder can occur which may only occasionally contaminate the product. This can be difficult to detect.

**6.4.3** Vacuum cleaners, or dust extraction units, can also be a source of contamination and it is recommended that the contents be regularly analysed microbiologically. These analyses can be used to help monitor the level of pathogens in the environment of the factory. The use of centralized vacuum systems is not recommended, as the pipe work can be a potential source of contamination.

**6.4.4** If high-pressure hoses are required in a cleaning programme these should be used at the start of the cleaning programme, as they can have the effect of aerosolising micro-organisms. Recommended safe pressure range is 28 kg/cm$^2$ - 49 kg/cm$^2$ although some hygienists accept 70 kg/cm$^2$ as an upper limit.

**6.4.5** After cleaning, food contact surfaces should have a TVC of less than one colony per square centimetre.

**6.4.6** Levels of chemical sanitizers that have been found to be effective for *Listeria* according to EPA (US Environmental Protection Agency) testing methods are chlorine based 100 ppm, iodine 25 ppm, anionics 200 ppm and quaternary ammonia 100 ppm. These may have to be adjusted, in plant, to compensate for reduction factors such as dilution and oxidation. Other agencies specify a concentration of 200 ppm of chlorine in chemical sanitizer and a contact time of 2 min.

**6.4.7** Brushes used on equipment should be readily identifiable from brushes used on floors. Different coloured bristles could be considered. As *Listeria* tends to be carried into factories by footwear, brushes are a vector for transferring it onto the plant, if the brushes are not properly controlled.

**6.4.8** Sampling utensils and manual agitators should be stored in a suitable sterilant solution. A chlorous solution is not suitable for aluminium and certain grades of stainless steel, as it causes piting.

# 7 Pest Control

## 7.1 Introduction

Rodents, insects and birds carry with them micro-organisms that can cause disease and hence can be a major source of food contamination. For pest infestation to occur, sites for breeding and a supply of food must exist. In food factories and grounds these two conditions can exist, if proper controls are not exercised. In and other sections specific requirements to help control pest infestation are dealt with. In this section, the additional requirements that shall be met, to control pests, are outlined.

## 7.2 General requirements

Rodents, birds, domestic and other animals, and insects shall be excluded, in as far as is practicably possible, from the factory. The grounds of the factory shall be protected and maintained so as to avoid the establishment of breeding sites for rodents and insects. Domestic and other animals shall be excluded from the factory ground, other than in the case of abattoirs or slaughterhouses where they shall be adequately penned.

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## 7.3 Specific requirements

**7.3.1** Fixed plant and equipment on floors shall be either 0.3 m from the ground and 0.5 m from walls, or shall be adequately sealed to prevent the build up of dirt behind or under the equipment.

**7.3.2** Air intake points and opening windows shall be at least fitted with a fly screen. (Mesh size No. 16 mm - 1.2 mm gap.)

**7.3.3** Insect electrocuters shall be placed in all processing areas, where food is exposed. Ideally they shall be located not more than 2.4 m from the floor, in an area free from droughts and not over areas where food could be exposed. They shall be placed away from natural light and shall be fitted with a catch tray, which shall be cleaned at defined appropriate intervals. This shall not apply if there is a sound technical reason for not having insect electrocuters such as a fire risk or a risk of a dust explosion.

**7.3.4** UV tubes on insect electrocuters shall be replaced at least every year and they shall be left on permanently, except when the plant is closed for a period in excess of seven days. Records shall be kept of these replacements.

**7.3.5** External doors shall be rodent proof (i.e. gaps not exceeding 6 mm) and shall be fitted with self-closers or protected by an internal lobby with a self-closing door. Plastic or air curtains may be used as an alternative to secondary doors.

**7.3.6** The factory shall be inspected regularly, for evidence of infestation by insects or rodents, and for the presence of birds, or wild or domestic animals. The inspection shall be carried out by trained personnel.

**7.3.7** Raw materials deliveries shall be inspected where appropriate for the presence of infestation in accordance with defined written procedures.

**7.3.8** If evidence of infestation is found in or around the factory premises, action shall be taken to remove or control the infestation.

**7.3.9** Insecticides and rodenticides if used, shall be used under such precautions and restrictions as to prevent the contamination of food or packing materials with illegal residues. Insecticides and rodenticides that look similar to the food being manufactured, or are in similar containers to those used for packaging, shall not be used.

**7.3.10** Birds shall be excluded from all production and storage areas and adequate steps shall be taken to ensure that this is effective; subject to the legal requirements for the preservation of wild life.

**7.3.11** A site drawing and register of all baiting points shall be kept up-to-date and open baits shall not be used in processing areas.

**7.3.12** All buildings shall be vermin-proof and shall be kept free from vermin. The factory surroundings shall be kept clean to keep away vermin.

**7.3.13** Pesticides shall not be used while processing is in progress and precautions shall be taken to ensure that all working surfaces are kept free from toxic pesticide residues. Approved arrangements shall be made for the identification, storage and handling of pesticides. In case of rodents, traps shall preferably be used.

