

DRAFT ZANZIBAR NATIONAL STANDARD

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Production, handling and processing of dried fruits and vegetables — Code of practice

DRAFT FOR STAKEHOLDER'S COMMENT

ZANZIBAR BUREAU OF STANDARDS

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National Foreword

This Draft Zanzibar National Standard has been prepared by the Fruits and Vegetables Standards Technical Committee. In accordance with the Zanzibar Bureau of Standards general procedures, this draft is here by presented to the public in order to receive any technical comment concerns.

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**Production, handling and processing of dried fruits and vegetables
— Code of practice**

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Foreword

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This second edition cancels and replaces the first edition (ARS 55: 1986), which has been technically revised.

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Production, handling and processing of dried fruits and vegetables — Code of practice

1 Scope

1.1 This African Standard provides recommended practices for production, handling and processing of fruits and vegetables that have been dried by natural or artificial means or a combination of both.

1.2 This standard does not apply to fruits and vegetables commonly known as "Dehydrated fruits and vegetables" with moisture content not exceeding 5 %.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

WHO guidelines for water quality.

3 Terms and definitions

There are no normative references in this document.

4 Sanitation and hygiene requirements for raw materials

4.1 Environmental sanitation in growing and food production areas

4.1.1 Sanitary disposal of human and animal wastes

Adequate precaution shall be taken to ensure that human and animal wastes are disposed of in such a manner that does not constitute a public health or hygienic hazard and extreme care should be taken to protect the fruit/vegetable from contamination with these wastes.

4.1.2 Sanitary quality of irrigation water

Any water used for irrigation shall not constitute a public health hazard to the consumer through the fruits and vegetables.

4.1.3 Animal, plant pest and disease control

4.1.3.1 Growing areas shall be kept free from rotten or decomposing fruit and vegetables that is attractive to insects, rodents and birds.

4.1.3.2 Where control measures are undertaken, treatment with chemical, biological or physical agents should be done only in accordance with the recommendations of the appropriate official agency by or under the direct supervision of personnel with a thorough understanding of the hazards involved, including the possibility of toxic residues being retained by the fruit and vegetable.

4.2 Sanitary harvesting and food production

4.2.1 Equipment and product containers

Equipment and product containers shall not constitute a hazard to health. Containers which are reused shall be of such material and construction to facilitate thorough cleaning, and shall be thoroughly cleaned and maintained as not to constitute a source of contamination to the fruit and vegetable.

4.2.2 Sanitary techniques related to harvesting and production

4.2.2.1 Removal of obviously unfit materials

Unfit products shall be segregated during harvesting and production to the fullest extent practicable and shall be disposed of in an appropriate manner. The harvested fruits and vegetables shall be examined by competent persons to ensure that it is fit for further processing into food.

4.2.2.2 Protection of product from contamination

4.2.2.2.1 Suitable precautions should be taken to prevent the raw fruits and vegetables from being contaminated by animals, insects, vermin, birds, chemical or microbiological contaminants or other objectionable substances during handling and storage. The nature of the fruit/vegetables and the methods of harvesting shall indicate the type and degree of protection required.

4.2.2.2.2 The raw or dried fruits and vegetables shall be moved to suitable storage, or to the processing area for immediate processing, as soon as possible after harvesting or drying.

4.2.2.2.3 Where fruits and vegetables are likely to have become infested with insects or mites during or after harvesting or drying as a preventive measure, suitable treatment such as appropriate fumigation shall be applied.

4.2.2.2.4 Fruits and vegetables held for processing shall be stored in closed containers, buildings, or under suitable type of covering that protects it from rodents, insects, birds, debris and dust. Fumigation methods and chemicals used shall be approved by legal authorities having jurisdiction.

4.2.3 Drying yards

4.2.3.1 Designation of drying yards

Where fruits/vegetables are dried by the sun in drying yards, such yards shall be recognized as food-processing yards whether drying is carried out on a grower's property or as a commercial operation. Such yards shall as far as possible comply with the relevant provisions of this code as are applicable, and in particular with the requirements in 4.2.3.2 and 4.2.3.3.

4.2.3.2 Requirements for the location of drying yards

4.2.3.2.1 Drying yards shall in all cases be located at a sufficient distance from cattle animal feed lots, settling pods and/or other waste collection areas to prevent contamination from these sources.

4.2.3.2.2 They shall also be appropriately located so that they have proper and adequate drainage.

4.2.3.2.3 drying yard shall be:

- a) well surfaced so that it shall permit maintenance of clean yard surfaces and prevent contamination of drying fruit and vegetable; and
- b) fenced, where necessary, to keep out animals as far as practicable, and the area around the drying yard shall be kept clean, free from weeds and other debris that can blow into the yard.

4.2.4 Cutting sheds

4.2.4.1 Cutting sheds in which fruit and vegetable is pitted, cut or otherwise prepared and spread on trays for drying should preferably be closed buildings with screened windows that do not permit access to rodents, insects, or birds.

4.2.4.2 Where cutting is done in open sheds, adequate precautions shall be taken to protect against

animal, insect, rodent and bird contamination or harbourage. The sheds shall be adequately lit and ventilated, and adequate clean toilet and hand-washing facilities shall be provided.

