

# INFRASTRUCTURE





## *Spices Processing Toolkit*



## **INFRASTRUCTURE**

### **1.- Infrastructure and processing site layout**

When setting up a food processing industry it is essential that the condition of the building - the materials of construction and its position - are all suitable for food production. The plant should not be located near swamps, ditches or refuse dumps where insects and rodents are likely to be found. The site should allow waste water to drain away freely and have suitable facilities to dispose of waste food and rubbish. A supply of clean water is essential.

Physical layout

Basic services

Equipment

#### **Physical layout**

Ideally the operational areas of the food processing industrie building should be at ground level, with the raw ingredients entering at one end and the finished goods leaving at the other.

The different operations should be kept separate from each other to prevent contamination. For example, perishable raw materials should be kept separate from non-perishable ones.

Packaging materials should be stored separately from the food items.

If possible, toilets should be located outside the processing building. If they are in the main building, there should be two doors between the processing room and the toilet.

Workers must have access to handwashing facilities with soap and clean towels.

The building should be constructed with smooth walls. The joint between the wall and floor should be rounded for easy cleaning. The building lines should be simple and square, without crevices and small places that can attract dust and may become birds nests. Windows should be covered with mosquito mesh to prevent the entry of flies and other insects.

The floor should be made of good quality concrete and should slope to a central drainage channel so that at the end of the day the whole area can be hosed down.

The drainage channel should be fitted with a heavy iron grating that can easily be removed for cleaning. The outlet of the drain should be covered with wire mesh to prevent rodents entering.

The ceiling and walls must be made from washable and easily dried materials. They must not be absorbent or porous.

The lighting should be natural if possible. If artificial lights are used they must not get in the way of the processing. The bulbs should be protected to prevent glass falling into the products if the lights are broken.

It is important to have good ventilation, especially where heating takes place. Large window openings should be covered with mesh to allow air and natural light into the building, while preventing insects and birds.

## **2.- Basic Services**

Three basic services are required for a basic food processing operation:

### **Electrical power**

It is preferable to have access to electricity for lighting and for the operation of machinery. The electricity points should be situated high up the walls and away from water supplies so that they do not get wet during hosing down of the building.

### **Drinking water**

Drinking water should be available in sufficient quantities to allow for the safe, hygienic processing of food. Water must be protected from all possible sources of contamination. The storage tank must be covered. Clean water is often a scarce commodity and therefore efforts should be made to conserve it. Clean water must be available at all times. It is recommended that an elevated storage tank is used that is not reliant on the use of electricity. The use of a storage tank allows the water to be treated with a disinfectant. It is recommended that chlorine is added to water as a disinfectant. The recommended dosage is 2 ppm of free chlorine, which is equivalent to 100ml sodium hypochlorite solution per 2000 litres of water. At this level, the chlorine disinfects, but does not affect the taste of the water.

### **Disposal of waste water and material**

Provision should be made for the disposal of waste water and waste material

### **Basic facilities**

A small to medium scale fruit and vegetable processing unit must have the following basic facilities:

#### **Reception of raw material**

The plant must have a special area for the reception and storage of raw material until it is required. This area may simply be a shed or an appropriately designed room. The area should be clean, away from direct sunlight and with control over the temperature and humidity according to the type of material being stored. Care should be taken to ensure that rodents, birds and insects cannot get into the store building. The raw material storage area should not be used for the storage of other products that could contaminate it such as cleaning materials and pesticides. The quality of the finished product is directly dependent on the quality of the raw material. Thus the conditions of the storage area are of great importance. This storage area should have basic equipment such as weighing scales for the reception of raw material.

#### **Processing room**

The processing room is the main place of activity. The different materials used during processing and the various pieces of equipment are kept here. Ideally, the room should be

large enough to house all the equipment needed for the various stages, to allow the process to be continuous and improve the efficiency of processing.

### **Quality control**

Quality control operations should be carried out in a separate room. The room should be equipped with basic equipment such as a sink, running water and a bench or table where the tests can be carried out. The equipment for testing should be kept in this room.