## 7.4 Recommendations

**7.4.1** For rodent proof door, bristle strips can be used.

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**7.4.2** Inspections are recommended at intervals of six weeks.

**7.4.3** Fly screens should be made of stainless steel or nylon.

# 8 Storage, distribution and transport

## 8.1 Introduction

Storage, distribution and transport shall be such as to prevent damage, contamination or deterioration of the food or materials that come into contact with the food.

## 8.2 Storage

### 8.2.1 General requirements

**8.2.1.1** Edible raw materials shall be kept in a separate store and shall, except in the case of meat, fruit and vegetables, be kept in suitable closed containers. When issued for use, the raw materials shall be well protected against contamination or the risk of contamination. Spare parts of machinery and stores liable to contaminate the product shall be kept away from processing area except when issued for use.

**8.2.1.2** The manufacturer shall provide adequate storage facilities to prevent damage or deterioration of the food.

**8.2.1.3** Stores and storage vessels shall be maintained in a hygienic condition and where controlled conditions are required, these shall be provided and the conditions shall be continuously monitored.

**8.2.1.4** The manufacturer shall provide adequate unloading facilities and all incoming material shall be inspected to ensure that, damaged goods which could cause spillages, or materials containing evidence of rodent or insect infestation, is not brought into the plant or factory, without taking adequate precautions.

**8.2.1.5** Adequate loading facilities shall also be provided.

**8.2.1.6** Vehicles used for the transport or distribution of food shall be, easy to clean, clean, free from odours and weatherproof, and in the case of vehicles with refrigeration, the refrigeration unit shall be adequate, to maintain the food at the required temperature.

### 8.2.2 Specific requirements for storage

**8.2.2.1** There shall be adequate storage for raw materials, in process materials, where applicable, and finished product.

**8.2.2.2** Unprocessed food shall not be stored in the same store as processed food, unless it can be shown there is no risk of cross contamination.

**8.2.2.3** Food that requires special storage conditions, such as controlled atmosphere, temperature or relative humidity, shall be stored under the appropriate conditions, and records of the storage conditions shall be maintained.

**8.2.2.4** Stores shall be rodent, insect and bird proofed and shall be maintained in a hygienic condition.

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**8.2.2.5** There shall be at least a 0.5 m passageway around the walls or partitions of all stores, to prevent the establishment of breeding sites for rodents and to aid hygienic inspections, except in the case of racks. Where racks are used against walls there shall be at least a 0.3 m clearance between the floor and the bottom of the rack.

**8.2.2.6** The height of stacking shall be limited so that crushing or distortion does not occur on the lower layers, sufficient to damage the product or packaging. The top layer of stored product shall not make contact with the overhead structures, as this could facilitate access by crawling insects.

**8.2.2.7** Storage tanks, bins and silos used for storage of food shall be constructed of suitable materials. They shall be fitted with suitable close fitting covers, which shall be kept in place at all times and if vented, the venting shall be designed and maintained so as not to contaminate the contents. The inlet valves and pipe work shall be maintained in a hygienic condition and precautions shall be taken to ensure that access to the pipe work by rodents, birds and insects, is prevented.

**8.2.2.8** All goods received shall be inspected in accordance with documented procedures, to ensure that damaged goods that could cause spillages are not brought into the warehouse without taking appropriate action to prevent the danger of spillages. They shall be inspected for evidence of rodent or insect infestation and if present shall not be taken into the store until appropriate defined action is taken.

### 8.2.3 Specific requirements for transport and distribution

**8.2.3.1** All vehicles used for the transport of food shall be inspected before loading, to ensure that they are clean and weatherproof. Where appropriate, the refrigeration unit shall be inspected, to ensure that it is in working condition and that there is adequate fuel in the units' fuel tank.

**8.2.3.2** The internal surfaces of the vehicle body shall be impervious and easy to clean and the vehicle body shall be sealed, to prevent the entry of pests, exhaust fumes and other sources of contamination.

**8.2.3.3** In the case of an insulated, container or vehicle body, the outside cladding shall be weatherproof, so as to prevent loss of the insulation properties due to moisture entering the insulation.

**8.2.3.4** Care shall be taken when loading food into refrigerated transport to ensure that there is adequate air circulation around the food and that the food on loading is at the correct temperature, as refrigeration units on transport vehicles have not the capacity to cool product.

**8.2.3.5** Food shall not be transported in the same container or unit as non-food items unless it can be demonstrated the non-food items present no risk of contaminating the food.

**8.2.3.6** Tankers and bulk units used for the transport of food, where the food comes into direct contact with the internal surfaces, shall be cleaned at appropriate intervals. These tankers and bulk unit shall not be used for the transportation of non-food items, unless it can be demonstrated that such items do not present a potential hazard to the food.

**8.2.3.7** CIP (Cleaning in Place) washing units or washing units which contain a re-circulation system for washing food tankers or bulk units shall not be used to wash tankers or bulk units which contained non food products.

**8.2.3.8** Loading or unloading of food or materials, which shall come into contact with food, shall not take place under conditions that could cause deterioration, contamination or damage.