4.2.5 Storage areas

Both fresh fruits and vegetables for processing and the dried fruits and vegetables shall be stored in areas where it is protected from rodent, insect and bird depredations, and storage time should be kept to a minimum consistent with Good Manufacturing Practice.

4.2.6 Hygienic operations

4.2.6.1 Drying trays, cutting equipment, and storage bins shall be kept clean and free from fruit and vegetable residues and foreign substances that may cause contamination of the fruits and vegetables.

4.2.6.2 There shall be an adequate supply of clean potable water (complying with WHO guidelines for water quality) for hand washing, equipment cleaning, and raw product washing.

4.2.7 Transportation

4.2.7.1 Facilities

Conveyances for transporting the harvested crop or raw product from the production area, place of harvest or storage shall be adequate for the purpose intended and shall be of such material and construction that permit thorough cleaning and shall be thoroughly cleaned and maintained as not to constitute a source of contamination to the fruit and vegetable.

4.2.7.2 Handling procedures

All handling procedures shall prevent the product from being contaminated. Care shall be taken in transporting perishable products to prevent spoilage or deterioration. Special equipment such as refrigeration equipment shall be used if the nature of the product or distances involved so indicate. If ice is used in contact with the fruit/vegetable, it shall be of sanitary quality.

5 Plant construction and layout

5.1 Requirements for plant location, size and design

The building and surrounding area shall be:

- a) kept reasonably free of objectionable odours, smoke, dust, or other contamination;
- b) of sufficient size for the purpose intended without crowding of equipment or personnel;
- c) of sound construction and kept in good repair;
- d) of draft construction as to protect against the entrance or harbouring of animals, insects or birds or vermin;
- e) well designed as to permit easy and adequate cleaning; and
- f) in areas not experiencing high concentrations of air-borne pollutants, equipment shall be used to remove pollutants from the air blown across or through the product.

5.2 Requirements related to sanitary facilities and controls

5.2.1 Separation of processes

5.2.1.1 Raw material handling areas

Areas where raw materials are received or stored shall be separated from areas in which final product preparation or packaging is conducted as to preclude contamination of the finished product.

5.2.1.2 Processing and storage areas

Areas and compartments used for storage, manufacture or handling of edible products shall be separate and distinct from those used for inedible materials. The food handling area shall be completely separated from any part of the premises used as living quarters and cooking purposes.

5.2.2 Water supply

An ample supply of cold and hot water shall be available where necessary. The water supply shall be of potable quality complying with relevant standards.

5.2.3 Ice

Where ice is used, it shall be made from water of potable quality and shall be manufactured, handled, stored and used, so as to protect it from contamination.

5.2.4 Auxiliary water supply

Where non-potable water is used for such purposes as fire control it shall be carried in completely separate lines, identified preferably by colour and with no cross-connection or back-siphonage with the lines carrying potable water.

5.2.5 Plumbing and waste disposal

5.2.5.1 All plumbing and waste disposal lines (including sewer systems) shall be large enough to carry peak loads. All lines shall be watertight and have adequate traps and vents.

5.2.5.2 Disposal of waste shall be effected in such a manner as not to permit contamination of potable water supplies. The plumbing and the manner of waste disposal shall be approved by the official agency having jurisdiction.

5.2.6 Lighting and ventilation

5.2.6.1 Premises shall be well lit and ventilated. Light bulbs and fixtures suspended over food in any step of preparation shall be of the safety type or otherwise protected and covered to prevent food contamination in the case of breakage.

5.2.6.2 Special attention shall be given to the venting of areas and equipment producing excessive heat, steam, obnoxious fumes or vapours, or contaminating aerosols. Good ventilation is important to prevent both condensation (which may drip into the product) and mould growth in overhead structures which may fall into the food.

5.2.7 Toilet-rooms and facilities

5.2.7.1 Adequate and convenient toilets shall be provided and toilet areas shall be equipped with self-closing doors.

5.2.7.2 Toilet rooms shall be appropriately located, well lit and ventilated and shall not open directly into a food handling area. They shall be kept in a sanitary condition at all times.

5.2.7.3 There shall be associated hand-washing facilities with liquid soap (unscented) within the toilet

area and the notices shall be posted requiring personnel to wash their hands appropriately after using the toilet.

5.2.8 Hand-washing facilities

5.2.8.1 Adequate and convenient facilities for employees to wash and dry their hands shall be provided wherever the process demands. They shall be in full view of the processing floor. Hand sanitizing solutions or liquid detergent in appropriate dispensers shall be provided at each hand washing point.

5.2.8.2 Single-use towels are recommended, where practicable, but otherwise the method of drying shall be approved by the official agency having jurisdiction. The facilities should be kept in a sanitary condition at all times.

5.3 Requirements for equipment and utensils

5.3.1 Materials

All food contact surfaces should be smooth; free from pits, crevices and loose scale; nontoxic; unaffected by food products; and capable of withstanding repeated exposure to normal cleaning; and non-absorbent unless the nature of a particular and otherwise acceptable process renders the use of a surface, such as wood.

5.3.2 Sanitary design, construction and installation

Equipment and utensils shall be designed and constructed to prevent hygienic hazards and permit easy and thorough cleaning. Stationary equipment shall be installed in such a manner as shall permit easy and thorough cleaning.

5.3.3 Equipment and utensils

5.3.3.1 Equipment and utensils used for inedible or contaminating materials shall be so identified and shall not be used for handling edible products. Colour codes may be used for ease of identification of equipment.

