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FOOD SAFETY AND STANDARDS  
AUTHORITY OF INDIA

*Inspiring Trust, Assuring Safe & Nutritious Food*  
Ministry of Health and Family Welfare, Government of India



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# MANUAL FOR SMALL SCALE BAKERY UNITS

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MANUAL FOR SMALL SCALE BAKERY UNITS

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# PART I

## INTRODUCTION TO FOOD SAFETY

Introduction to Food Safety  
Factors Affecting Food Safety  
Food Spoilage  
Food Poisoning



### INTRODUCTION TO FOOD SAFETY

#### INTRODUCTION TO FOOD SAFETY

**Food Safety** can be defined as the assurance that food will not cause harm to the consumer when it is prepared or eaten according to its intended use.

**Food Safety Programs** are procedural measures that help in ensuring safe food handling

#### WHY IS FOOD SAFETY IMPORTANT?

- Social and Statutory Responsibility of Food business operator.
- Customer Satisfaction and Loyalty
- Loss of Customer & Sale
- Loss of prestige & reputation
- Financial Loss to the Organisation
- Legal Action by Regulatory Authorities

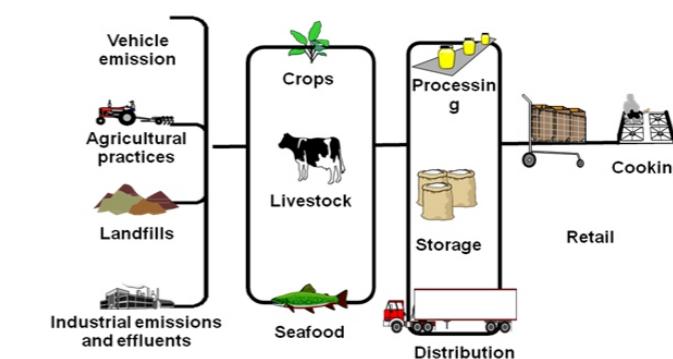
#### FACTORS AFFECTING FOOD SAFETY

**Food hazards** are the factors, which are the biggest threat to food safety. A hazard is defined as: a biological, chemical, or physical agent in a food, or condition of a food, with the potential to cause an adverse health effect.

**Food adulteration** are not only the intentional addition or substitution or abstraction of substances which adversely affect the nature, substances and quality of foods, but also their incidental contamination during the period of growth, harvesting, storage, processing, transport and distribution.

**Food contaminant** has been defined as any substance not intentionally added to food, which is present in food as a result of the production, manufacture, processing, preparation, treatment, packing, transport or storage of such food as a result of environmental contamination.

#### SOURCES OF CONTAMINATION THROUGHOUT FOOD CHAIN



## TYPES OF FOOD CONTAMINANTS



### 1. Physical Contaminants

Any foreign object (inanimate) found in the food or a naturally occurring object (bone in fillet), that poses a hazard is called a 'Physical Contamination or Hazard'.

### 2. Chemical Contaminants

Chemical hazards are in two categories: naturally occurring poisons and chemicals or deleterious substances. The first group covers natural constituents of foods that are not the result of environmental, agricultural, industrial or other contamination. Examples are aflatoxins and shellfish poisons. The second group covers poisonous chemicals or deleterious substances which are intentionally or unintentionally added to foods at some point in the food chain. This group of chemicals can include pesticides and fungicides and well as lubricants and cleaners.

### 3. Biological Contaminants

Biological contaminants are the living organisms, or substances produced by organisms, that pose a threat to human health. They are a major concern in food processing because they cause most food borne illness outbreaks.

## CONTAMINANTS ASSOCIATED WITH FOOD

BIOLOGICAL	CHEMICAL	PHYSICAL
<ul style="list-style-type: none"> <li>- Macro biological : Pest, Birds</li> <li>- Microbiological</li> <li>- Pathogenic Bacteria : <i>Salmonella</i> spp <i>Bacillus cereus</i> <i>Staphylococcus aureus</i></li> <li>- Parasites and protozoa</li> <li>- Viruses</li> <li>- Mycotoxins</li> </ul>	<ul style="list-style-type: none"> <li>- Veterinary residues, antibiotics</li> <li>- Non permitted Food Additives : Food Colors, Flavours, etc.</li> <li>- Plasticisers and packaging migration</li> <li>- Chemical residues, pesticides, cleaning fluids</li> <li>- Toxic metals; Lead and cadmium</li> <li>- Food chemicals; preservatives, processing aids, polychlorinated biphenyls (PCBs), printing inks, Prohibited substances</li> </ul>	<ul style="list-style-type: none"> <li>- Glass , Hair</li> <li>- Metal</li> <li>- Stones</li> <li>- Wood Plastic</li> <li>- Parts of pests</li> <li>- Insulation material</li> <li>- Bone</li> <li>- Fruit pits</li> </ul>

### 4. Allergens

An **allergen** is normally any harmless substance that causes an immediate allergic reaction in a susceptible person. Food allergens are almost always proteins although other food constituents, such as certain additives, are known to have allergenic (allergy-causing) properties.

**Food allergy** is a potentially serious immune response to eating or otherwise coming into contact with certain foods or food additives.

A food allergy occurs when the immune system :

- Identifies a particular food protein as dangerous and creates antibodies against it
- The next time the individual eats that food, immune system tries to protect the body against the danger by releasing massive amount of chemicals including Histamine
- Histamine is a powerful chemical that can cause a reaction in the respiratory system, gastrointestinal tract, skin or cardiovascular system.
- In the most extreme cases, food allergies can be fatal. Although any food can provoke an immune response in allergic individuals, a few foods are responsible for the majority of food allergies.

**The following foods and ingredients are known to cause hypersensitivity and shall always be declared :**

1. Cereals containing gluten; i.e., wheat, rye, barley, oats, spelt or their hybridized strains and products of these;
2. Crustacean and products of these;
3. Eggs and egg products;
4. Fish and fish products;
5. Peanuts, soybeans and products of these;
6. Milk and milk products (lactose included);
7. Tree nuts and nut products; and
8. Sulphite in concentrations of 10 mg/kg or more."

While the Codex list contains the major allergens on a world-wide basis, the foods, which are common causes of allergic reactions, differ between geographical areas, as a result of dietary preferences, for instance. Some countries have chosen to include additional foods on their national list of foods and ingredients that must be declared on food labels.

## HANDLING ALLERGENS

### 1. Raw Material

- a. Review the labels of incoming raw materials for the appropriate allergen information or any changes.

- b. Tag each case/pallet/bag, etc. as appropriate of raw materials to ensure the allergen is clearly called out as the materials are stored and used in your facility.
- c. Handle appropriately any damaged containers of allergens to minimize cross-contamination at receipt.

#### **2. Store :**

- a. Store allergenic ingredients or products separately to prevent minimize cross-contamination.
- b. Using clean and closed containers.
- c. Designating separate storage areas for allergenic and non-allergenic ingredients and/or products. When segregated storage is not possible, use other methods such as not storing allergens over non-allergens, storing like allergens (milk and whey) together, etc.
- d. Using and documenting clean up procedures for spills or damaged containers of allergens.
- e. Using dedicated pallets and bins.

#### **3. During Production :**

- a. Ensure the traffic patterns of raw materials, packaging supplies, and employees are limited during the production of allergen containing products and do not lead to cross-contact.
- b. If possible, have dedicated processing equipment and containers to prevent allergen cross-contact.
- c. Minimize the reuse of processing and/or cooking media such as water or oil.
- d. Declare allergens when serving or on labels.



#### **4. Sanitation :**

- a. Have standardized procedures for sanitation operations (SSOP's) and ensure they are followed
- b. Use appropriate cleaning methods (wipe/scrape, vacuum, soap and water wash, proper chemicals).
- c. Ensure adequate lighting in the proper locations (including flashlights to check inside equipment)  
Specify employee practices - hand washing at appropriate times (for example after handling a product that contains allergen)

## **FOOD SPOILAGE**

Food Spoilage means that the original nutritional value, texture, flavour of the food are damaged, the food becomes harmful to people and unsuitable to eat.

#### **Signs of Food Spoilage :**

- Off odours
- Discoloration
- Slime / Stickiness
- Mould and Bacterial growth
- Changes in texture –e.g. dry or spongy
- Unusual taste
- Staling

## **MAJOR REASONS FOR FOOD SPOILAGE**

**1. Foreign matter :** Human hair, stapler pins, metal particles, fabric, plastic, alkali etc. are big threats to food safety and can cause food spoilage. Anything that is not considered as food or food substance is considered as foreign matter.

**2. Lack of proper drainage :** A drain in a food processing area must be flowing with no back flow and should be highly cleanable preventing re-entry of pest from a common drain.

**3. Non- food grade equipment :** There are many equipment that are used in modern bakery practices, but very few materials like ceramic or high quality Stainless Steel etc are allowed as food contact materials. So food grade equipment is essential for ensuring shelf life for product, reducing metal contamination and ensuring food safety.

**4. Improper handling :** With unclean hands and wrong selection of equipment and packing it in unsuitable material will result in food safety issues.

**5. Improper processing :** Wrong process method can lead to major changes in end product. Right temperature, right time, proper additives and understanding process steps is essential to ensure food safety.

**6. Residues of chemicals :** Chemicals come into contact in food as crop contaminants then later in the process of sanitizing voluntarily by our process. The next involuntary entry of chemicals into food can be through residues of equipment or utensil sanitation operations. It is important to ensure thorough washing is done before equipment is taken into production.