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### 8.3 Recommendations

**8.3.1** Covered facilities should be provided for loading and unloading vehicles, so that these operations can be carried out independently of weather conditions.

**8.3.2** Refrigerated transport should be fitted with a temperature recorder and records of the temperature of the container or vehicle during transportation should be maintained.

**8.3.3** Where the same refrigerated transport is used for deliveries to several points care should be taken to ensure that the temperature in the food section is maintained at the correct level.

**8.3.4** Refrigerated transport should be fitted with a recording thermometer (thermograph).

## 9 Zoning

### 9.1 Introduction

Unprocessed food can cause contamination of processed food either by direct contact or by micro-organisms being carried from the unprocessed food to the processed food by air, water or personnel. Food can also be contaminated by the same means from areas such as micro-biological laboratories, effluent plants and chemical contamination can occur from steam boilers, refrigeration plants, detergents, etc. Thus it is necessary to physically separate areas, within a food factory, to prevent potential contamination of the food, and to adequately control the access of personnel to production and laboratory areas.

### 9.1 General requirements

The manufacturer shall take effective action to protect the food produced for those operations, which may cause contamination with undesirable micro-organisms, chemicals, filth or other extraneous material. The manufacturer shall control access to areas where food is sensitive to contamination and shall take adequate precautions to ensure, that personnel entering food-processing areas, are not a source of contamination from other areas (refer also to Clause 4).

### 9.3 Specific requirements

**9.3.1** Production areas where processed foods are exposed shall be physically separated where possible from areas where unprocessed or partially processed food is stored, prepared or handled. Where this is not possible, due care shall be taken to ensure that the final product is not contaminated by food which has not been fully processed. (Refer also to the requirements in 4.1.1 for High Risk Foods.)

**9.3.2** Separate storage areas shall be provided, for processed and unprocessed foods, unless it can be demonstrated that contamination of the processed food cannot occur.

**9.3.3** Access to processing areas and particularly areas where food is exposed shall be restricted. The level of restriction required shall depend on the risk of contamination of the food.

**9.3.4** Microbiological laboratories shall be physically separated from production areas and protective clothing used in the microbiological laboratory shall not be worn in food processing areas.

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### 9.5 Recommendations

**9.5.1** The manufacturer should identify areas and operations from which there is a risk of contamination of the food with undesirable micro-organisms, odours, chemicals, filth and other extraneous materials. These areas should be physically separated either by partition, location or other effective means and access to these areas should be adequately controlled, to prevent contamination of food.

**9.5.2** Personnel working or entering the processing areas should not enter the microbiology laboratories.

**9.5.3** Personnel should not go from areas where raw materials are handled into areas where finished product is exposed. If this is essential, adequate precautions should be taken to ensure that micro-organisms are not carried on their person.

**9.5.4** For high risk processing areas access should be through a changing room, where personnel entering the area are required to change their footwear and protective clothing and to wash their hands; or via an air lock fitted with a foot and boot bath, hand washing facilities and changing facilities.

## 10 Services

### 10.1 Introduction

In a food factory contamination of food can be caused by inadequate or poorly designed or maintained services. Micro-organisms can be carried on dust particles in the air, or can be contained in water. Steam can also be a source of chemical contamination and condensation. Services ducting can be used by rodents and insects to gain entry to the plant and inadequate control of waste and effluent can lead to the establishment of breeding sites for rodents, birds and insects.

### 10.2 General requirements

Adequate services shall be provided by the manufacturer and they shall be designed, maintained, controlled and monitored so as to avoid the risk of contamination of the food, at all stages of production.

### 10.3 Specific requirements for construction

**10.3.1** Electrical equipment shall be appropriate, e.g. in a wet area or an area where washing takes place, electrical equipment shall comply with the requirements for this type of use.

**10.3.2** Cladding used for pipe work shall be suitable for use in a food area and shall be covered with aluminium or a suitable alternative.

**10.3.3** Appropriate materials shall be used for services and services lines. The materials shall not contaminate the services being carried and shall be inert to attack by cleaning agents, where appropriate.

**10.3.4** Extraction units shall be provided for equipment, which gives off fumes or steam and shall be adequate to prevent the build up of condensation or fumes in the processing areas.

**10.3.5** Equipment that requires drainage shall be piped directly to drain.

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**10.3.6** There shall be a water seal on all drains and drains shall discharge directly into a piped sewer which itself shall be water sealed.

**10.3.7** Service entry and exit points shall be adequately sealed. The sealing shall be smooth and special precautions shall be taken to ensure that service entry and exit points do not provide access for rodents.

**10.3.8** Adequate services shall be provided and shall be properly installed and maintained.

## 10.4 Specific requirements for ventilation/air quality

**10.4.1** Forced ventilation, if present, shall be designed so that air flows in the opposite direction to product flows. Air intake points shall be at least 1 m above internal floor levels and 1 m above outside surfaces.

**10.4.2** Ventilation throughout the factory shall be sufficient to prevent condensations on walls, ceilings and overhead structures under normal operating conditions.

