



FOOD SAFETY AND STANDARDS
AUTHORITY OF INDIA

Inspiring Trust, Assuring Safe & Nutritious Food

Training Manual

Food Safety Supervisor Course

Special – (Level 2) – Bakery



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Welcome to the manual –

The manual is designed for small, medium and large scale bakery manufacturing units, producing variety of bakery products.

This manual explains General Requirements on Hygienic and Sanitary Practices to be followed by all Food Business Operators engaged in Bakery Food service establishments, as per Food Safety & Standard Act, 2006.

This manual presents **bare minimum requirements and good practices** of Food Safety and Hygiene to be followed by Food Business Operators along with Industry best practices.

Learning Outcome –

The objective of this manual is to train the personal that can be designated as Food Safety Supervisors in the bakery industries, about food safety and hygiene requirements which are to be followed in their businesses. The Food Safety Supervisors (FSS) may interpret these requirements according to the size and type of their establishment.

The desired outcome of this manual is better understanding of food safety and hygiene requirements and high standards of food safety in the Bakery industry.

What the law says –

The establishment in which bakery and all bakery wares are processed and packed, by the food business operator and the persons handling them should conform to the sanitary and hygienic requirement, food safety measures and other standards as specified below. It shall also be deemed to be the responsibility of the food business operator to ensure adherence to necessary requirements.

In addition to the requirements specified below, the food business operator shall identify steps in the activities of Food businesses, which are critical to ensure food safety, and ensure that safety procedures are identified, implemented, Maintained and reviewed periodically

In India, the mandatory sanitary & hygiene requirements for food business operators are –

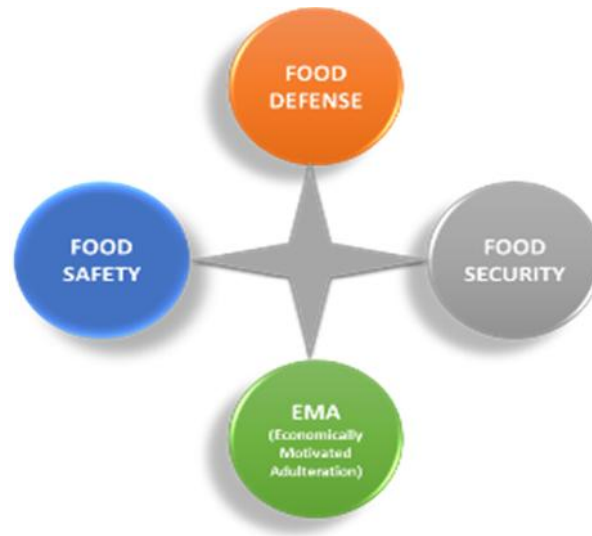
“Part II of Schedule 4” of Food Safety and Standards (Licensing & Registration of Food Businesses) Regulations, 2011 (<http://www.fssai.gov.in/home/fss-legislation/fss-regulations.html>) under Food Safety & Standard Act, 2006 (<http://www.fssai.gov.in/home/fss-legislation/food-safety-and-standards-act.html>)

PART I

INTRODUCTION TO FOOD SAFETY

- Food safety & food safety hazards
- Allergens
- Unsafe Food

Different Concepts, Different Meaning



Food safety

- The efforts to prevent unintentional contamination of food products by agents
- reasonably likely to occur in the food supply
- (E.g., E. coli, S. Listeria)

Food defense

- Efforts to prevent intentional act or threat of deliberate contamination
- Done with chemical, biological or radio nuclear agents

Food security

The reliable availability of a sufficient quantity and quality of nutritious food for a population.

Economically Motivated Adulteration (EMA)

- Dilution or substitution of ingredients for economic gain,
- Without knowledge of purchaser, Intentional,
- May or may not be harmful
- E.g.- Melamine in China

Food Safety means assurance that food is acceptable for human consumption according to its intended use.

Food Safety Management System means the adoption of Good Manufacturing Practices, Good Hygienic Practices, Hazard Analysis and Critical Control Point and such other practices as may be specified by regulation, for the food business.

Food Safety Programs

Food Safety Programs are procedural measures that reduce the likelihood of a food safety or a food quality hazard occurring, but one that may not be directly related to activities taking place during production.