5.3.3.2 Equipment used for drying shall be so constructed and operated that the product cannot be adversely affected by the drying medium.

6 Plant facilities and operating requirements — Environmental hygiene

6.1 General

6.1.1 Buildings and equipment shall be designed, constructed, maintained and cleaned to standards that ensure the safety and quality of the ingredients and finished product throughout the entire process.

6.1.2 Staff shall be trained to work tidily and operate a "clean as you go" regime.

6.2 Floors

6.2.1 The design of the floors shall permit easy cleaning and junctions between floors and walls shall be rounded and continuous.

6.2.2 The floors shall be smooth and free from cracks including open joints. They shall have adequate drainage slopes to direct any water towards drainage channels. There shall be no back flow from the drainage to the production areas.

6.3 Walls, doors and windows

6.3.1 Walls

All walls shall be impermeable, smooth, and easy to clean. All finishes shall be properly applied and maintained. Painted surfaces shall not be allowed to deteriorate or flake. Paint used shall be designed for food production areas. Tiles if used shall be sound and in good repair. Loose or damaged tiles are unacceptable.

6.3.2 Windows

Mesh screens shall be put on all windows to avoid insects. Glass shall not be used on the windows in the production areas, only shutter-proof materials are required.

6.3.3 Doors

The doors opening from the production areas to the outside shall have self-locking devices to ensure doors remain closed at all times. Hanging strip doors shall cover the doors opening from the production to the outside, to avoid entry of rodents, animals, birds, dust or insects when the doors are opened. The doors shall be sealed at the bottom completely to avoid entry of rodents, animals, birds or insects to the production areas. Rubber may be used or any suitable material.

The walls, doors and windows shall be cleaned regularly.

6.4 Ceilings and overhead

6.4.1 Ceilings

They shall have a smooth, impermeable surface kept in good repair. They shall be regularly cleaned and the joints shall be sealed.

6.4.2 Overhead structures

The number of overhead structures shall be minimized in production. If required, they shall be of a circular cross-section to aid cleaning and shall be frequently inspected.

6.5 Potability of water

6.5.1 Water quality

The water used for cleaning or rinsing shall be of potable quality (WHO guidelines for water quality) and its microbiological suitability shall be checked regularly, at least twice a year.

6.5.2 Water treatment

In case the water is not potable, appropriate treatment should be taken to ensure that safe water is used.

6.6 Solar dryers

6.6.1 The cabin where the trays for drying are placed shall be enclosed, if in a building or enclosure, to prevent exposing the inside of dryers to rodents, animals, birds, dust, insects and other contaminants. The cabin shall also have wire mesh at appropriate places to avoid the entry of rodents.

6.6.2 The inside of the solar dryer shall be wiped with a clean dry cloth dipped in a sanitizing solution for disinfection, when the dryer is empty.

6.6.3 The solar panels shall be wiped regularly to avoid accumulation of dust, according to the instructions by the supplier of the solar panels.

6.7 Factory perimeters

6.7.1 Outside areas shall be maintained in a sound condition with adequate drainage. Areas shall be kept clean and tidy at all times and debris, old equipment, pallets etc. shall not be allowed to accumulate.

6.7.2 Rubbish bins shall be covered, emptied regularly, and maintained in a clean condition.

6.8 Factory perimeters

Adequate, suitably designated facilities should be provided for cleaning utensils and equipment. Such facilities should have an adequate supply of hot and/or cold water, where required. A separate cleaning area should be provided for tools and equipment from highly contaminated areas like toilets, drainage and waste disposal areas. Where appropriate, facilities for washing food should be separated from facilities for cleaning utensils and equipment, and separate sinks should be available for hand washing and food washing.

7 Good Manufacturing Practices

7.1 General

Good Manufacturing Practices (GMP) encompass many aspects of procurement, manufacture, distribution and sale, which potentially affect quality and integrity. Personnel hygiene and environmental hygiene shall be controlled.

7.2 Management of personnel health and hygiene

7.2.1 Personnel health

7.2.1.1 Plant management shall ensure that any person afflicted with infected wounds, sores, or any illness, notably diarrhea, immediately report to management.

7.2.1.2 Management shall take care to ensure that no person, while known to be affected with a disease capable of being transmitted through food, or known to be a carrier of such disease microorganisms, or while afflicted with infected wounds, sores, or any illness, is permitted to work in any area of a food plant in a capacity in which there is a likelihood of such person contaminating food or food contact surfaces with pathogenic organisms.

7.2.2 Personnel hygiene

7.2.2.1 Plant management shall ensure that everyone entering the production area present himself or herself in a clean and tidy manner and maintain a high standard of personal hygiene.