### **Storeroom for finished products**

The storeroom should be clean and airy, free from damp and away from direct sunlight. The temperature of the room should be kept as low as possible to maintain the quality of the stored products. The storeroom should be fitted with shelves to allow neat and tidy storage of the processed foods. Processors should regularly test the quality of the stored products and make sure they rotate the stock, selling the oldest stock first.

### **Other facilities**

Some equipment needs to be stored outside the main processing area, but still accessible to the processor. The boiler or steam generator needs to be housed outside the main processing area to avoid contamination of the foods.

### **Sanitary facilities**

All sanitary facilities - changing rooms, toilets and hand washing areas should be kept separate from the processing area to avoid cross contamination.

## **3.- Equipment**

When buying equipments for spice processing, some care should be taken to decide what is the best for the individuals' specific needs. It is a good idea for buyers to visit trade fairs, manufacturers, equipment retailers and bee products enterprises to see the equipment under action and seek advice from experts.

Several factors that should be considered when buying new equipment include the following:

- the robustness of the equipment
- the simplicity of servicing, cleaning and maintenance
- what spares must be help
- how long it will take to get replacement parts.

There are many different types of equipment available, some of which are essential to the spice processing industries while others are optional, labour saving devices. It is important to think carefully about what is essential and what the plant can manage without. How long it will take to get replacement parts.

The following is a guide of additional equipment available.

In addition to the large pieces of equipment, there are several other smaller items. Some of those items are essential, whereas other ones facilitate the process. The optional extra are the following ones:

Weighing scale (from 100-1000kg)
Weighing scale (from 50-100kg)
Weighing scale (from 3-5kg)
Weighing scale (from 100-500g)
Tank and stainless steel basket (aspersion bath)
Table with stainless steel- screened support (trickler)
3 stainless steel push-cars for transportation of plastic boxes provided with fixed and gyrating turns
Stainless steel push-cars for transportation of trays
Supporting table made of stainless steel
10 wooden chopping boards
7 stainless steel thick- bladed knives (15-20cm x 2cm)
7 stainless steel thick-bladed knives (10cm x 1cm)
3 stainless steel differently - sized spoons
3 large plastic spoons
3 stainless steel skimmers
3 large wooden spoons
5 plastic trays (40x60x5cm)
3 plastic buckets (40 litres)
4 plastic buckets (10 litres)
4 stainless steel buckets (10 litres)
20 plastic lidded boxes
Shelves, racks for storage
Wooden palettes. Dimensions: 1.2 x 1.0 m
Plastic palettes. Dimensions: 1.2 x 1.0 m.

## Equipment suppliers

The information contained here is adapted from the ITDG publication Small-scale Food Processing (see bibliography number 11). Please note that the list is far from exhaustive. There are many more suppliers of equipment that we could not locate. Contact numbers change, suppliers go out of business and new suppliers emerge. Please inform FAO if you know any suppliers that would like to be included in this database.

FAO and UNIDO do not endorse any of these suppliers or manufacturers and accept no responsibility for the products offered for sale.

Manufacturer	Country	Main equipment
TPI Technico Plaste Industrie	Benin	Packaging material and Equipment
ASELEC - Atelier de Soudure et d'Electricite	Burkina Faso	Drying Equipments
Atelier KONATE B. Boubacar	Burkina Faso	Drying Equipments
CEAS-ATESTA (SAPE. SATA)	Burkina Faso	Drying Equipments
Kabore Koutiga Jean et freres (Etablissements)	Burkina Faso	Drying Equipments
Kinate et freres (Etablissement)	Burkina Faso	Drying Equipments
Soldev - Soleil et Developpement	Burkina Faso	Drying Equipments
AGCM - Atelier General de Construction Metallique	Burkina Faso	Drying Equipments
Fabasem	Cameroon	Packaging material and Equipment
Helepac	Cameroon	Packaging material and Equipment
Plasticam	Cameroon	Packaging material and Equipment