**10.4.3** Air intake points shall be at least fitted with a fly screen and should be fitted with dust filters. They shall be located so as to avoid the intake of air contaminated by micro-organisms, dust, aerosols, chemicals, smoke, etc. Where appropriate air shall be filtered to the required class.

**10.4.4** The temperature in various sections of the factory shall comply with any relevant legislation and shall be controlled where necessary to protect the quality of the food.

**10.4.5** Where necessary to protect the quality of the food, relative humidity shall be controlled.

**10.4.6** Where the control of air, temperature, relative humidity or relative pressure is deemed necessary to protect the quality of the food, these parameters shall be measured and recorded. Cooling of unwrapped foods should be carried out in an area supplied with mould free air.

**10.4.7** Where appropriate, to control the risk of food contamination the microbial quality of the air shall be monitored.

## 10.5 Specific requirements for compressed air and gases

**10.5.1** Compressed air, which comes into contact with food, shall be dry to prevent the build up of micro-organisms in the air lines and shall be free from micro-organisms, chemicals, dirt and filth, which could contaminate the food.

**10.5.2** Where appropriate non-return valves shall be fitted in the airlines to prevent the entry of food into the lines.

**10.5.3** Compressed air shall not be used for cleaning purposes in processing areas and if used in this way shall cause dirt to spread around the factory.

**10.5.4** Compressed air, carbon dioxide, nitrogen and oxygen shall be filtered through a micron filter located close to the point of use, if the gas comes in contact with food.

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## 10.6 Specific requirements for water

**10.6.1** Storage tanks, reservoirs, etc. for water shall be covered so as to present the contamination of the water by birds, rodents, organic and inorganic matter and shall be inspected weekly. The air vents to these tanks and reservoirs shall be insect and rodent proof.

**10.6.2** Vacuum breakers shall be included in the water system in all locations where back siphoning of contaminated water could occur.

**10.6.3** Flexible hoses, if used, shall be suitable for food use, shall not be immersed in liquids unless designed for this purpose and if immersed shall be in the cleaning programme. When not in use they shall be properly stored on a reel or equivalent.

**10.6.4** Potable water shall comply with EAS 12, *Drinking (potable) water — Specification*.

**10.6.5** Non potable water can be used provided that it cannot contaminate the food, that the non-potable water lines are colour coded or labelled every two metres and that there is no interconnection between the potable and non-potable water supply. Non-potable water shall not be used for cooling cans.

**10.6.6** Where water is used as an ingredient or processing aid, it shall be potable and shall have appropriate chemical, microbiological and organoleptic specification.

**10.6.7** If water is dechlorinated to prevent chlorophenol taints, appropriate precautions shall be taken in handling the water and storage time shall be maintained at a minimum.

## 10.7 Specific requirements for steam

**10.7.1** Steam that comes into direct contact with food or with water shall only contain additives that are permitted for use by law or Good Manufacturing Practices and the total solids in the boiler shall be controlled so as to avoid carry over of boiler solids.

**10.7.2** Boilers should be properly operated and maintained.

## 10.8 Specific requirements for waste; storage and disposal

**10.8.1** Skips or containers for waste, offal and other waste material shall be covered and emptied at least once per week, or more frequently as is consistent with minimizing the risk of infestation.

**10.8.2** Skips or containers for waste shall be located as far as practicable from processing areas and air intake areas and shall be sited on self-drainage concrete, tarmac or an equivalent surface.

**10.8.3** Combustible waste if incinerated shall be burned in an incinerator of an approved design located at adequate distance from the factory, so as to avoid a fire hazard or contamination of the factory air supply.

**10.8.4** Waste containers shall be provided in appropriate locations in the factory. Only such containers shall be used for the disposal of waste. The containers shall be such that they cannot be mistaken for food containers and shall be emptied daily. Packaging material, whether damaged or not, shall not be used as a waste receptacle.

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### 10.9 Specific requirements for electrical lighting

**10.9.1** All light fittings shall be of the safety type in all areas other than office space remote from the factory.

**10.9.2** Where appropriate, white light shall be used, e.g. where the colour of the food is a critical quality parameter and has to be monitored.

**10.9.3** The minimum in density of light shall be as follows:

- 540 lux (50 ft candles) at inspection points;
- 220 lux (20 ft candles) in general work areas; and
- 110 lux (10 ft candles) in other areas.

## 11 Effluent and waste disposal

### 11.1 General requirements

Food factories shall have an efficient effluent and waste treatment and disposal system, which shall, at all times, be maintained in good order and repair. All effluent lines (including sewer systems) shall be large enough to carry peak loads and shall be constructed as to avoid contamination of potable water supplies. All evacuation pipes shall be connected to the sewers and equipped with traps.

### 11.2 Specific requirements for solid waste disposal

Facilities with covers, where applicable, shall be provided for the storage of waste and inedible materials prior to their removal from the establishment. These facilities shall be designed to prevent access to waste or inedible materials by pests, or rodents and to avoid contamination of food, potable water, equipment, buildings or roadways on the premises. Waste shall be stored away in a separate place from the processing room.