**7. Non-standard sanitation :** Sanitation must be based on strict guidelines of either historical data or validation. If chemicals are used in less or more quantity or in an unverified process or method, sanitation will fail to achieve proper results giving way for food to become unsafe.

**8. Poor raw materials :** Raw material selection must be based on strict scientific reference and frequent sampling.

**9. Additive :** Additives of any nature like essence, flavors etc can spoil food if not used in the right quantity. Unauthorized additive also must not be used.

**10. Non potable water :** Water is involved in food process in various stages from washing to soaking then involved in either directly food production as an ingredient or in some in direct manner to mix or bake or steam. It is also important for washing and sanitation operations. Water in food industry must conform to IS 3025 and IS 10500 standards.

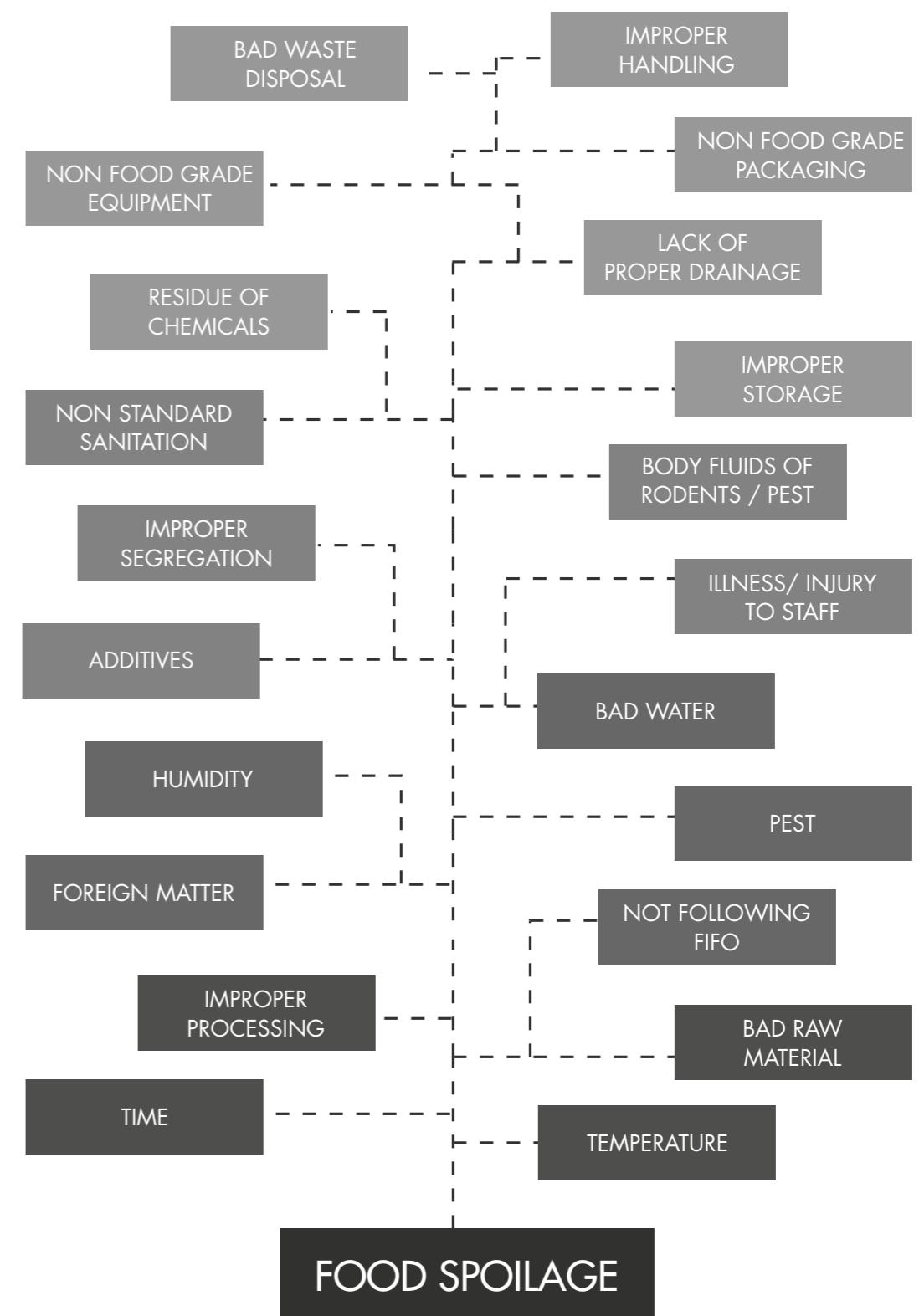
**11. Improper storage :** Storage must not only be done by FIFO method but also properly segregated and with required ventilation. Right combination of duration, temperature ventilation and segregation defines a good storage. Any deviation in one of these will result in food becoming unsafe.

**12. Not following FIFO :** FIFO is first in first out; sometime FEFO is followed which is first expiry first out. But FIFO is the most adopted method because in food industry, expiry date is not waited for. Process should begin much before, the best before date or use by date to give the guest safe food.

**13. Illness/Injury to staff :** Food safety is much dependent on the food handler's personal behavior and health status. A person with cough, cold, open wound, itching and any illness which is of an irritable nature tends to make him handle things without washing his hands after touching the body. The most common danger to food safety is from cough and cold and open wounds for food handlers.

**14. Improper segregation :** Improper segregation of materials and utensils can cause cross contamination.

**15. Humidity :** Humidity is a major cause for enabling micro organism multiplication. Food



zones must have lesser than 65 % humidity to ensure food safety.

**16. Temperature :** Temperature of holding, proofing, baking, storing, Serving, transporting, each one of this is an important factor in food being safe.

**17. Time :** Display time, holding time and discard time for already stored items is crucial for food safety.

**18. Non-food grade packing :** Food has to be packed only in acceptable packing material to ensure food safety.

**19. Pest :** Food invites pests and the movement of pest towards food is natural. Enough care must be taken to plan pest control devices and other forms of controls to ensure that they are highly restricted from either getting into food or contaminating food resulting in food safety issues.

**20. Body fluids of rodents/pests :** Many invisible things in food chain happen due to the contamination caused by rodents, reptiles, pests, nocturnal animals and birds present in the storage yard, marketing yard, transportation etc. If attention is not given it can also happen inside the store . The body fluids like urine, fecal matter etc., get into the food process and make the food very unsafe for consumption.

**21. Improper waste disposal :** Waste is an outcome of process but often present very close to the process region. If it is not disposed in a scientific manner it can breed pest and micro organisms which are a threat to food safety.

## CROSS CONTAMINATION

Cross contamination is one of the most common causes of food poisoning. It happens when harmful germs are spread onto food from other food, surfaces, hands or equipment.

### HOW CROSS CONTAMINATION MAY OCCUR

#### 1. Food to food

Food can become contaminated by bacteria from other foods. This type of cross-contamination is especially dangerous if raw foods come into contact with cooked foods.

Here are some examples of food-to-food cross-contamination :

- I. In a refrigerator, meat drippings from raw meat stored on a top shelf might drip onto baked products placed on lower shelf.

#### 2. Hand to food

People can also be a source of cross-contamination to foods. Some examples are :

- I. Handling foods after using the toilet without first properly washing hands.
- II. Touching egg and then preparing eggless products without washing hands between tasks.
- III. Using an apron to wipe hands between handling different foods, or wiping a counter with a towel and then using it to dry hands.

#### 3. Equipment to food

Contamination can also be passed from kitchen equipment and utensils to food. This type of contamination occurs because the equipment or utensils were not properly cleaned and sanitized between each use. Some examples are :

- I. Using unclean equipment, such as slicers, can openers, and utensils, to prepare food.
- II. Using a cutting board and the same knife when cutting different types of foods, such as breads, vegetables, cakes etc.

### HOW TO AVOID CROSS - CONTAMINATION

- Raw materials and ready-to-eat foods should be kept separate at all times.
- Hands should be thoroughly washed before switching from preparing non vegetarian products to any other activity.
- Work surfaces, chopping boards and equipment should be thoroughly cleaned (intend clean and sanitize) before the preparing of food starts and after it has been used.
- Staff should be made aware how to avoid cross-contamination.



## FOOD POISONING

**Food poisoning** is an acute illness, which usually occurs within 1 to 36 hours of eating contaminated or poisonous food.

Symptoms normally last from 1 to 7 days and include one or more of the following :

- Abdominal pain
- Diarrhea
- Vomiting
- Fever
- Nausea

## PART II



## PRE-REQUISITE PROGRAMMES

Location & Surroundings  
Layout & Design  
Equipment  
Facilities

### PRE-REQUISITE PROGRAMMES

#### LOCATION AND SURROUNDINGS

Location of Bakery Establishment shall be located away from environmentally polluted areas and industrial activities which produce disagreeable or obnoxious odour, fumes, excessive soot, dust, smoke, chemical or biological emissions and pollutants, and which pose a serious threat of contaminating food; areas subject to flooding; areas prone to infestations by pests; and areas where wastes, either solid or liquid, cannot be removed effectively.



#### LAYOUT & DESIGN OF FOOD ESTABLISHMENT PREMISES

- Building and surrounding area shall be designed, constructed and maintained in a manner to prevent conditions which may result in contamination of food. The material movement should be done in one direction only (no backward flow), to prevent cross contamination.