Some of the Benefits of a Food Safety Program:

- **Eliminates costs of poor quality and unsafe food products, which may result in:**
 - Defective products
 - Wastages
 - Product returns
 - Reduction in shelf life
 - Loss of customers
 - Reduction in repeat sales
 - Production line downtime
 - Excess inventory
 - Product liability

- **Brand Image which results in:**
 - Market Competitiveness
 - Higher Profits
 - Consumer satisfaction
 - Greater consumer Loyalty

A comprehensive Food Safety Program comprises:

- ❖ **GMP - Good Manufacturing Practices**
- ❖ **GHP - Good Hygiene Practices**
- ❖ **HACCP - Hazard Analysis and Critical Control Point thru Risk Mitigation**
- ❖ **A Structured Management System which drives GHP, GMP, HACCP**

Why Food Safety?

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that Prevent foodborne illness.

Goal is to reduce foodborne illnesses by improving food safety-related behaviors and practices.

Food borne illness :

- Is a burden on public health is substantial
- Causes hospitalization and deaths
- Is transmitted to human beings through food and water
- Is Caused by: infectious agents/poisonous substances arising from microbial toxins, harmful chemicals or other harmful substances

What is FSMS as per FSSAI

- FSS Act 2006 defines Food Safety Management System (FSMS) as the adoption Good Manufacturing Practices, Good Hygienic Practices, Hazard Analysis and Critical Control Point and such other practices as may be specified by regulation, for the food business.
- For the purpose of this document and all assessments conducted there under, the definition of FSMS shall be read as the above and the requirements for this shall be taken as that defined under Schedule IV & Critical Control Point.

FSMS Program based on FSSAI



Schedule IV

Why?

Section 16 of the FSSA, holds FSSAI responsible for regulating and monitoring the manufacture, processing, distribution, sale and import of food so as to ensure safe and wholesome food.

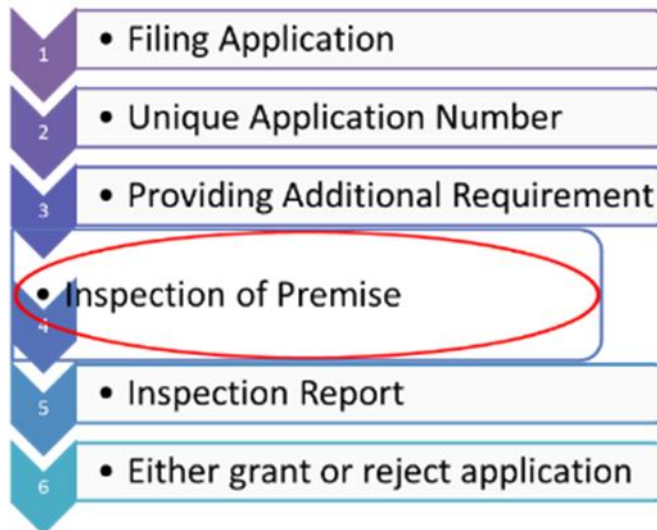
How?

By introducing basic hygiene and safety requirements in the form of Schedule IV

Where in FSSR?

The Schedule IV has been mandated for compliance by introducing it as a licensing requirement/condition under the Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011.

Where does it impact?



Why Are We Concerned?

Food borne illnesses may affect all

People with high risk of foodborne illnesses:

- 1) Infants
- 2) Young children and older adults
- 3) Pregnant women
- 4) People with weakened immune system/ with certain chronic diseases

Children < 4 yrs age:

reported highest incidences from food borne pathogens- *Campylobacter*, *Cryptosporidium*, *Salmonella*, *Shiga* toxin-producing *Escherichia coli* O157, *Shigella*, and *Yersinia*

Older people > 50 yrs age:

greater risk of hospitalizations and death from intestinal pathogens commonly transmitted through foods