### 11.3 Specific requirements for liquid waste disposal

**11.3.1** All floor drains shall be fitted with effective traps and shall be covered with a suitable grid. They shall be maintained in a clean condition and shall be sanitized at appropriate intervals to prevent the risk of contamination of the food.

**11.3.2** Sewerage lines shall be adequate in size and shall be cleaned when necessary by rods or other appropriate means. Ideally this should be done using manholes located outside the factory.

**11.3.3** Manholes within the factory should be avoided but if essential shall be doubly sealed.

**11.3.4** If effluent is being treated on site or close to the site, the effluent plant should be located, as far as possible, down wind from the air intake points of the factory.

**11.3.5** The effluent plant shall be adequate in size to handle the maximum anticipated loading both in terms of hydraulic and BOD loading and shall be adequately controlled to meet the specified requirements for treated effluent and to avoid the risk of pollution.

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## 11.4 Specific requirements for wash hand basins and sterilizers

**11.4.1** Wash hand basins, troughs or washing fountains shall be provided in all production areas convenient to personnel entry points and adjacent to work stations, where their absence would present a risk to the safety of the food. They shall be provided in all areas where food is handled.

**11.4.2** Wash hand basins, troughs or washing fountains shall be supplied either with warm water or cold and hot water and the taps shall be elbow, knee, foot or electronically operated.

**11.4.3** Hand sanitizing solutions or sanitizing liquid soap shall be provided at each hand washing point.

**11.4.4** Knife sterilizers if used or required by law shall be maintained at 82 °C minimum when in use.

## 11.5 Recommendations

**11.5.1** Potable water should be chlorinated in-house to ensure a minimum residual free chlorine level of 0.1 ppm to 0.2 ppm at the point of use or treated with a suitable source of UV light or the equivalent. Chlorinated water should be stored for a minimum of 20 min to allow adequate contact time for the chlorine.

**11.5.2** Methods of treatment should be fitted with a visual or audible alarm system, which shall be activated in the event of failure of the system. This alarm system should be checked at defined intervals and records of the checks kept.

**11.5.3** The residual free chloride level of potable water should be checked regularly at the points most likely to be low in chlorine, e.g. the end of the longest pipe run from the source of supply, water storage tank or chlorinating plant. At least one check should be carried out daily. Where the quality of water is critical to the safety of food, e.g. cooling water for cans, checks should be carried out daily for the residual free chlorine level.

**11.5.4** If UV light is used to ensure the safety of potable water the intensity of the light source should be checked at regular intervals and records of such checks kept.

**11.5.5** The microbiological quality of potable water should be checked monthly or weekly for the presence of coliforms. The results shall conform to EAS 12, *Drinking (potable) water — Specification*.

**11.5.6** Aerosolized water (e.g. cooling towers, refrigeration plant cooling units and ventilation systems) can be a source of *Legionella*, and can result in Legionnaires' disease in susceptible people. Hence precautions should be taken in such systems that operate between 20 °C and 55 °C to prevent the build up of *Legionella*. Temperature in excess of 60 °C or effective biocides can be used as methods of control.

**11.5.7** Where natural light is used in food processing areas the windows or skylights should be ideally north facing.

**11.5.8** Plant service should not interrupt the smooth finish of walls, ceiling or floor.

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# 12 Premises and structures

## 12.1 Introduction

In siting a food plant it is necessary to ensure that the area is free from flooding and that the air is clean and free from excessive levels of yeast and mould and from odours. It is essential that conditions, both in the grounds and in the factory premises that would lead to air or foot borne filth, or the harbourage or breeding of micro-organisms, insects, rodents or birds, be eliminated or controlled.

The factory and structures shall be suitable in size, construction and design to facilitate maintenance and clearing. They shall be maintained in a clean condition and be adequate for the purpose for which they are used. A well-designed building can greatly reduce the cost of cleaning.

## 12.2 General requirements

The grounds and factory premises shall be maintained and kept free of conditions that could lead to the contamination of food or the breeding or harbourage of micro-organisms, insects, rodents and/or birds.

## 12.3 Specific requirements for the grounds

**12.3.1** Equipment pallets, engineering materials, etc. stored in the grounds shall be stored so as not to provide sites for harbourage or breeding of insects, rodents, etc. They shall be stored neatly in a clearly defined area.

**12.3.2** Litter, waste and refuse shall be stored in suitable containers (see 10.8).

**12.3.3** Yards, road, etc. within the factory shall be surfaced to avoid excessive dust.

**12.3.4** Stagnant water shall be eliminated. Stagnant water can be present in gutters, open drains, potholes and pools and can be caused by inadequate drainage or incorrectly sloped surfaces.

**12.3.5** Unused buildings, outhouses, service buildings, etc. shall be kept clean and tidy to prevent the establishment of sites for the harbourage and breeding of rodents and insects.

**12.3.6** Precautions shall be taken to ensure that contamination from trucks and other vehicles is not brought into the factory either by fork truck or by foot.