- The floor of food processing / food service area shall be made of impervious, non-absorbent, washable and non-toxic materials. Floor surfaces should remain dry and shall be maintained in a sound condition. The wall-floor juncture should be rounded or coved to facilitate easy cleaning.

- The drainage system shall be properly maintained to avoid any stagnation of water and therefore do not provide any chance for pest harbourage. Floors shall be sloped appropriately



to facilitate adequate drainage. The drainage shall flow in a direction opposite to the direction of food preparation / manufacturing process flow. The openings of the drains shall be thoroughly covered with wire mesh to prevent insects and rodents from entering the processing area.



- The walls shall be made of impervious, non-absorbent, washable and non-toxic materials and require a smooth surface easy to clean up to a height appropriate for the operations and wherever necessary, disinfect.

- Ceilings and overhead fixtures shall be designed, constructed, finished and maintained so as to minimize the accumulation of dirt, condensation and growth of moulds and shedding of paint or plaster particles. Sufficient number of windows and exhaust openings shall be provided to minimize accumulation of dirt.



- Windows, roof vents, doors & all other openings to outside environment shall be well screened with wire-mesh or insect-proof screen as applicable to protect the premise from fly and other insects / pests / animals & the doors be fitted with automatic closing springs. The mesh or the screen should be of a type which can be easily removed for cleaning.

- Doors shall be made of smooth and non-absorbent surfaces so that they are easy to clean and wherever necessary, disinfect. Regular maintenance of door shall be conducted to prevent any mould growth or termites with ageing.



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**EQUIPMENT**

- The exhaust fans shall be provided with flaps on outer side and the other openings shall be adequately covered with screens to avoid entry of birds and pests and the same shall be maintained.

- Light fittings, just above the process area, shall have shatter-proof protective covers to avoid the glass, dust or insects from contaminating the food.

- The equipments shall be such located, designed and fabricated so that they permits necessary maintenance and cleaning functions as per its intended use and facilitates good hygiene practices inside the premise including monitoring and audit.

- Equipment and containers that come in contact with food and used for food handling, storage, preparation, processing, packaging and serving shall be made of corrosion free materials, which do not impart any toxicity to the food material.

- Equipment and utensils used in the preparation of food shall be appropriately labelled, kept at all times in good order and repair and in a clean and sanitary condition, and shall not be used for any other purpose.

- Proper Procedures should be available for handling each equipment like Ovens, Mixers, Proofers etc.

- Equipment shall be such located, designed and fabricated so that it permits necessary maintenance and cleaning functions as per its intended use and facilitates good hygiene practices inside the premise including monitoring and audit.

- Appropriate facilities for the cleaning and disinfecting of equipments and instruments especially cleaning in place (CIP) system to be adopted.

## FACILITIES

- Food Safety equipments in bakery industry are required for keeping food products safe from foreign particles and ensuring hygienic environment all around production area. Main equipments for food safety are :

- **Metal Detectors** : These are installed to detect metal contamination. Metal particles as small as 0.75 mm can be detected.
- **Sieves** : They are required to sift foreign matters in flour, sugar and other ingredients.
- **Magnets** : They are installed in various places to ensure that raw material are free from metallic properties.
- **Filters** : Filters for liquid ingredients as well as water are installed in various places. They prevent liquid ingredients from being contaminated.
- **Ozoniser** : Keep the environment free from microbes and other germs.
- **Air curtains** : Provides barrier to insects and dust.
- **Other instruments** like thermometer, Pressure guage, Hygrometer are required to monitor product and raw material quality.



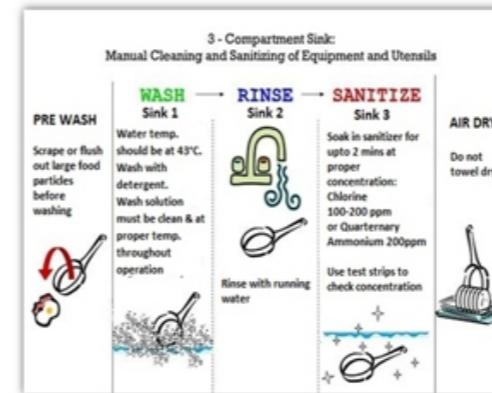
Keep Bakery equipment clean

Equipment should be properly arranged and well labelled



**- Water Supply :** Only potable water in processing and cooking, food handling, washing shall be used and it shall be tested according to IS:10500 requirements. The storage tanks shall be cleaned periodically & records shall be maintained. The non potable water can be used for cleaning of equipment not coming in contact with food, food steam production, fire fighting & refrigeration equipment. The non potable water pipes shall prevent the use of this water for contamination of food material and shall be clearly distinguished from those in use for potable water by using color coding systems.

**- For Cleaning Utensils / Equipment** adequate facilities for cleaning, disinfecting shall be provided with hot and cold water facility, if required. As a good industry practice, there shall be three compartment sink for wash, rinse and sanitize the equipment & containers. The equipment & containers after sanitizing shall be allowed to air dry for effective drying. The procedure for cleaning has been shown in poster below :



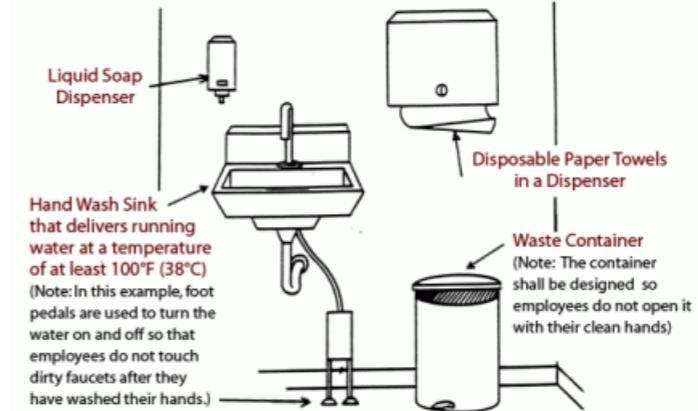
**- For washing of raw materials**, sinks with a draining board, detergent and hot water shall be provided and these facilities must be kept clean and, where necessary, disinfected. Also ensure that separate sinks shall be used for washing raw foods & washing utensils or for any other purposes.

**- Ice and Steam** for use in production of food shall be made of potable water. They should be handled hygienically to avoid cross contamination. The ice shall be handled using food grade plastic scoop and the ice machine shall be kept clean at all times.

**Handling Ice Machine****Clean & hygienic Ice Machine****Dirty Ice Machine**

- **Personal facilities and toilets** are of major importance as the personals are constantly in touch with the food. Proper hand washing facilities shall be provided. The requirements of a Hand washing and drying system include :

- Porcelain/Stainless Steel Wash-hand basins, preferably knee operated
- Germicidal liquid Soap
- Sanitizer
- Supply of hot and / or cold water
- Wet hands drying system
- Clean and dry towels, preferably paper towel/rolls
- Covered Trash Bin, preferably pedal operated with plastic lining

**Dirty facilities****Clean facilities**

Also, separate adequate number of hygienic lavatories and changing facilities shall be provided for the personnel. The restroom and refreshments rooms shall be separate from food process and service areas to avoid personnel from having their food in restroom. The bakery establishment shall display hygiene requirements for the workers at a prominent place in English or in local language to help them in understanding and implementing personal hygiene.

Staff Member	Suggested number of lavatories, Urinal stall & Hand wash basins/ number of employees					Ideally 15-20 persons 1 tap	
	MEN			WOMEN			
	Lavatories	Urinals	Wash basins	Lavatories	Wash basins		
10	1	1	1	1	1		
20	1	2	2	2	2		
40	2	3	2	3	3		
60	3	3	2	4	4		
80	4	4	3	6	5		
100	4	4	3	8	6		
120	5	5	4	9	7		
140	5	5	4	10	8		
180	5	6	5	11	8		
Add 1 lavatory, 1 urinals and 1 wash basin for every 70 persons in excess of 280 persons					Add 1 lavatory, and 1 wash basin for every 35 persons in excess of 280 person		



SEPARATE LOCKERS FOR MEN AND WOMEN FOR CHANGING CLOTHES

FOOD SHALL BE CONSUMED IN REFRESHMENT ROOM AND NOT IN REST ROOM



**- Air quality and ventilation system** shall be designed and constructed so that air does not flow from contaminated areas to clean areas. The suggested air changes/hour in separate section of the bakery establishment are as follows :

S. No.	TYPES OF PREMISES/WORK ROOM	AIR CHANGES/HOUR
1	Bar, public room, cafe	8-10
2	Cellars	3-5
3	Kitchen	20
4	Toilet	6-10
5	Store room	3-6
6	Office	6-10
7	Bake houses	20-30

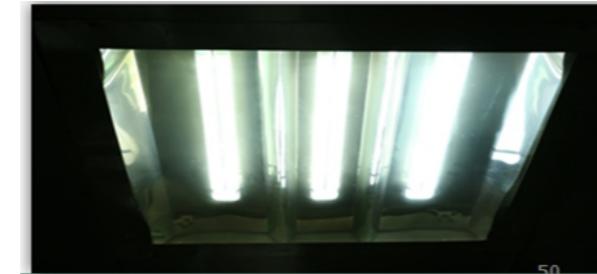
**- Lighting :** Adequate natural or artificial lighting should be provided to carry out operations in a hygienic manner. Lighting fixtures should be covered to prevent breakages of electrical fittings to contaminate food.