7.2.2.2 With respect to the personal hygiene standards the following issues shall be noted:

- a) all personnel are expected to bathe daily before entering the factory so as to avoid body odour;
- b) fingernails shall be short and clean. Nail varnishes and false nails shall be not permitted;
- c) the excessive use of cosmetics e.g perfume, aftershave and make up shall not be allowed. False eyelashes shall not be worn;
- d) no jewellery except a plain wedding band is permitted. Ear clips shall not be worn. Nose studs are unacceptable. Wristwatches and cufflinks shall not be worn;
- e) suitable and approved secure storage areas shall be provided for personnel's belongings such as purses, handbags;
- f) all sores, cuts, grazes, infected areas and other wounds shall be covered by a suitably coloured waterproof dressing, incorporating a metal strip, by the company and applied by the company medical representative who is responsible for providing first aid;

- g) any dressing applied shall be accounted for at the end of the shift. The loss of any dressing shall be reported immediately to the management. Where possible, dressings shall be covered by rubber gloves. Staff arriving at work with an unprescribed wound dressing shall have it checked and, if, necessary replaced; and
- h) the officer responsible for Quality Assurance shall check personnel hygiene daily and record. Anyone not complying with the regulations on personnel should be requested to leave production areas.

7.2.2.3 Medical facilities shall have the following characteristics:

- a) appropriate room with first aid kit and trained nurse, but if there is no trained nurse there should be a trained first aid personnel to handle basic medical issues;
- b) basic first aid facilities shall be available to all the working areas and these should be agreed on by the Company Medical Advisor. All treatment shall be documented; and
- c) all personnel shall be made aware of their responsibility for health and safety. Each person shall have a certificate from public health authorities that permit him/her to work in a food-processing establishment.

7.2.2.4 Handling of accidents or illnesses includes the characteristics below:

- a) all accidents at work, however minor, shall be reported;
- b) in case of cuts leading to bleeding, brightly coloured waterproof plasters that contrast the fruits/vegetables being handled, shall be issued by the first aid supervisor to the individual. Checks shall be done at the end of the shift to ensure that the plaster is still in place on the individual and has not been lost. If the plaster is lost after being issued then all the product packed that day shall be put under quarantine unless the plaster is found;
- c) in case the bleeding has affected the product, the entire product shall be rejected. The working area and equipment should be cleaned thoroughly and disinfected; and
- d) all members of staff shall report to management when suffering from, being in contact with, or being a carrier of, any infectious diseases like in case of stomach upsets, nausea, vomiting, skin breakages, boils, discharging ear or skin infections, cholera etc, individuals shall be assigned duties away from production areas or in severe cases to rest until they are confirmed okay.

7.3 Management of hygienic operating practices

7.3.1 Sanitary maintenance of plant, facilities and premises

7.3.1.1 The building, equipment, utensils and all other physical facilities of the plant shall be kept in good repair and shall be kept clean and maintained in an orderly, sanitary condition.

7.3.1.2 Waste materials shall be frequently removed from the working area during plant operation and adequate waste receptacles shall be provided.

7.3.1.3 Detergents and disinfectants employed shall be appropriate to the purpose and shall be so used as to present no hazard to public health.

7.3.2 Management of cleaning and cleaning programmes

7.3.2.1 Cleaning and use of sanitizers

During cleaning, detergents and disinfectants shall be used appropriately. The manufacturers usually indicate instructions for usage of the sanitizer on the label. These shall be translated for use by the workers. Cleaning schedules and use of sanitizers shall be established and should be specific to all areas, surfaces and equipment.

7.3.2.2 Cleaning programmes and routines

7.3.2.2.1 The production areas, floors, tables, knives, slicers, gloves, and sinks shall be cleaned before beginning a shift and at the end of the shift every day. All these areas need to be cleaned by use of appropriate detergents, and then rinsing is done using potable water and disinfected where applicable as recommended by the manufacturer of the sanitizer.

7.3.2.2.2 Trays shall be cleaned immediately after emptying the dried product. They shall be cleaned with detergent, rinsed with water and then sanitized. Cleaning may also be done as need be during the shift.

7.3.2.2.3 Walls, windows, doors, and ceilings shall be cleaned at least once a week.

7.3.2.2.4 Toilets and changing rooms shall be cleaned at least twice a day.

7.3.2.2.5 The compound shall be cleaned at least once a day.

7.3.2.2.6 Uniforms shall be changed at least once a day.

7.4 Management of metals and metal control

7.4.1 General requirements

Every precaution shall be taken to prevent the contamination of final products with metal. It is essential that metal contamination risks be controlled. To ensure effective metal management attention should be given to the following:

- a) fabric and equipment that is likely to rust and corrode shall be avoided;
- b) metal to metal contacts, where wear may occur shall be avoided;
- c) self-locking nuts shall be used to replace conventional ones;
- d) nails, staples shall not be allowed to come into contact with produce or with the packaging materials; and
- e) there shall be control procedures during maintenance, repair, alteration or routine cleaning.

7.4.2 Requirements related to knife control

These requirements include the following:

- a) knives shall be made of stainless steel with plastic handles;
- b) knives shall be numbered on the handles;
- c) knives shall be inspected before issuing out to ensure that all the blades are intact;
- d) before being issued and the end of each shift, the knives shall be recorded by the person responsible for quality assurance;
- e) at the end of the shift, the knives shall be inspected paying particular attention to the blades; and

- f) if any blades are noted to be damaged, the produce cut on the day shall be placed under quarantine. If the blades were damaged during cutting, then the produce cut during that shift should be rejected, without further processing. It is dumped and considered as unfit for consumption.

7.5 Management of glass

7.5.1 Glass shall be eliminated completely from the food processing areas, all storage areas and packaging materials stores.