**12.3.7** In rural areas, cattle grids or another appropriate system shall be used to prevent cattle from entering the factory grounds.

**12.3.8** Animals shall not be permitted in the factory grounds, other than when they are used as a raw material.

**12.3.9** Access to the factory grounds shall be protected by a perimeter fence or wall.

**12.3.10** The grounds shall be kept free of uncut weeds and grass, litter, waste and miscellaneous materials.

**12.3.11** Precautions shall be taken to prevent in as far as possible birds from nesting or perching in the grounds of the plant. (Regulations in relation to the preservation of wild life shall be complied with.)

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**12.3.12** Yards, outside structures, pathways shall be maintained in a clean condition and in particular shall be kept free of excreta, from birds and animals, to avoid foot borne filth and harmful micro-organisms, such as salmonella, being carried into the plant.

## 12.4 Specific requirements for roofs and outside structures

**12.4.1** Roofs, valleys and gutters shall be maintained to prevent the damage to food or materials used in the preparation or presentation of food by rainwater and to prevent walls and floors from becoming damp or wet due to rain.

**12.4.2** Roofs, valleys and gutters shall be kept clear of debris, including insects, dead birds, etc., and shall be inspected at appropriate defined intervals.

**12.4.3** Outside structures shall be kept clear of debris, bird droppings, etc. as these can lead to the contamination of food.

## 12.5 Specific requirements for walls

**12.5.1** Walls shall be free from cobwebs, dampness, condensation and mould.

**12.5.2** Junctions between walls, and walls, floors and ceilings shall be closed and ideally should be coved.

**12.5.3** The joints on panelled walls shall be sealed.

**12.5.4** Wall surfaces likely to come into contact with product shall be suitably protected and if sheeted, the sheeting shall be sealed. The surfaces shall be cleaned at least daily.

**12.5.5** Horizontal ledges and sills should be avoided and if present shall be kept free from dust and any miscellaneous items.

**12.5.6** Openings for conveyors, services, vents, etc. shall be smooth and sealed.

**12.5.7** Where appropriate, walls shall be protected from damage by moving equipment. Galvanized guard rails or the equivalent shall be used.

**12.5.8** Walls shall be properly maintained, this shall include the absence of flaking paint, the replacement of damaged tiles, the proper grouting of tiles and the sealing of cracks and joints on internal wall surfaces.

**12.5.9** Fixtures, signs, switch boxes, etc. should be avoided on internal wall surfaces and where present in processing areas shall be sealed to avoid sites for the accumulation of dirt.

**12.5.10** Walls shall be maintained in a clean condition.

## 12.6 Specific requirements for floors

**12.6.1** Floors shall be constructed of durable water-resistant material, i.e. concrete floor tiles or approved synthetic materials.

**12.6.2** Floors shall be resistant to attack by product spillage, cleaning agents and cleaning solutions.

**12.6.3** Floors shall be maintained in good condition, free from cracks, holes or corrosion.

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**12.6.4** Floors shall be smooth to aid cleaning subject to the requirement of being safe to walk on when wet, dry or greasy.

**12.6.5** Wet areas shall be provided with adequate facilities for drainage and the floors shall be adequately sloped to drains, so as to avoid the presence of pools of liquid forming.

**12.6.6** Channels, if used, shall be easily accessible for cleaning and shall be cleaned daily. Where appropriate for safety or other reasons they shall be covered with removable grids that shall be removed and cleaned daily.

**12.6.7** Concrete floors shall be suitably constructed or sealed to prevent the build-up of dirt or the release of dust.

**12.6.8** Dark boards should be avoided but if essential shall be easily cleanable and made of metal or suitable plastics. Wooden dark boards shall not be used.

**12.6.9** Mezzanine floors, bridges to mezzanine floors and bridges over equipment shall be completely sealed and shall include side walls and walls around openings, where the absence of these requirements could lead to the contamination of machinery or products passing or sited below. Adequate provision shall be made for cleaning.

**12.6.10** Floors shall be kept clean, free from litter, the accumulation of water, oil, etc. and processing areas shall be cleaned at least daily. In sensitive production areas the floors shall be cleaned with a sterilization agent.

## 12.7 Specific requirements for ceilings and overheads

**12.7.1** Ceilings shall be smooth, impervious and easy to clean.

**12.7.2** Girders, overhead pipe work services and structures should be kept to a minimum to aid cleaning, and if present shall be free of dust, rust, mould, flaking paint, cobwebs and extraneous material.

**12.7.3** False ceilings are ideal for enclosing services, roof structures, etc. If present they shall be smooth and impervious adequately supported and if appropriate shall be provided with catwalks or other means to facilitate cleaning and enable maintenance to be carried out in the space above the ceiling.