**- Safety lighting** is required for the bakery and the escape routes. Storage areas and social areas should be equipped with escape route orientation lighting.



PROPER LIGHTING FACILITY  
IN THE WORK AREA

LIGHTS SHALL BE COVERED



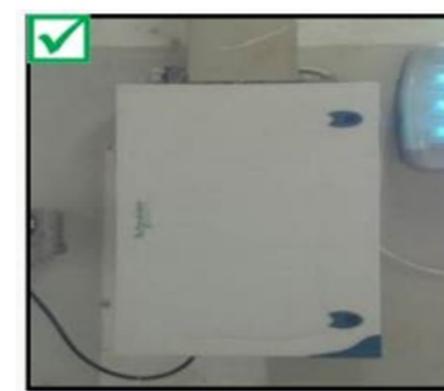
**The suggested level of luminance in separate section of the bakery establishment are as follows :**

S. No.	AREA	LEVEL OF LUMINANCE (lux)
1	Food storage area	220 approx
2	Inspection area	540 approx
3	General Area	220 approx
4	At food preparation surface	500 approx
5	Retail, dishwashing, hand washing, toilet areas	300 approx
6	For reading, inspection, and monitoring equipments goods are separate	600- 1200 approx
7	If the mixing space, baking room and the workplace for decorating baked	Mixing space: at least 300 Lux Baking room: at least 200 Lux Work area for decoration: at least 500 Lux.

#### - Electrical Panel

- In new plants, all socket circuits for hand-held machines must be equipped with additional protection in the form of an FI safety switch with a tripping current of 30 mA.

- The electrical panels should have rubber mats/shockproof paint flooring below to prevent from any electric shock to any employee working at the station.



ELECTRIC PANEL AND BOARD SHOULD BE COVERED

# PART III



## FOOD OPERATION AND CONTROLS

Procurement of Raw Material  
Storage of Raw Material  
Food Processing & Control

### FOOD OPERATION AND CONTROLS

#### PROCUREMENT OF RAW MATERIAL

While procuring and receiving the raw material, the food handler shall ensure that :

- 1.** All raw materials and food ingredients should be procured from approved suppliers and must conform to FSSA Regulations. As per Condition of license, Every manufacturer, distributor or dealer selling an article of food to a vendor shall give either separately or in the bill, cash memo or label a warranty in Form E i.e. Form of Guarantee and COA/COC should accompany each received consignment.
- 2.** All raw materials, food additives and ingredients, wherever applicable, shall conform to the Regulations and regulations laid down under the Act.
- 3.** Records of raw materials & source of procurement shall be maintained in a register for inspection.
- 4.** All raw materials should be checked for visible deterioration & off- odour and cleaned physically thoroughly.
- 5.** No raw material or ingredient thereof shall be accepted if it is known to contain parasites, undesirable micro-organisms, pesticides, veterinary drugs or toxic items or decomposed or extraneous substances, which would not be reduced to an acceptable level by normal sorting and/or processing.
- 6.** Raw materials should be purchased in quantities that correspond to storage/preservation capacity of the bakery establishment.
- 7.** Packaged raw material must be checked for 'expiry date' / 'best before' / 'use by' date, packaging integrity and storage conditions.
- 8.** Receiving temperature of potentially high risk food should be at or below 5°C.
- 9.** Receiving temperature of frozen food should be -18°C or below.
- 10.** All material should be examined at point of receiving for Labeling, giving Product name, Manufacturers name and address, date of manufacturing and expiry and code, and all information required by packaging Rules. Material should be easily traceable to its source.



## STORAGE OF RAW MATERIAL

- After receiving and accepting the raw material, there comes the need of storage. The storage facilities shall be designed and constructed to avoid cross - contamination during storage, permit adequate maintenance and cleaning and shall avoid pest access and accumulation. Cold Storage facility shall be provided for food that requires being stored below 5°C.

- While designing the storage room, segregation shall be there for raw, processed, packaging, rejected, returned or recalled food items, allergen material & distinguishably marked and secured products (hardware & cleaning chemicals). The storage area for raw food shall be separate from the area of work-in-progress, processed, baked and packaged products. Also, the containers made of non-toxic materials shall be provided for storage of raw materials, work-in-progress and finished / ready to serve products.

- All raw materials, food ingredients, food additives and packaging materials to be kept 6" off the floor and 18" off the wall; to enhance easy and adequate maintenance and cleaning and also to avoid any pest harbourage.



NO STACKS



PROPER STACKS



RAW MATERIALS SHOULD BE PROPERLY STORED WITH APPROPRIATE LABELLING

- Pallets to be cleaned at regular intervals to keep them free of cobweb, dust, dirt etc. and also to be inspected regular any repair/ replacement, if required.

- Best Practice is to avoid wooden pallets and to use plastic pallets. In case wooden Pallets are used, care should be taken to  
 a) Carry fumigation every 6 months;  
 b) Periodic cleaning, inspection and maintenance  
 c) Record keeping

- Wrappers & Trays, before going to Production, are to be kept under fumigation and ozonation.

- All wrapper rolls to be shrink-wrapped.

- Proper segregation shall be provided for storage of non-food chemicals, raw, processed, rejected, recalled, returned and re-cycled materials in a separate designated area to avoid any possibility of cross contamination.

- All materials to be appropriately labeled for proper identification.

- Adopt a First-Expired First-Out (FEFO)/ First - In First-Out (FIFO) approach for all raw materials, ingredients, work-in-progress, processed/ cooked and packaged food products.

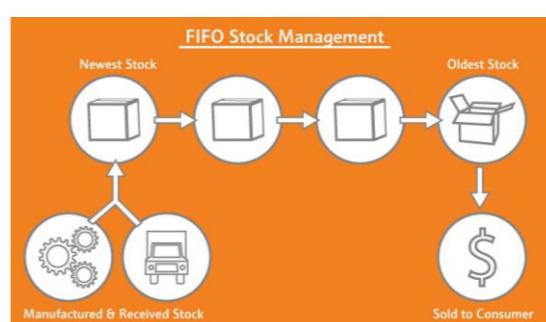
- Do not use materials beyond their expiry date.

- Store materials at appropriate temperatures. Monitor and record temperatures of the chiller and freezer daily.

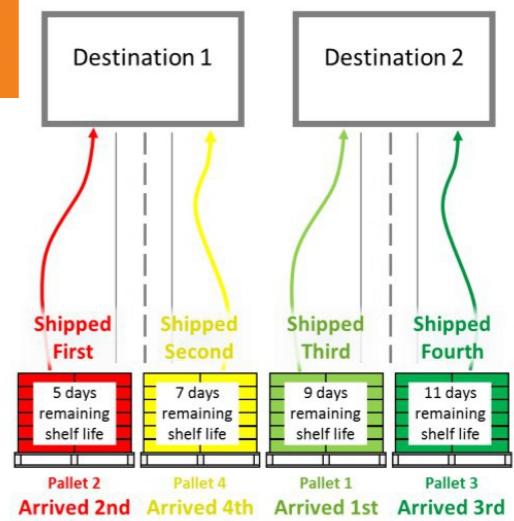
- As far as possible, store raw materials away from ready-to eat ingredients; in a separate chiller.

- Always store ready-to-eat materials/ ingredients in covered containers above raw materials/ ingredients.

- All raw materials, food additives and ingredients shall be stored in separate areas from printed packaging materials, stationary, hardware and cleaning materials/ chemicals.

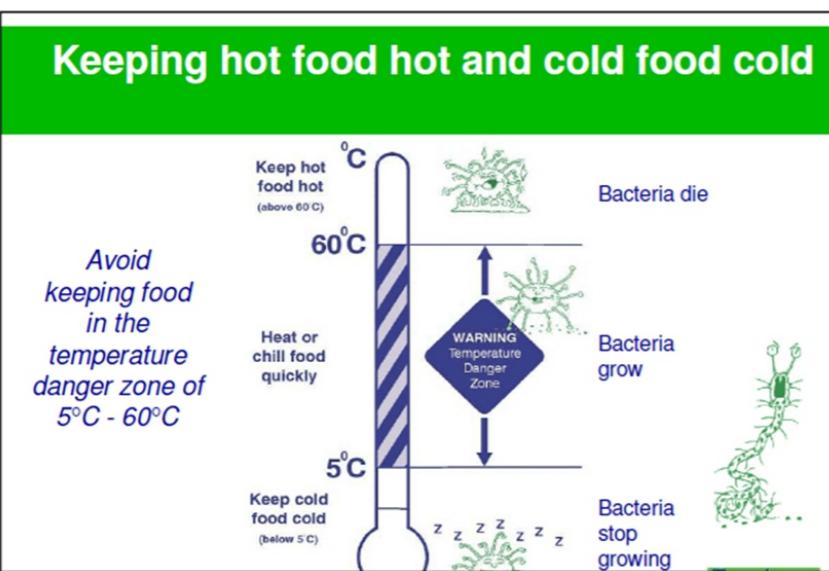


'Simple' FEFO Distribution



## FOOD PROCESSING AND CONTROL

- Temperature control :** All microorganisms have a defined temperature range in which they grow, with a minimum, maximum, and optimum. An understanding of the interplay between time, temperature, and other intrinsic and extrinsic factors is crucial to selecting the proper storage conditions for a food product.
- Time control :** When considering growth rates of microbial pathogens, in addition to temperature, time is a critical consideration. Food producers or manufacturers address the concept of time as it relates to microbial growth when a product's shelf life is determined.
- The Food Business shall develop and maintain the systems to ensure that time and temperature is controlled effectively where it is critical to the safety and suitability of food. Such control shall include time and temperature of receiving, processing, cooking, cooling, storage, packaging, distribution and food service up to the consumer, as applicable.
- Whenever frozen food / raw materials are being used / handled / transported, proper care should be taken so that defrosted / thawed material shall not be stored back and after opening for future use.
- Such systems shall also specify tolerance limits for time and temperature variations and the records thereof shall be maintained in a register for inspection.
- Wherever cooking is done on open fire, proper outlets for smoke/steam etc. like chimney, exhaust fan etc. shall be provided.
- Steam** should be clean, dry and free from boiler carryover; which depends on boiler operations pressure and loading, water treatment management and efficient distribution; which influence the quality of steam.