7.5.2 Perspex is recommended on windows instead of glass.

7.5.3 Lighting fixtures, including insectocutor tubes, in all production and storage areas shall be guarded or sealed with unbreakable enclosures to glass in case of any glass breakage. This shall be kept clean at all times and not allowed to accumulate dust, debris etc.

7.5.4 Glassware and glass bottles not intended for production including soft drink (soda) or beer bottles shall not be allowed in the production areas.

7.5.5 Personal watches are not allowed in the production areas.

7.5.6 A glass register shall be maintained listing every piece of glass in the production and storage areas. Regular inspection and records by the controller on a weekly basis is essential to ensure that breakage has not occurred.

7.5.7 In case of glass breakage, production shall stop immediately. Any affected produce shall be isolated, rejected and dumped and such an incidence recorded. Production should only resume if there is no further risk of contamination by glass.

7.6 Management of pests and toxic substances

7.6.1 Effective measures shall be taken to protect against the entrance into the premises and the harbourage on the premises of insects, rodents, birds or other vermin.

7.6.2 Pest control is not just the control of rodents, flies, and birds: It includes all living creatures whether walking, crawling or flying which contaminate the product or environment. The policy shall be one of prevention by the maintenance of good hygiene and housekeeping standards plus adequate screening and proofing of premises to exclude pests, supported by an effective inspection programme.

7.6.3 Rodent monitoring systems include the following:

- a) non-toxic baits shall be used whenever possible based on infestation history;
- b) depending on the level of infestation, toxic baits can be used. Granular baits and contact pesticide dusts shall not be used. Solid blocks are highly recommended;
- c) the position of all baits shall be indicated on a layout map of the premises;
- d) the bait position shall be numbered and recorded on a checklist. The date of inspection shall be recorded on the checklist and on the bait container;
- e) the bait boxes shall be designed to allow locking to avoid accidental poisoning of human beings and other animals; and
- f) the keys to the bait boxes shall be kept by the responsible personnel.

7.6.4 Electric insect knockdown devices include the following:

- a) these are positioned at each door opening from the factory to the outside;

- b) they shall be permanently operational and the U.V tubes shall be changed at the frequency recommended by the manufacturer; and
- c) catch trays shall be fitted and emptied and cleaned weekly. The contents of each tray shall be monitored and recorded, to help identify unusual increases in insect numbers or types.

7.6.5 Birds shall be prevented from gaining access to the factory buildings. Birds can also be excluded from the external roosting sites on buildings ledges, undersides of canopies etc by use of anti-perching devices.

7.6.6 All types of domestic animals such as dogs and cats shall be excluded from areas where food is processed or stored and they are unacceptable in any part of the factory exterior areas. Staff shall not feed, or otherwise encourage stray animals.

7.6.7 The following among other requirements shall be observed during storage of toxic substances:

- a) all rodenticides, fumigants, insecticides or other toxic substances shall be labeled and stored in separate locked rooms or cabinets. They shall be handled and used only by properly trained personnel;
- b) or under the direct supervision of personnel with a thorough understanding of the hazards involved, including the possibility of contamination of the product; and
- c) records shall be kept on their regular application.

7.7 Management of toilets and cloakrooms

7.7.1 The facilities shall be adequate for the number of personnel employed. They shall function properly and kept in a clean condition.

7.7.2 Hand washing facilities shall be provided next to the toilets.

7.7.3 " Wash Your Hands" notices shall be clearly displayed in bold type on all doors, above urinals, and above wash basins to remind staff of this.

7.8 Management of hand washing and hand drying facilities

7.8.1 Hand washing facilities shall be provided in toilet facilities and at entrance points of the production areas.

7.8.2 All personnel entering production areas shall wash their hands. Washing troughs shall be sufficient to allow proper cleansing of hands and forearms for all the staff entering or leaving the area.

7.8.3 " Wash Your Hands" notices shall be clearly displayed in bold type in appropriate places to be a constant reminder to personnel on their responsibility to wash their hands at expected times and also when deemed necessary.

7.8.4 Only unperfumed and colourless, liquid, bactericidal soap shall be provided at all washing locations. Dispensers shall be easy to clean and designed to contact during use.

7.8.5 Further disinfection or alcohol rinses, is necessary after hand washing as an extra measure to ensure high standards of hygiene.

7.8.6 Foot or knee operated hand washing facilities are most preferred in high-risk areas.

7.8.7 Only disposable paper towels are acceptable and suitable dedicated towel dustbins should be provided and emptied and cleaned regularly. The lids of these bins shall be foot operated.

7.8.8 Alcohol rinses or disinfection are essential after use of the paper towels.

7.9 Management of personnel habits

7.9.1 Personnel shall not drink, eat food, chew gum, and sweets, spit, smoke, or use tobacco or snuff in production areas.

7.9.2 Designated places shall be provided where smoking may be done, away from the production places.

7.9.3 Signs for “No Smoking”, “No spitting”, “No eating” shall be put up in appropriate production areas.

7.10 Management of refreshment areas or canteens

7.10.1 All meals, food or drink shall be taken in the canteen or in the place set aside for this purpose away from the production areas. The canteen or refreshment place shall be kept very clean at all times. Failure to do this leads to rodents, cockroaches and other contaminants inhabiting the place and eventually getting to the production areas.

7.10.2 Glass or soda bottles shall not be taken into production areas.

7.11 Management of protective clothing

7.11.1 All personnel including management and visitors shall wear suitable protective clothing before entering the production areas for whatever purpose.