Printpak	Cameroon	Packaging material and Equipment
Ghana Carton Boxes Mfg Ltd	Ghana	Packaging material and Equipment
Plastics Packaging Products Ltd	Ghana	Packaging material and Equipment
John Kojo Arthur	Ghana	Packaging material and Equipment
Technology Consultancy Centre	Ghana	Drying Equipments
Sada-SA	Mali	Packaging material and Equipment
G North Son PVT Ltd	Zimbabwe	Mills
H C Bell Son Engineers PVT Limited	Zimbabwe	Mills
Modern Erection	Bangladesh	Vegetables Preparation Equipment
Chengdu Jinlong Rongxing Trading Co. Ltd	Chine	Cut and Peel Equipment
Acufil Machines	India	Cleaners, graders, dryers
Bombay Engineering Industry	India	Heat treatment (pans and Kettles)
Bombay Industrial Engineers	India	Heat treatment (pans and Kettles) / Drying Equipments
Central Institute of Agricultural Engineering	India	Vegetables Preparation, cut Equipment / heat treatment / Drying Equipments / Cleaners / graders / Mills
DIW Precision Engineering Works	India	Mills
Energy Machine	India	Heat treatment (pans and Kettles) / Packaging material and Equipment
Essae-Teraoka Limited	India	Quality Control Equipment
Forsberg Agritech India PVT Ltd	India	Cleaners and graders Equipment
Gardners Corporation	India	Heat treatment (pans and Kettles) / Mills / Packaging material and Equipment
Geeta Food Engineering	India	Heat treatment (pans and Kettles)
Goma Engineering PVT. Ltd.	India	Heat treatment (pans and Kettles)
Goldin (India) Equipment Private Limited	India	Vegetables Preparation Equipment, Cleaners and graders Equipment
Gurdeep Packaging Machines	India	Packaging material and Equipment
Hitech Ultraviolet PVT. Ltd.	India	Quality Control Equipment
Indcon Boilers Ltd.	India	Heat treatment (pans and Kettles)
Industrial Refrigeration PVT. Ltd.	India	Vegetables Preparation Equipment
John Fowler India Limited	India	Cleaners and graders Equipment
Jwala Engineering Company	India	Vegetables Preparation, cut Equipment
Kaps Engineers	India	Mills
Karishma Instruments PVT. Ltd.	India	Quality Control Equipment
M.M.M.Buxabhoy & Co.	India	Packaging material and Equipment
Machin Fabrik	India	Heat treatment (pans and Kettles)
Narangs Corporation	India	Vegetables Preparation, cut and peel Equipment /Heat Treatment / Packaging material and Equipment
Orbit Equipments PVT. Ltd.	India	Packaging material and Equipment
Premium Engineers PVT. Ltd.	India	Cleaners and Graders Equipament / Drying Equipments
Rajan Universal Exports (Manufacturers) PVT. Limited	India	Vegetables Preparation, cut and peel Equipment
Rank and Company	India	Mills and Dryers
R.P.M. Engineers (India) Ltd	India	Heat treatment (pans and Kettles)
Sharp Thermal Engineers PVT. Ltd	India	Heat treatment (pans and Kettles)
Shirsat Electronics	India	Drying Equipments
Sridevi Packing Industries	India	Packaging material and Equipment