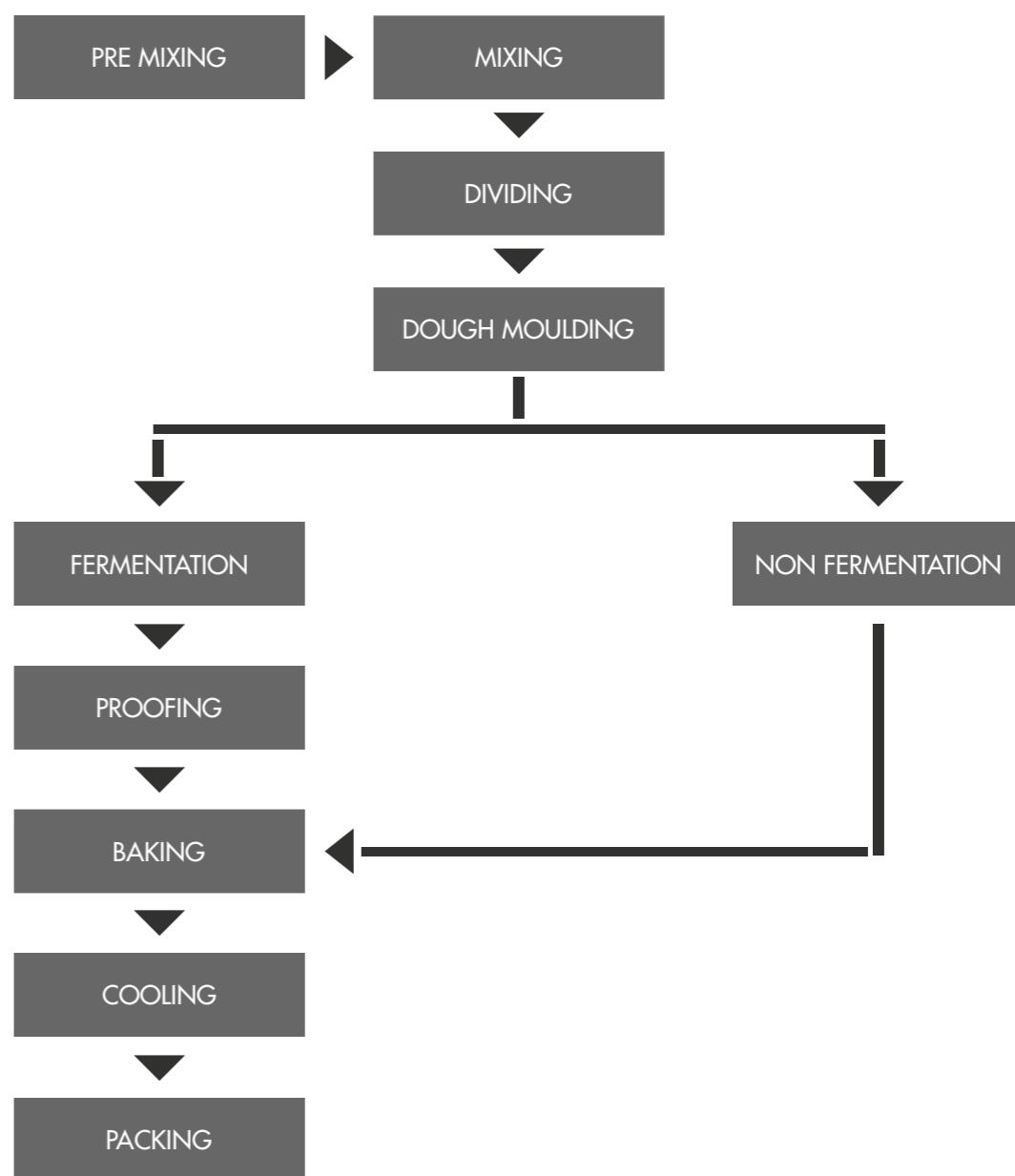


## MANUFACTURING PROCESS AND CONTROLS IN BAKERY

### MATERIAL FLOW IN BAKERY

Bakery businesses are food processors of largely wheat based products cooked in insulated heated space, the bakery ovens. These can be of vastly different sizes, and be suitable for baking a variety of products. Bread, Cakes, Biscuits follow different processes. Artisan and craft bakeries make a variety of hand crafted delicacies.

Broadly, all units will follow similar system flow of material through processing, and control points for food safety is equally important for all units.



## PREMIXING & MIXING, FERMENTATION, HANDLING OF BULK DOUGH

### Premixing

- i) Flour should be sieved through minimum 32u mesh and the sieve should be cleaned regularly.
- ii) If weevils are found, such consignments should be rejected.
- iii) There should be a periodic cleaning mechanism to prevent cross-contamination and dust generation and to ensure safe collection of unwanted materials like dust, dirt, foreign objects if any.
- iv) Good Practices; such as vacuum cleaning, collection of debris through hypochlorite can be used)
- v) Sugar to be passed through magnetic grill before use and periodic cleaning of magnetic grill to be ensured.
- vi) Sugar bags to be free from any external contamination like dust, dirt, rice bran, etc.
- vii) Egg trays to should be free from dirt or pests
- viii) Broken egg-shells to be stored in plastic bags and disposed off at regular intervals.
- ix) Fruit cuts to be washed with ozonized water before use.
- x) Potassium sorbate to be dissolved thoroughly in water before use. Only freshly prepared sorbate solution to be used.

### Mixing

- i) Mixing room should be clean & dry without any spillage
- ii) All mixing utensils should be free from grease and old batter. This is ensured by using washing before use.
- iii) Mixing bowls, beaters and scrappers to be washed with hot water at least once in 24 hours
- iv) Egg whisk to be added in mixing through strainer only. The strainer to be cleaned with hot water at least once in each shift followed by swabbing with hypochlorite solution. The strainer is to be dipped in 500ppm Sodium Hypochlorite solution, when not in use.
- v) Mixing room floor to be cleaned with hot water followed by mopping with hypochlorite solution

## DIVIDING AND PREPARATION OF INDIVIDUAL UNITS

- From bulk dough, unit dough piece or batter is separated for processing before baking.
- High speed machines, Semi-automatic equipment, and hand work are required.
- Food should be prepared at steady pace and not allowed to stand more than necessary for process.
- Temperature control should be maintained as needed by process.
- Dough bits, dusting flour, and oil if left on worktable for long, will go rancid and will allow bacterial and fungal growth.



WORK TABLE SHOULD NOT BE LEFT DIRTY



WORK TABLE SHOULD BE CLEANED IMMEDIATELY

## BAKING, COOLING, & FINISHING

- Oven area should be segregated, to avoid cross contamination with fumes and smoke.
- Baking room should be clean & dry. This room is to be mopped with 500ppm Sodium Hypochlorite solution, at least once in each shift
- Controls should be maintained on temperatures, humidity, and timing of baking.
- Baked goods are free from micro organisms, but as they cool, they provide excellent medium for mold growth. Cooling should be done in as clean an environment as possible.
- Finishing, cutting, and decorating should be done with all precautions of Good Manufacturing Practices, and Personal hygiene.

## PACKAGING AND STORAGE OF FINISHED PRODUCT

- Only food grade packaging material (printed/unprinted) should be used for wrapping and packaging of food items. The food grade certificate/ declaration should be checked in the COA during receiving of the materials.
- Packaging material should also be kept and stored under hygienic conditions in a room intended for the purpose.
- All the products should be labeled according to the Food Labeling Act.
- Immediately after packaging and proper labeling, the products should be placed in the rooms provided for storage under required temperature and humidity conditions.
- Temperature and relative humidity of the storage area should be maintained to optimum required level.
- FIFO system should be applied for dispatch of all products.
- Temperature of cake slabs at the time of packing out from the Slab cooling room should be within the range of 14 – 190C
- Packing room temperature is to be maintained at 22-24 deg Centigrade
- Packers handling naked cakes to use sterilized gloves. Disinfectant solutions to be used by all packers as and when required

- Slicer blades & conveyor belts to be sterilized with isopropyl alcohol at least 3 times in each shift or as & when required
- Contact parts of packing machines to be cleaned with 500 ppm hypochlorite solution
- Exposure of UV light on PVC trays, cakes & wrappers to be done during packing
- Metal Detectors to be checked with probes before every start of the packing machine
- Uniform sorbate spray to be done on the top surface of the naked bar cakes before packing.
- Air of sorbate spray line is filtered through the Ultra filter unit, which is checked by the Supplier and changed, if required.