7.11.2 The clothing shall be clean and conform to the following:

- a) lightly coloured coats/overalls;
- b) all pockets shall be secure and on the inside; and below chest
- c) buttons are unacceptable. Fastening may be done by use of studs on the inside or by use of Velcro.

7.11.3 No personal clothing shall be allowed on top of the protective clothing.

7.11.4 Personnel leaving production areas to visit the canteen, toilets, or any non-production environment, shall leave the protective clothing in changing room.

7.11.5 Washing of the protective clothing shall be done within the company. Home laundering is not acceptable.

7.11.6 Suitable foot wear shall be worn and shall be used only in the production areas. Personnel should wear their own shoes away from the production areas and shall change the shoes before entering the production area.

7.11.7 All personnel shall dip their footwear into a footbath before entering the production areas. The foot dip shall have a sponge and a disinfectant.

7.12 Personnel hygiene and food handling practices

7.12.1 All persons working in a food plant shall maintain a high degree of personal cleanliness while on duty. Clothing including suitable head dress should be appropriate to the duties being performed and shall be kept clean.

7.12.2 Hands shall be washed as often as necessary to conform to hygienic operating practices.

7.12.3 All necessary precautions shall be taken to prevent the contamination of the food product or ingredients with any foreign substance.

7.12.4 Minor cuts and abrasions on the hands shall be appropriately treated and covered with a suitable waterproof dressing. Adequate first-aid facilities shall be provided to meet these contingencies so that there is no contamination of the food.

7.12.5 Gloves used in food handling shall be maintained in a sound, clean and sanitary condition; gloves shall be made of an impermeable material except where their usage would be inappropriate or incompatible with the work involved.

8 Operating practices, raw materials and production requirements

8.1 Raw material handling

8.1.1 Acceptance criteria

The raw material shall comply with appropriate quality requirements, and shall not be accepted by the plant if known to contain decomposed, toxic or extraneous substances that shall not be removed to acceptable levels by normal plant procedures of sorting or preparation.

8.1.2 Storage

Raw materials stored on the plant premises shall be maintained under conditions that shall protect against contamination and infestation and minimize deterioration.

8.1.3 Water

Water used for conveying raw materials into the plant (for processing) shall be from such a source or suitably treated as not to constitute a public health hazard and shall be used only by permission of the official agency having jurisdiction.

8.2 Inspection and sorting

Raw materials shall be inspected, sorted or culled as required to remove unfit materials before use. Such operations shall be carried out in a clean and sanitary manner. Only clean, sound materials shall be used in further processing.

8.3 Washing or other preparation

Raw materials shall be washed as needed to remove soil or other contamination. Water used for such purposes shall not be recirculated unless suitably treated to maintain it in a condition as shall not constitute a public health hazard. Water used for washing, rinsing, or conveying final food products shall be of potable quality.

8.4 Preparation and processing

Preparatory operations leading to the finished product and the packaging operations shall 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 microorganisms.

8.5 Packaging of finished product

8.5.1 Packaging materials

Packaging materials shall be stored in a clean and sanitary manner and shall not transmit to the product objectionable substances beyond acceptable limits and shall provide appropriate protection from contamination.

8.5.2 Techniques for packaging

Packaging shall be done under conditions that preclude the introduction of contamination into the product.

8.5.3 Preservation of finished product

8.5.3.1 Methods of preservation or treatment of the finished product shall be such as to kill any insects or mites remaining after processing and to result in protection against contamination, deterioration, or development of a public health hazard.

8.5.3.2 The finished product shall be of such moisture content that it can be held in the localities of origin and under any normally foreseeable conditions for those localities without significant deterioration by decay, mould, enzymatic changes, or other causes.

8.5.3.3 In addition to applicable drying, the finished product may be treated with chemical preservatives at levels in accordance with the applicable standards, heat processed and/or packed in hermetically sealed containers so that the product shall remain safe and shall not spoil under normal non-refrigerated storage conditions.

8.6 Storage and transport of finished products

8.6.1 The finished products shall be stored and transported under such conditions as shall preclude contamination with or development of pathogenic or toxicogenic microorganisms and protect against rodents and insect infestation and deterioration of the product or of the container.

8.6.2 The product shall be stored under suitable conditions of time, temperature, humidity, and atmosphere, to prevent significant deterioration.

8.6.3 Where dried fruits and vegetables are stored under conditions in which they may become infested by insects and mites, appropriate methods of protection shall be used regularly. Dried fruits and vegetables shall be stored in such a manner, that they can be fumigated in situ or stored that they can be removed elsewhere for fumigation in special facilities (for example fumigation chambers, steel barges, etc.). Cold storage may be used, either to prevent infestation in localities where insects are likely to be present in ordinary storage or to prevent insects from damaging the finished products.

8.7 Sanitation control programme

8.7.1 There should be in place a sanitation programme. Procedures of the sanitation programme shall be followed by everyone. A well trained personnel shall be responsible for implementation of sanitation programme.

8.7.2 It is desirable that each plant in its own interest designates a single individual, whose duties are preferably separated from production, to be held responsible for, the cleanliness of the plant. This staff shall be a permanent part of the organization and should be well trained in the use of special cleaning tools, methods of disassembling equipment for cleaning, and in the significance of contamination and the hazards involved.