**12.7.4** Where there is no access to the space above the ceiling, the ceiling shall be totally sealed.

**12.7.5** Skylights if present shall be clean and free of condensation and shall not open.

**12.7.6** False ceilings shall not be made with asbestos or made from material likely to disintegrate.

**12.7.7** Openings in ceilings for conveyors, vents, piping, etc. shall be properly sealed and shall be smooth.

**12.7.8** Canopies over equipment, air vents and air vent covers and screens shall be kept free of dust and clean.

**12.7.9** Ceilings shall be kept free from condensation to prevent the growth of mould and water dropping on the food. This can be achieved by correct air circulation, insulation and the venting of moist air.

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**12.7.10** There shall be in place, a high cleaning programme for the total factory, with special emphasis on the production areas.

**12.7.11** Where there is internal access to outside roofs and structures, access shall be controlled to prevent food borne filth from being brought into the plant. The access door shall be locked, unless fire regulations require otherwise, and personnel exiting on to roofs shall change their footwear on re-entering the plant.

## 12.8 Specific requirements for doors and windows

**12.8.1** Doors, windows and window frames shall be maintained in good condition and free from mould, flaking paint, etc. and shall be kept clean.

**12.8.2** Windows that are opened shall be fitted with a fly screen.

**12.8.3** Doors leading into production areas, which are used, other than as an emergency exit, shall be fitted with a self-closing device, air curtains or plastic strips.

**12.8.4** Doors, windows and window frames shall be tight fitting.

**12.8.5** External doors shall be kept closed. If this is impracticable, due to frequent use, then overlapping plastic strip curtains, rubber swing doors or an appropriate alternative shall be used.

**12.8.6** Internal window sills shall have a slope of 45° or in the case of existing premises, window sills, if horizontal, shall be kept free of dust and extraneous material.

**12.8.7** External doors shall be constructed so as to prevent the entry of rainwater into the factory.

**12.8.8** Wooden doors should be avoided and if used should be flush doors to prevent the accumulation of dirt, and they shall be coated with a non-toxic, easily cleanable material.

## 12.9 Specific requirements for furnishings

**12.9.1** Furnishings shall be solidly constructed and in good repair.

**12.9.2** They shall be clean both inside and outside.

**12.9.3** They shall ideally be constructed of metal or plastic. If wood or a wood based product is used in their construction, they shall have a finish that is non-toxic and easy to clean.

**12.9.4** They shall be ventilated where necessary.

**12.9.5** The top of furnishings shall be kept free of dust and extraneous material and where appropriate should be sloped.

## 12.10 Specific requirement for lifts

Lifts shall be maintained in a hygienic condition and precautions shall be taken to ensure that the well of the lift is maintained, free from conditions that could present a risk of contamination to the food.

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### 12.11 Recommendations

**12.11.1** Kerbs if used around wet areas, should be coved on both sides and ideally should have a rounded top.

**12.11.2** Care should be taken in designing ceiling heights as low ceilings can lead to condensation and high ceilings are difficult to maintain.

**12.11.3** Access to outside roofs and structures from inside the plant should be avoided as roofs often contain bird droppings, which can be contaminated with salmonella or other food poisoning micro-organisms.

**12.11.4** Windows in processing areas should be doubly glazed or double windows should be installed to prevent condensation and they should be mounted flush to the internal wall surface to avoid ledges.

**12.11.5** Shatterproof material should be used instead of glass in areas where broken glass could contaminate the food.

**12.11.6** Personnel entrances to processing areas should have two doors with a lobby between, which should contain hand washing facilities and storage for clean protective clothing.

**12.11.7** Wall tiles are not recommended, as the area behind the tiles can be used for breeding by insects if there is a failure of the tile grouting. Tiled walls should only be used where they are specified in regulations.

**12.11.8** There should be a wide path at least one metre wide around the factory so as to reduce the chance of rodent infestation and it should be kept clean and clear of materials.

**12.11.9** In landscaping the area around a factory, care should be taken, and trees, particularly deciduous trees should be avoided as rotting leaves can be a sources of mould and trees can give harbourage to birds.

## 13 Plant and equipment

### 13.1 Introduction

Plant and equipment shall be easy to clean and ideally new plant should be designed so that corners are eliminated by coving and all parts are accessible for cleaning and inspection. As the cost of cleaning can be significant, poorly designed plant and equipment can increase the cost of cleaning. Plant and equipment shall be inert to attack by the foodstuff, water and cleaning agents.

### 13.2 General requirement

All processing equipment shall be designed, constructed, installed, and maintained so as not to be a source of food contamination. All food contact surfaces shall comply with the relevant East African Standard and Public Health Act, Laws.

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## 13.3 Specific requirements

**13.3.1** Product contact surfaces shall be smooth, impervious, non-toxic, and non-absorbent and shall be inert to attack by the food processed or the cleaning agents used, shall be corrosion resistant and suitable for food use.

**13.3.2** Dissimilar metal shall not be used where electrolytic corrosion can take place.

**13.3.3** Dead ends in pipe work shall not be present, as these cannot be adequately cleaned.

**13.3.4** Storage and blending vessels shall be fitted with suitable close fitting covers which shall be kept in place at all times.

**13.3.5** The plant and the equipment shall be inspected at appropriate intervals for the presence of cracks and if found they shall be repaired. Micro-organisms can grow in cracks and not be killed by normal cleaning procedures.