### SLICING/PACKING OF BREAD AND CONFECTIONARY PRODUCTS

- Cool baked products on clean racks and trays. As far as possible, the baked products should be covered during cooling.
- Clear crumbles that are left after slicing the products.
- Use clean packaging to pack the products.
- Control samples must be kept in a separate designated place for each batch of production; required to recheck on the samples during any special situations like customer complaints.
- Finished products must conform to FSSAI Regulations.

### RETAIL AND DISPLAY

- Ensure that products are stored in clean display cases which are covered at all times.
- Ensure products are stored at appropriate temperatures (e.g. cakes with fresh cream should be stored in chiller display units at 4°C and below).
- Do not display products with perishable fillings beyond 4 hours at room temperature. Adopt first-in-first-serve approach in the display of products for sale.
- A time stamp is to be used for the products to inform consumers on the "consume-by" date.

### PACKAGING

#### What is the distinction between Packaging and Packing?

Packaging encompasses 'packing' and takes an integrated view of the Product requirement, Production needs, Marketing needs, Distribution Hazards and Customer satisfaction.

Packing simply involves stuffing or filling in the material and is one of the many aspects of Packaging.

#### What are the functions of packaging?

**Protection :** Packaging material shall provide adequate protection for all baked products to prevent contamination and damage.



NO PACKING



PACKING



PACKAGING

**Preservation :** Food products can be stored and prevented from microbial deterioration with efficient packaging. Packaging also facilitates in shelf life enhancement of food products.

**Presentability :** Attractive colors, logos, symbols and proper packaging makes it more appealing to the customers and can affect customer purchase decision.

**Communication :** The packaging conveys necessary information to the consumers. It includes general features of the product, ingredients, net weight of the contents, name and address of manufacturer, maximum retail price.

**Convenience :** Packed items can be moved, stored and stacked easily.

The packaging material may be contaminated from physical hazard (such as dirt, hair etc), chemical hazard (such as process ink, adhesive etc) & biological hazard (such as bacterial or fungal contamination). The food packaging material shall conform to all the Regulations and standards laid down under the Food Safety & Standard Act, 2006. For primary packaging, only Food grade packaging materials are to be used. The packaging materials or gases where used, shall be non-toxic and it shall not pose a threat to the safety and suitability of food. The packaging material should be free from contamination from physical, chemical & biological hazard.



The food contact material includes, all material which directly comes in contact with food like :

1. Primary Food Packaging Material.
2. Utensils, spoons, scoop etc.
3. Equipments & containers.
4. Chopping boards.
5. Cutting tools
6. Cling films used to cover foods.
7. Conveyor belts, others.



PACKAGING MATERIALS OR GASES SHALL BE NON TOXIC



IT SHOULD NOT BE A THREAT TO THE SAFETY AND SUITABILITY OF FOOD

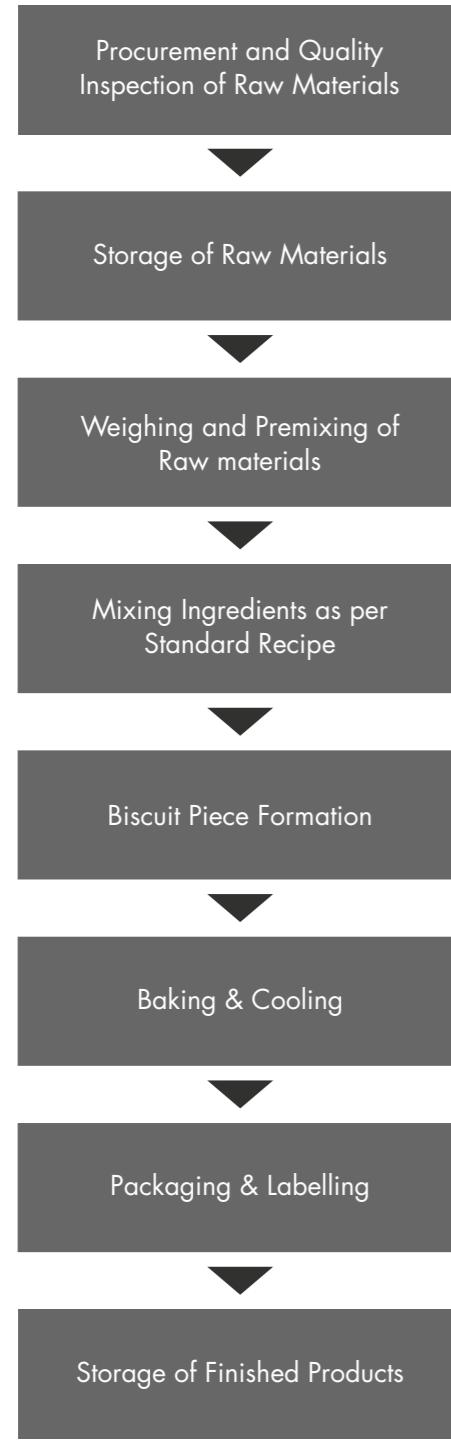
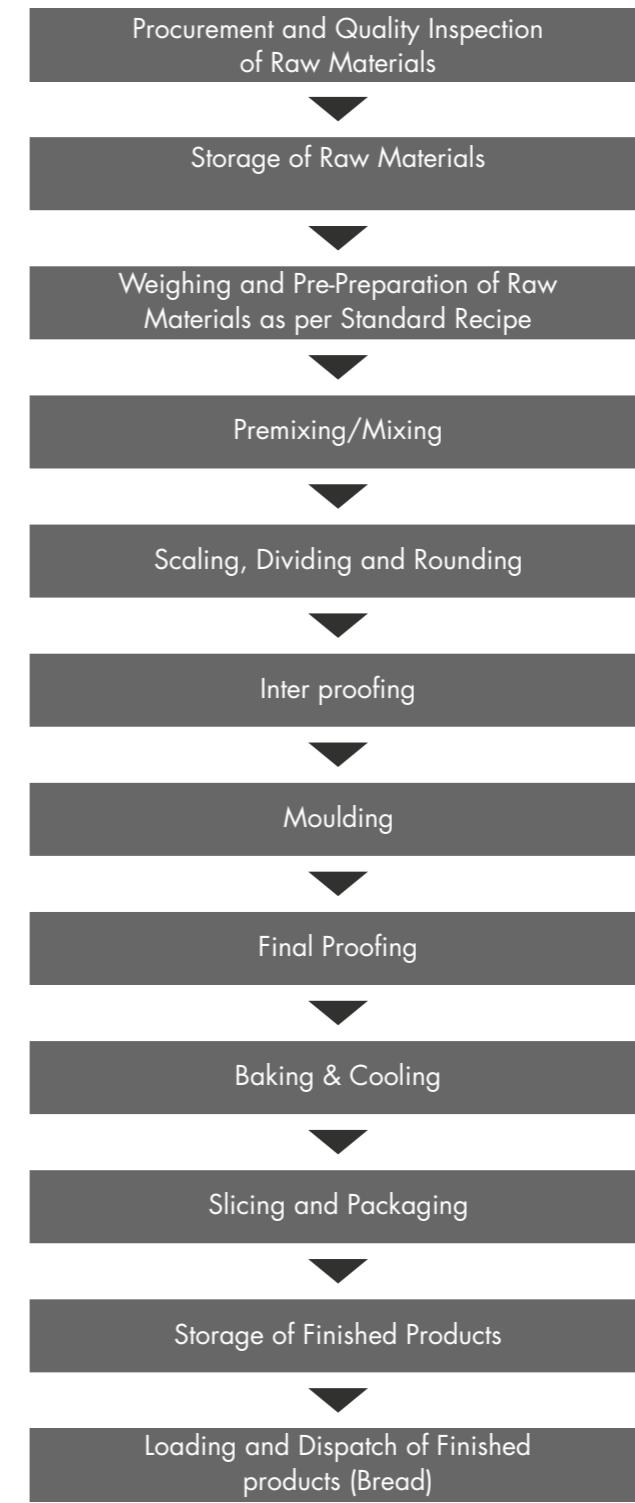