8.7.3 Critical areas, equipment for cleaning and materials shall be designated for specific attention as part of a permanent sanitation schedule.

9 Laboratory control procedures

In addition to any control by the official agency having jurisdiction, it is desirable that each plant in its own interest shall have its own or access to laboratory control of the sanitary quality of the products

processed. The amount and type of such control shall vary with the fruit and vegetable as well as the needs of management. Such control shall reject all fruits and vegetables that are unfit for human consumption.

10 End product specifications

Appropriate methods shall be used for sampling, analysis, and determination in the following specifications:

- a) to the extent possible in good manufacturing practice the products shall be free from objectionable matter;
- b) the products shall not contain any pathogen microorganisms or any toxic substance originating from microorganisms; and
- c) the products shall comply with the requirements on Pesticide Residues and Food Additives as contained in permitted lists or Codex commodity standards.

11 Record keeping

11.1 Records shall be available and be supplied on demand as evidence to establish food safety. These records shall be legible, permanent, accurate and signed and dated by the individual(s) responsible.

11.2 They shall include procedures, controls, limits, and subsequent follow-up documents. They shall be retained for at least one year after the expiration of the durable life date (best before date) or, at least two years after the food has been released to the consumer.

11.3 The necessary records shall include:

- a) raw material quality control record;
- b) grower/supplier agreements;
- c) drying control record;
- d) stock control record;
- e) company induction for all staff;
- f) training programme;
- g) daily personnel check list;
- h) hygiene and sanitation records;
- i) water analysis checks;
- j) knife control record;
- k) glass control record;
- l) accident and illnesses record;
- m) pest control records;
- n) chemicals records (additives, sanitizers);

- o) foreign matter control record;
- p) finished product control record, lots records including distribution; and
- q) customer complaints register.

12 Training and competence

12.1 Awareness and responsibilities

Food hygiene training is fundamentally important to the food business. All personnel should be aware of their role and responsibility in protecting food from contamination or deterioration. Personnel should have the knowledge and skills necessary to enable them to handle food hygienically. Those who handle cleaning chemicals or other potentially hazardous chemicals should be instructed in proper use to prevent contamination of food.

All those engaged in food operations who come directly or indirectly into contact with food should have sufficient understanding of food hygiene to ensure they have competence appropriate to the operations they are to perform.

Training is fundamentally important to any food hygiene system and the competence of personnel. Adequate hygiene training, and/or instruction and supervision of all personnel involved in food-related activities contribute to ensuring the safety of food and its suitability for consumption.

12.2 Training programmes

12.2.1 Elements to consider in determining the extent of training required include:

- a) nature of hazards associated with the food, for example its ability to sustain growth of pathogenic or spoilage microorganisms, the existence of potential physical contaminants or known allergens;
- b) way the food is produced, processed, handled and packed, including the likelihood of contamination;
- c) extent and nature of processing or further preparation before consumption of the food;
- d) conditions under which the food will be stored;
- e) expected length of time before consumption of the food; and
- f) use and maintenance of instruments and equipment associated with food.

12.2.2 Training programmes should also consider the knowledge and skill levels of the personnel being trained. Topics to be considered for training programmes could include the following as appropriate to a person's duties:

- a) principles of food hygiene applicable to the food business;
- b) measures relevant to the food business that are used to prevent contaminants in food;
- c) importance of good personal hygiene, including proper hand washing and wearing, when needed, appropriate clothing, for food safety;
- d) good hygiene practices applicable to the food business; and
- e) appropriate actions to take when food hygiene problems are observed. In addition, for retail and food service operations, whether personnel have direct customer interaction is a factor in

training, since it may be necessary to convey certain information about products (such as allergens) to customers.

12.3 Instruction and supervision

The type of instruction and supervision needed may depend on the size of the business, the nature of its activities and the types of food involved. Managers, supervisors and/or operators/workers should have sufficient knowledge of food hygiene principles and practices to be able to identify deviations and take necessary action as appropriate to their duties. Periodic assessments of the effectiveness of training and instruction programmes should be made, as well as routine supervision and verification to ensure that procedures are being carried out effectively. Personnel tasked to perform any activities used in food control should be trained adequately to ensure that they are competent to perform their tasks and are aware of the impact of their tasks on the safety and suitability of the food.

12.4 Refresher training

Training programmes should be routinely reviewed and updated where necessary. Systems should be in place to ensure that food handlers and personnel associated with the food business, such as maintenance staff, remain aware of all procedures necessary to maintain the safety and suitability of food. Records should be kept of training activities.

Annex A
(informative)

Materials required for processing dried fruits and vegetables

A.1 The provisions detailed below are required for processing of all dried fruits and vegetables.

A.1.1 Preparation rooms including but not limited to:

- a) room for storage of raw materials;
- b) processing rooms for cutting and slicing;
- c) sorting/packing/labelling room;
- d) storage room for packing material;
- e) changing rooms;
- f) washrooms away from the processing facility; and
- g) storage room for cleaning materials detergents/disinfectants.

A.1.2 Other facilities include but not limited to:

- a) insectocutors or insect electrocutors for each exit of processing room;
- b) drying facilities such as solar driers, dehydrators, ovens, etc; and
- c) first aid box.