**13.3.6** Bearings inside and outside the product zones shall not be excessively lubricated and leaking oil seals shall be repaired.

**13.3.7** Where required motors shall be fitted with oil catch trays. This shall apply to all motors where oil leaks could enter the food unless food grade lubricants are used.

**13.3.8** Sieves and filters shall be regularly checked and shall be included in the cleaning programme, where applicable.

**13.3.9** Pumps used for food shall be regularly stripped down. The frequency of stripping down shall be stated in the cleaning programme.

**13.3.10** Where appropriate pipe work shall be of sterilizable quality and open-ended pipes shall be fitted with caps or other means to prevent contamination. Where appropriate open-ended pipes shall be self-draining.

**13.3.11** Feed conveyors to and from filling machines and closing machines shall have suitable covers to protect the open food containers and product from overhead contamination, where this is appropriate.

**13.3.12** Food conveyors lubricated with water, soap solutions or food grade lubricants shall be fitted with a catch tray.

**13.3.13** Reasonable access under, inside and around plant and equipment shall be provided for servicing and cleaning. Plant and equipment may be mounted directly on walls or floors provided it is adequately sealed to prevent the establishment of sites for the breeding and harbourage of insects and rodents.

**13.3.14** Containers used for the transport of unpacked food within the factory shall be controlled, to prevent it being used for the transport of raw product and without adequate cleaning being then used for processed product thus causing cross contamination.

## 13.4 Recommendations

**13.4.1** Conveyors, conveying food, open food containers whether full or empty and caps, lids or closures should be covered to prevent contamination of the food or materials in contact with food. The covers and conveyors should be designed to facilitate cleaning.

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**13.4.2** Covers and the top of plant and equipment should not be flat. This aids cleaning and prevents materials being left on top of the plant.

**13.4.3** Nuts, screws, bolts, etc. if used should be of the self locking type and suitable precautions should be taken to ensure that they do not interrupt the smooth finish of the plant or equipment.

**13.4.4** When plant or equipment is being purchased due consideration should be given to ensure that it is of a hygienic design.

**13.4.5** Containers used for the transport of unpacked food within the factory should be colour coded with different colours for containers used for raw and processed product.

**13.4.6** A separate set of maintenance tools should be reserved for use in high risk processing areas.

# 14 Records

## 14.1 Introduction

It is essential that records be maintained of all actions taken to assure the safety of food. These records can be used to demonstrate that appropriate action has been taken to assure the safety of the food. In addition they can be used as an aid to effective management of product safety.

## 14.2 General requirement

The manufacturer shall establish and maintain procedures for identification, collection, indexing, filing, storage, maintenance and disposition of hygiene records.

## 14.3 Specific requirements

**14.3.1** Records shall be maintained of all actions, test results and other relevant information required to ensure that hygiene is maintained at an appropriate level to assure the safety of the food produced.

**14.3.2** These records shall be indexed, filed, stored and maintained for a suitable period and procedures shall exist for the disposition of out of date records.

**14.3.3** Records shall include:

a) a record of all critical parameters and tests carried out to assure the safety of the finished product, and the results of these tests, including microbiological results (Hazard Analysis and Critical Control Point system — HACCP);

b) the calibration status and procedures used to calibrate all devices used to assure the safety of the finished product;

c) records showing that all staff members have been appropriately screened as suitable to work in a food premises by a medical examiner and they are trained in the principles of hygiene;

d) records showing that the cleaning programme has been adhered to and that the strengths, temperatures and contact time of cleaning solutions complies with the specified requirements;

e) records showing that the factory has been inspected for evidence of infection by rodents, birds, animals or insects at, at least three monthly intervals, by a suitably qualified person;

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f) records showing that incoming material, where appropriate, has been inspected for the presence of rodents or insects and that distribution vehicles have been inspected;

g) records showing that water storage vessels are inspected on a weekly basis for the presence of birds, rodents, etc., daily records of residual free chlorine levels and records of other water analysis; and

h) records showing that a hygiene/housekeeping inspection has been carried out at defined intervals using a written checklist.

**14.3.4** Where appropriate to ensure the safety of food, the following records shall also be maintained:

Chemical, functional, microbiological and organoleptic specifications for raw materials, in process materials and finished product.

a) records of environmental tests;

b) records showing that the tubes in insect electrocuters are replaced at appropriate intervals;

c) records of controlled conditions such as temperature, relative humidity, controlled atmosphere and positive and negative air pressures and air quality during production, storage and distribution;

d) appropriate records for the effluent plant to show that treated effluent complies with specified requirements;

e) records showing that glass pipes, flow meter and glass equipment has been routinely inspected for cracks, splinters, etc;

f) records showing that air filters have been inspected and replaced at appropriate intervals;

g) records of sensitivity checks on metal detectors; and

**14.3.5** Where it is found, that hygiene is not being maintained at the defined level, records shall be maintained of the corrective action taken, to bring it under control.

**14.3.6** All records shall be signed by an appropriate person or persons and dated.

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