USE FOOD GRADE PACKAGING MATERIALS

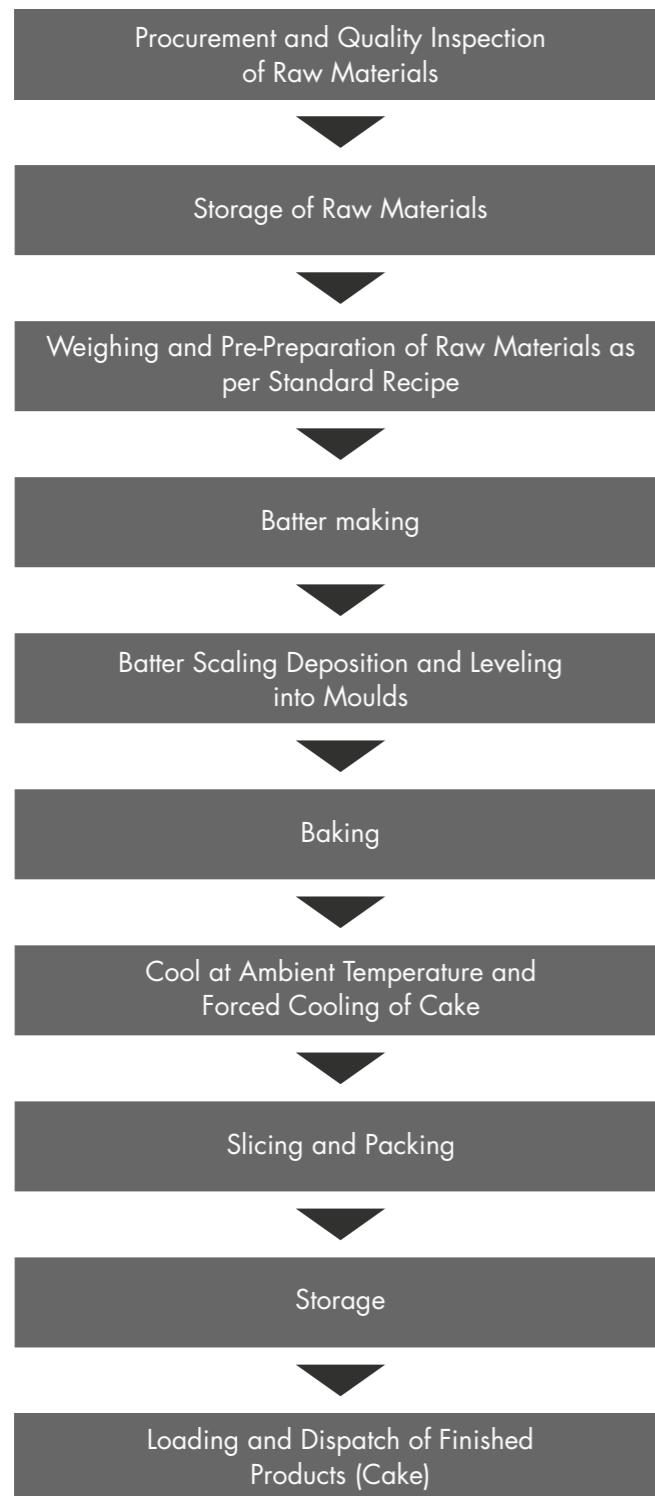
## TRANSPORTATION

- Processed / packaged and / or ready-to-eat food shall be adequately protected during transportation and / or service.
- The conveyances and / or containers shall be designed, constructed and maintained in such that they can effectively maintain the requisite temperature, humidity, atmosphere and other conditions necessary to protect food.
- Conveyances and / or containers used for transporting / serving foodstuffs shall be non toxic, kept clean and maintained in good condition in order to protect foodstuffs from any contamination.
- Receptacles in vehicles and / or containers shall not be used preferably for transporting anything other than foodstuffs where this may result in contamination of foodstuffs.



**MANUFACTURING AND PROCESSING PARAMETERS****Biscuit Manufacturing Process****Bread Manufacturing Process**

### Cake Manufacturing Process



### CONTROL POINTS IN BAKERY WITH RESPECT TO FOOD SAFETY

#### 1. Weighing on ingredients

Lack of use of standard weights and scales causes a lot of problems in bakeries. As bakeries use a lot of ingredients and additives essential for the process example baking soda, artificial colour and flavour. Use of ingredients should be within the prescribed limits of standards set by the FSSAI. If ingredients are not in permissible limits, the products will be termed as adulterated or misbranded. Formulating standard recipes and training the staff the importance of correct usage of weights and scales is important.

The ingredients and additives used in the recipes have to be approved by the FSSAI.

#### 2. Mixing

Mixing step where all the ingredients are mixed to form a dough. Often special mixers like spiral or rotator mixers are used for this purpose. Care should be taken that these are always maintained in the best of condition. Any loose parts should be repaired immediately to avoid physical contamination. Blades os stainless steel should be preferred over plastic ones. Often this might be semi automated activity, so the personal hygiene of the person handling the mixing shoule be tended to as contamination can occur at this point.

#### 3. Kneading

Kneading is often a step facilitating better gluten formation resulting in a soft fermented product. Care of the personal hygiene should be taken if the process is manual and loose parts or blades should be checked if its an automated process.

#### 4. Fermentation

Fermentation is step followed in a few baked products like bread. It's typically a leavening process where in yeast breaks down the carbohydrates and results in formation of gas and dough rising. The yeast used to leaven the bread should be of good quality and strains are not contaminated with other microbes causing undesirable effects in the fermentation process. This process should be the time bound to avoid excessive fermentation.

#### 5. Panning/ Moulding

This step consists of addition of dough into moulds or pans for further baking step. These should be preferably made with stainless steel or food grade material and use of plastic should be avoided.

#### 6. Baking

The time and temperature relationship is very important for the product to bake as well as eliminate the microbes. This relation needs to be studied carefully. It is a CCP in the

bakery process. Use of temperature display, recording devices are necessary and helpful for ovens.

Yeast dissipation of the oven is important, insulated in case of wood fired oven or diesel fired so that smoke can be let out directly and the temperature in the manufacturing premises does not rise.

### **7. Cooling**

Proper cooling is essential after baking. The product should come to room temperature naturally before packaging. Improper cooling will lead to condensation in product after packaging and early spoilage due to microbial growth. Cooling should also be done in clean and cool air so as to avoid contamination of product.

### **8. Packaging/ Wrapping**

- Packaging is done as a medium to safeguard the food from external spoilage as well as means to provide product information to the consumer. Most of the small bakery units refer doing manual packaging rather than installing automated packaging. Or it is a semi-automated activity example; biscuits are first manually packed in trays and then sent on conveyors for packaging.
- Use of clean baskets and trays should be done to hold the finished product before packaging.
- Often a metal detector step should ideally be incorporated during packaging to rule out possible metal contamination. This metal detection is considered as CCP so that metal contamination if caused while processing and packaging can be controlled.

### **9. Product Storage**

- Product Storage is temperature sensitive , can be classified into:
  - Ambient storage for dry products like Khari, toast , bread, biscuit.
  - Cold storage- Chocolate and fresh cream cakes, pies, pastries.
- Product storage should be away and separate from Raw material storage to avoid cross contamination.
- Product should be stored on pallets and away from the wall and not the floor, near the wall.
- Product stacking should be appropriate so that the lower boxes or wholesale packages maintain their integrity and do not get crushed under pressure.
- Product storage should be labeled and classified according according to the product for easy product flow and dispatch.
- Products should be stored facilitating First- Expiring- First- Out (FEFO) to maintain stock rotation.
- Use of temperature and humidity recording devices are helpful to maintain the FSMS.
- Product recalled or withdrawn from the market should have segregated storage.

### **10. Personal Hygiene**

Personal Hygiene is an important and key aspect to bakery in relation to food safety. Being labour oriented process it is of utmost importance to maintain personal hygiene. Even a healthy person harbours and is a carrier of host of micro-organisms. To eliminate and reduce the possibility of contamination the following steps need to be taken :

- Wearing clean clothing or a uniform preferably cotton.
- Hair restrictions like beard net or a hair cap, scarf to restrict contamination due to hairfall.
- Strategic placing of hand washing stations and foot dips to reduce microbial load.
- Restriction on use of rings, bracelets and necklaces to avoid contamination. Implementation of jewellery policy will help.
- Food handlers suffering from infectious diseases discouraged in production areas.
- Visitors should be discouraged in production area.
- Personal habits like chewing or eating food in production, scratching nose, hair should be avoided.

In general the bakery units tend to hot leading to a lot of sweating and microbial growth , FBO should take care to provide enough ventilation for the same.

### **11. Cleaning and Sanitation**

- Use of cleaning and sanitation program will be helpful to maintain the cleanliness and hygiene in the bakery. This program can indicate the areas, and equipment to be cleaned at set frequencies and the method of cleaning and sanitizing. This is helpful from the point of Good Manufacturing Practices(GMP). Formulation of Standard Sanitary Operating Procedures(SSOP) for the areas and equipment will provide standardisation to the bakery unit.
- Dusting and mixing operations in a bakery tend to create a thin mist or dust of flour all over the manufacturing premises, this leads to build up and microbial proliferation.
- Also proper sanitation of fermentation chamber or premise will help to eliminate bad microbes and undesirable growth in the product.
- Cleaning of burnt product, soot from the oven is equally important to prevent contamination in the product.
- Blow drying to remove crumbs and burnt product is a suitable process.

### **12. Waste disposal**

- The main waste in the bakery unit is of unused dough, fondant, burnt product. These need to be removed in a timely manner. Dough and fondant may lead to fungal growth in the manufacturing premises, whereas burnt product will contaminate the finished product.
- Waste should be disposed immediately in covered bins to avoid contamination.

### 13. Pest control

- Bakery ingredients like flour and sugar are prone to rodent attacks. The entry for these should be avoided in a bakery by sealing or fitting wire meshes to points where access can be gained. The most prevalent pest in a bakery rodents, cockroaches and flies. Use of trap, insecticides, air curtains and PVC curtains can help to avoid entry and elimination.
- Potential breeding sites should be identified example; near mixers where there is left over dough.
- Food or product shall be contained in pest proof containers example; display counters in cake shop. Bulk packages of wholesale shall be stacked on pallets away from the floor and roof.
- Pest infestations should be dealt with immediately without affecting the product and chemical if used should be food grade with Material Safety Data Sheet (MSDS).
- Record maintenance of pest control activities and pest activity if any needs to be done FSMS.



### 14. Water

Whenever water is used as a raw material, potable water only should be used of standards as laid down by the FSSAI and other international standards. Water pipelines of potable water and sewage should be separate and maintained for leakages to avoid contamination.

## FOOD FOR INTOLERANCE

**Food intolerance** is a negative reaction often delayed to a food, beverage, food additive or compound found in foods that produce symptoms in one or more body organs or systems. The main food intolerance that affect the bakery industry are intolerances to gluten or an allergy to milk/eggs.