A.2 Basic utilities and consumables for use in processing of fruits and vegetables include but not limited to the following:

- a) trays, (these shall be enough to ensure continuous drying);
- b) protective clothing or uniforms, preferably light coloured including head gear or covers;
- c) comfortable closed shoes, white rubber shoes or gumboots;
- d) gloves;
- e) hand washing liquid soap (non-perfumed);
- f) paper towels;
- g) disinfectant (non-perfumed), for example, 95 % ethyl alcohol for final, hand disinfection;
- h) detergent for cleaning floors, tables, trays, uniforms etc;
- i) chlorine powder;
- j) appropriate food grade packages for finished dried products;
- k) pallets for storage;
- l) dustbins with lids, foot operated for inside pack house; and

m) contents of the first aid box.

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Annex B
(informative)

Quality control procedures

B.1 General

A system of control in processing, quality and safety, shall be in place so as to achieve maximum efficiency, while consistently producing products that conform to customer expectations. The system shall among others cover the aspects found below.

B.2 Inspection and storage of raw materials

B.2.1 The raw materials shall always be off-loaded in a covered place and transferred to their appropriate storage area.

B.2.2 The raw materials for organic production shall be stored separately from conventionally produced materials. Similarly, materials for organic production shall be only obtained from the farmers that have been certified for organic certification.

B.2.3 The details of all supplied raw materials shall include details of the farmer's code, date of harvest to allow lot numbering and traceability.

B.2.4 The person responsible for quality shall keep record of the date the raw material was harvested and received, the quantity received, the assigned lot number, defects, etc.

B.2.5 Where a lot supplied contains many defects this shall be communicated back to farmer so that necessary production adjustments could be made with a view to improve quality.

B.3 Drying process control

B.3.1 The drying process shall be monitored and records kept at regular intervals and reference should always be made to the expected Fresh: Dried fruit and vegetable ratio.

B.3.2 Daily analysis results on the quantity of produce and the expected grade 1 quality versus the actual grade1 quality obtained.

B.4 Product identification and traceability

B.4.1 For purposes of product identification and traceability, each of the approved farmers, or any other approved supplier, shall be assigned a unique code identification number.

B.4.2 At the farm level, the produce shall be labelled with the farmer's code. Produce delivered to the processing unit shall have a farmer's delivery list bearing the following information:

- a) the farmers code;
- b) date of delivery;
- c) the produce;
- d) organic quality for organic produce; and
- e) signature of the farmer.

B.4.3 All produce arriving at the processing unit, shall be labelled with the lot number indicating the farmer's code and the date of harvesting produce. The same lot number shall be kept together with the produce during storage.

B.4.4 During drying, the dryer and the trays shall be tagged with same lot number to enable the easy identification of the product that was supplied by a particular farmer.

B.4.5 The same lot number shall be retained during sorting, grading and packing of the product. It shall appear on the outer box when the product has finally been packed and is ready for dispatch.

B.5 Packaging and labelling

B.5.1 The packaging shall adequately protect the product during the expected life under specified. It shall also not have any significant adverse interaction with the product.

B.5.2 Where dried fruits and vegetables are vacuum packed the sealing has to be neat and intact without any hole that can allow entrance of air.

B.5.3 The following information shall be indicated on each bag for the dried product:

- a) product name;
- b) lot number; and
- c) the words "Organic" in case of an organic product.

B.5.4 The following information shall be indicated by the exporter on each bag:

- a) product type;
- b) lot number;
- c) best before date;
- d) name and details of exporter;
- e) country of origin;
- f) net weight; and
- g) certifying body, (the EU regulation clause, in case of organic produce).

B.6 Net weight control

B.6.1 Each individual bag shall be accurately weighed on a calibrated balance. Tare weight of the empty bags shall be taken and recorded. The gross weight shall then be taken of the individual.

Net weight = Gross weight - Tare weight.

B.6.2 Sample at least five bags every hour during and packing, and determine the net weight and record the result.

B.6.3 In case some bags are found to contain less or more the required net weight, such bags shall be rejected and sent back for repacking.

B.6.4 In calibrating the measuring equipment the following shall be observed:

- a) all measuring instruments used shall be having known accuracy. Such instruments include thermometers, weighing scales, relative humidity gauges etc.;

- b) where possible, calibration of these instruments shall be done by the Metrology Division of the National Bureau of Standards or any other competent calibration laboratory recognized by the National Bureau of Standards. Most instruments require calibration by these laboratories once a year. The issued calibration certificates shall be kept; and
- c) scales shall be verified every time before use by a person responsible for quality assurance using stamped weight.

B.6.5 To ensure conformance to the customer specification the quality of dried fruits and vegetables shall be monitored during sorting, packing, weighing, and labelling. Monitoring records shall be kept. The monitoring may include the following:

- a) levels of defects observed. If the defect levels are higher than the limit, then the entire product shall be re-sorted again and the sorting team cautioned to sort carefully;
- b) monitoring of the quality of seals. In case of poor seals, the bags shall be re-sealed; and
- c) proper labelling especially the lot number and words organic quality when the production is organic in origin.

B.6.6 Final confirmation of batch shall be made when the batch conforms to customer requirements and other applicable statutory and regulatory requirements.

Bibliography

1. EAS 1107:2023, *Production, handling and processing of dried fruits and vegetables — Code of practice*
2. CXC 3:1969; *Code of hygienic practice for dried fruits*

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