Sri Rajalakshmi Commercial Kitchen Equipment	India	Heat treatment (pans and Kettles)
Techno - Equipments	India	Heat treatment (pans and Kettles)
TECHNOMAX ENGINEERING CO.	India	Heat treatment (pans and Kettles)
The Bombay Engineering Works	India	Drying Equipments
Udaya Industries	India	Mills and Dryers
Universal Complex	Russia	Vegetables Preparation, cut and peel Equipment / Drying Equipments / Packaging material and Equipment
Ashoka Industries	Sri Lanka	Dryers
Kundasala Engineers	Sri Lanka	Drying Equipments
Udaya Industries	Sri Lanka	Drying Equipments
Kinn Shang Hoo Iron Works.	Taiwan	Cut and Peel Equipment
Banyong Engineering	Thailand	Packaging material and Equipment
Charoenchai Company Ltd	Thailand	Mills
Kasetsart University	Thailand	Drying Equipments
Kongsonglee Kanchang	Thailand	Cleaners and graders Equipment
Narongkanchang	Thailand	Drying Equipments
Ruang Thong Machinery Ltd.	Thailand	Mills
Sahathai Factory	Thailand	Heat treatment (pans and Kettles)
ALFA Technology Transfer Centre	Vietnam	Packaging material and Equipment
Anh Tuan Mechanical Cooperative	Vietnam	Mills
Doan Binh Mechanical Cooperative	Vietnam	Mills
Duc Huan Mechanical Cooperative	Vietnam	Mills
Physics Institute of Ho Chi Minh City	Vietnam	Heat treatment (pans and Kettles) and Mills
Sai Gon Industrial Corporation (SINCO)	Vietnam	Cleaners and graders Equipment and Quality Control
Technology & Equipment Development Centre (LIDUTA)	Vietnam	Packaging material and Equipment
Focus Trade S.R.O	Czech Republic	Vegetable Processing equipment / heat treatment / Drying Equipments
APV Unit Systems	Denmark	Heat treatment (pans and Kettles)
Niro A/S	Denmark	Drying Equipments
Actini	France	Heat Treatment (pans and kettles)
Electra	France	Mills
Femia Industrie	France	Cut and Peel Equipment / Selection Equipment
Gauthier	France	Heat Treatment (pans and kettles) / Cleaners and Graders Equipment
Henri Biaugeaud	France	Vegetable preparation, cut equipment / heat treatment/ Packaging material and Equipment
Marot	France	Cleaners and graders Equipment
Neu Séchage Industriel	France	Drying Equipments
Robot Coupe	France	Cut Equipment
Samap	France	Mills
Urschel International LTD	France	Cut Equipment / Selection Equipment
Innotech	Germany	Drying Equipments
Gebruder Lodige Maschinenbau GmbH	Germany	Drying Equipments
C.Van't Riet Zuiveltechnologie B.V.	The Netherlands	Heat Treatment (pans and kettles)
Alvan Blanch	UK	Vegetable Processing equipment / heat treatment / Drying Equipments

Armfield Limited	UK	Heat Treatment (pans and kettles)
Charles Wait (Process Plant) Limited	UK	Heat Treatment (pans and kettles) and Mills
Fullwood Limited	UK	Heat Treatment (pans and kettles)
HRP Focus Limited	UK	Vegetable Processing equipment
Mitchell Dryers Limited	UK	Drying Equipments
Natural Resources Institute	UK	Drying Equipments
Scotmec (Ayr) Limited	UK	Mills
Status Instruments Limited	UK	Quality Control Equipment
The Pascall Engineering Company	UK	Mills
C S Bell Co	USA	Mills
International Ripening Company	USA	Quality Control Equipment
Lehman Hardware Appliances	USA	Mills
Agmac – Automação e Máquinas Ltda	Brazil	Vegetable Processing, cut equipment / heat treatment
Aruá	Brazil	Vegetable Processing, cut equipment / heat treatment / Drying Equipments / Packaging material and Equipment
Bernauer Engenharia E Serviços Ltda	Brazil	Drying Equipments
Braseq Brasileira de Equipamentos Lta	Brazil	Quality Control Equipment
Cirati Máquinas Ltda	Brazil	Drying Equipments
Dmven	Brazil	Mills
Dycron	Brazil	Cleaner and Grader
Equipamentos e Tecnologia de Alimentos S/C Ltda	Brazil	Vegetable Processing equipment
Indústria de Máquinas Mecamau São José Ltda	Brazil	Vegetable Processing, cut equipment / heat treatment / Drying Equipments
Máquinas Tigre	Brazil	Mills
Metalúrgica Visa Ltda	Brazil	Cut equipment
Pardal	Brazil	Vegetable Processing equipment / Drying Equipments
Schur	Brazil	Cut equipment / Packaging material and Equipment
South America Máquinas Inoxidáveis	Brazil	Vegetable Processing, cut equipment /heat treatment
DISEG - Maquinarias Para La Industria Alimentaria	Peru	Mills / Vegetable Processing, cut equipment
FAINSA Fabricantes En Acero Inoxidable S.A.	Peru	Heat Treatment (pans and Kettles)
Mecanicos Unidos	Peru	Mills
Industrias Technologicas Dinamicas S.A.	Peru	Drying Equipments / Packaging material and Equipment
Servifabri S.A.	Peru	Vegetable Processing, cut equipment
Vulcano Tecnologia Aplicada Eirl	Peru	Mills