1. **Gluten intolerance** or celiac disease is a lifelong illness that is caused by sensitivity to gluten. Millions of people who cannot properly digest gluten must choose alternative grains for bakery products. Gluten free baking is presented with the challenge of replicating the functionality of gluten in the absence of wheat flour. Gluten free bread can be produced by replacing wheat flour with a mixture of fine rice flour, potato starch and tapioca fiber. Xanthan gum is added to provide the structure and prevent crumbiness of the product.

2. **Lactose intolerance** is the inability of adults and children to digest lactose found in milk and to a lesser extent dairy products, causing side effects. Lactose found in milk can be replaced by using soy milk. Whipped dairy products can be replaced by vegetable based 'cream filling'. Soft or silken soybean curd can be successfully used to replace cream in cheese cake.

3. **Egg allergy** is a hypersensitivity to dietary substance from the yolk or whites of eggs, causing an overreaction of the immune system which may lead to physical symptoms. Most breads, pastries and biscuits or cookies can be made egg free by replacing the moisture content that is contributed by eggs with milk or other liquids. Cakes and sponge making is heavily reliant on the functional characteristics of eggs as an aerating medium. Commercial egg replacers are made up of potato starch, tapioca fiber, chemical leavener and carbohydrate gum. Addition of lecithin into the products improves overall volume, texture and eating quality.

# PART IV



## PERSONAL HYGIENE

Health Status  
Behavioural & Personal Cleanliness  
Visitors

### PERSONAL HYGIENE

#### HEALTH STATUS

No personnel suffering from a disease shall be allowed to enter into any food handling area. Any person suffering from a disease shall immediately report illness or to the management and medical examination of a food handler shall be carried out immediately.

All personnel shall be made medically examined once in a year and a record signed by a registered medical practitioner shall be maintained. All the personnel shall be compulsorily inoculated against the enteric group of diseases and a record shall be maintained. In case of an epidemic, all workers are to be vaccinated irrespective of the scheduled vaccination. Medical examination to be concluded :

1. Physical examination
2. Eye Test
3. Skin examination
4. \*Compliance with schedule of vaccine to be inoculated against enteric group of diseases
5. Any test required to confirm any communicable or infectious disease which the person suspected to be suffering from on clinical examination

**Note - \*** Vaccine to be inoculated against enteric group of diseases, shall be decided by the medical practitioners according to the list as declared by the municipal corporation of that area.



PERFORMA FOR MEDICAL FITNESS CERTIFICATE FOR FOOD HANDLERS  
(FOR THE YEAR .....

(See Para No. 10.1.2, Part- II, Schedule - 4 of FSS Regulation, 2011)

#### HEALTH CHECKUP BY MEDICAL PRACTITIONERS

It is certified that Shri/Smt./Miss.....  
employed with M/s....., coming in direct  
contact with food items has been carefully examined\* by me on date .....  
Based on the medical examination conducted, he/she is found free from any  
infectious or communicable diseases and the person is fit to work in the above  
mentioned food establishment.

Name and Signature with Seal  
of Registered Medical Practitioner /  
Civil Surgeon

**\*Medical Examination to be conducted:**

1. Physical Examination
2. Eye Test
3. Skin Examination
4. Compliance with schedule of Vaccine to be inoculated against enteric group of diseases
5. Any test required to confirm any communicable or infectious disease which the person suspected to be suffering from on clinical examination.

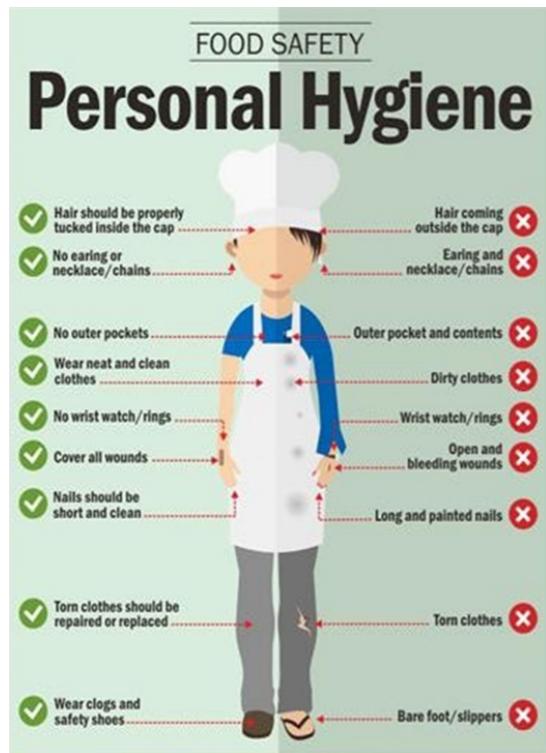
An illustrative performa is shown here  
and it can be downloaded from  
[www.fssai.gov.in](http://www.fssai.gov.in)

## BEHAVIOURAL & PERSONAL CLEANLINESS

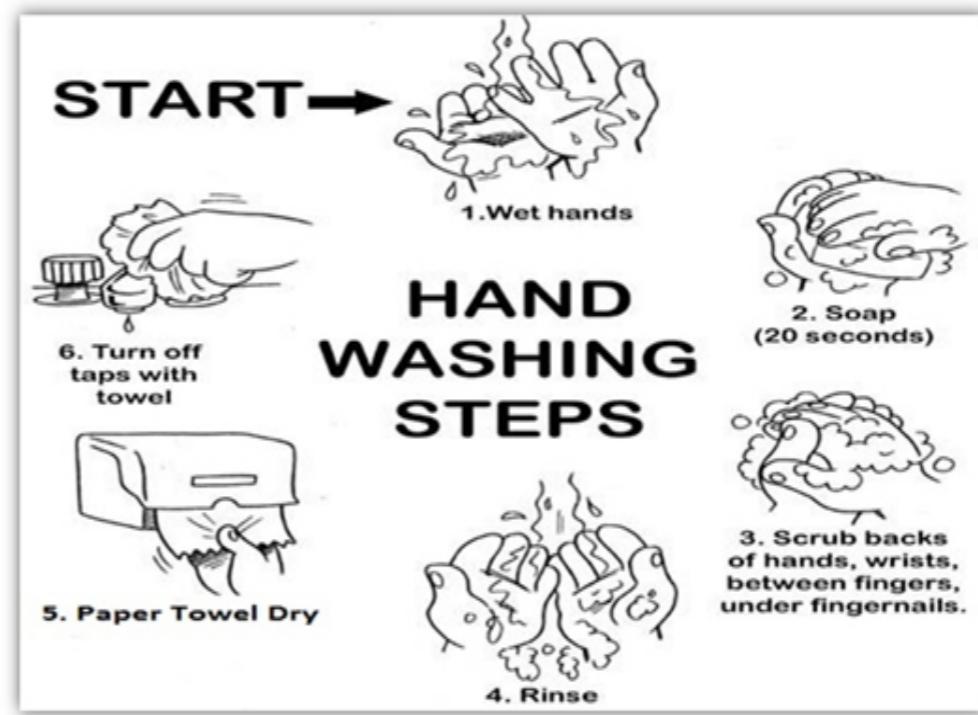
Personal cleanliness of food handlers is the most important link in preventing food borne illness. These personal hygiene habits shall become a part of their behaviour.

1. All food handlers shall wear suitable clean protective clothing, head covering, face mask, gloves and footwear.
  2. Food handlers shall always wash their hands with soap and clean potable water, disinfect their hands and then dry with hand drier or clean cloth towel or disposable paper.
  3. Food handlers shall always wash their hands at the beginning of food handling activities immediately after handling raw food or any contaminated material, tools, equipment or work surface, where this could result in contamination of other food items or after using the toilet.
  4. No Food handlers shall be engaged in smoking, spitting, chewing, sneezing or coughing over any food and eating in food preparation and food service areas.
  5. The food handlers should trim their nails and hair periodically.
  6. Food Handlers shall avoid certain hand habits such as scratching nose, running finger through hair, rubbing eyes, ears and mouth, scratching beard, scratching parts of bodies etc. When unavoidable, hands should be effectively washed before resuming work after such actions.
  7. Street shoes inside the food preparation area should not be worn while handling & preparing food.
- Food handlers should not handle soiled currency notes/cards to avoid cross contamination.

### BASIC REQUIREMENTS FOR PERSONAL HYGIENE



### HOW TO WASH HANDS

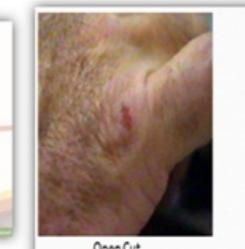


### GENERAL HYGIENE AND HEALTH OF FOOD HANDLERS



**VISITORS****GENERAL HYGIENE AND HEALTH OF FOOD HANDLERS**

Food handlers shall avoid certain hand habits such as scratching nose, running finger through hair, rubbing eyes, ears and mouth, scratching beard, scratching parts of bodies etc.



1. Generally visitors should be discouraged from going inside the food handling areas.
2. Visitors when entering food manufacturing, cooking, preparation and storage or handling areas shall wear protective clothing, footwear.
3. Visitors shall adhere to the personal hygiene provisions as mandate for food handlers.



Visitor policy shall be documented



Visitor shall be given visitor card with restricted entry



Visitor shall wear protective clothing & footwear and shall adhere to food safety provisions as mandate.