Challenges to Safe Food Production

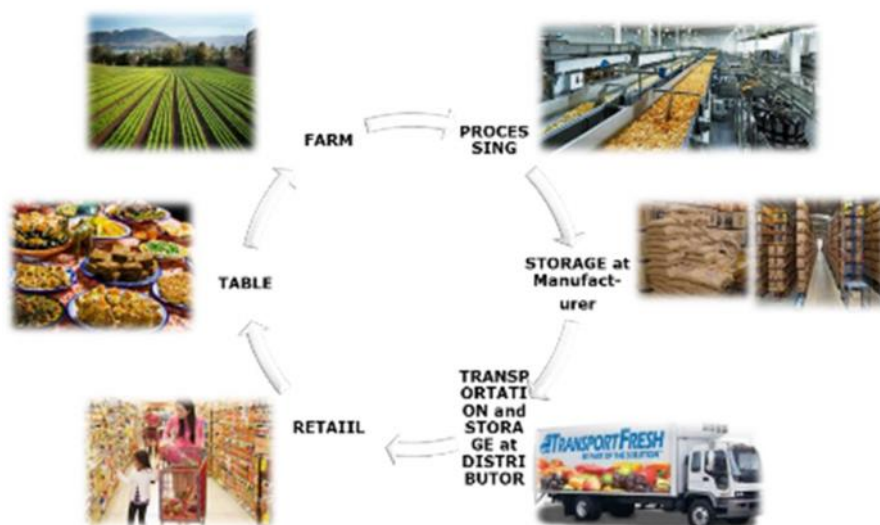
Challenges to Food industries

- Large employee populations with high rates of turnover, communication challenges, and cultural differences in how food is prepared
- Irregular GMP, GHP Training systems for workers
- Lack of sick leave policies for sick workers
- Difficulties in tracing food items to their sources
- Changes in production practices
- Increasing imports

Challenges from Consumers: Inadequate Knowledge on

- When certain foods are to be cooked to appropriate temperatures
- Need for Separating more risky food from less risky food
- Storing food at safe temperatures
- Properly cleaning hands and surfaces

Food Safety can be ensured by practicing Sanitary and Hygienic Practices - From FARM to TABLE



Key Foodborne Diseases and Hazards

BACTERIA:

- ❑ *Brucella*, commonly from unpasteurized milk or cheese of infected goats or sheep, can cause fever, muscle pain or more severe arthritis, chronic fatigue, neurologic symptoms and depression.
- ❑ *Cholera* can be caused by consuming food contaminated with *Vibrio cholerae*. It causes watery diarrhoea that can be fatal within hours if left untreated.
- ❑ *Listeria* can result in infection and meningitis, and is usually spread by consuming contaminated raw vegetables, ready-to-eat meals, processed meats, smoked fish or soft cheeses.

VIRUS:

- ❑ *Hepatitis A* is a liver disease caused by the hepatitis A virus, transmitted through food contaminated by the faeces of an infected person. It causes jaundice, nausea, anorexia, fever, malaise and abdominal pain.

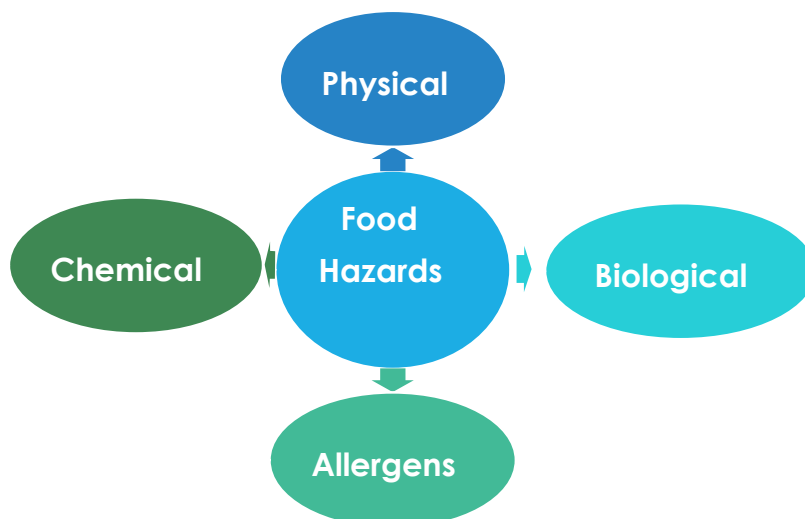
CHEMICALS & TOXINS:

- ❑ *Aflatoxin* is a toxin produced by mould that grows on grain that has been stored inappropriately, and can cause liver cancer, one of the most deadly forms of cancer.
- ❑ *Cyanide* poisoning may occur when inappropriately processed cassava is consumed.

PARASITES:

- ❑ *Toxoplasmosis*, caused by *Toxoplasma gondii*, spread through undercooked or raw meat and fresh produce, can result in impaired vision and neurological conditions.
- ❑ *Pork tapeworm (Taenia solium)* can cause cysts to develop in the brain (cysticercosis), which is the most frequent preventable cause of epilepsy worldwide.
- ❑ *Echinococcus tapeworms* can infect humans through food contaminated with dog or fox faeces. They can cause tumours to form in the liver, lungs and brain.
- ❑ *Chinese liver fluke (Clonorchis sinensis)* commonly contracted through raw and incorrectly processed or cooked fish, can cause bile duct inflammation and cancer

Food Safety Hazard means biological, chemical or physical agent in food, or condition of food, with the potential to cause an adverse health effect. There are majorly three types of hazards . Allergens are also included as a food hazard.



Biological Hazards

The 5 types of biological hazards

- ❑ Bacteria – (Clostridium spp., Salmonella spp., Listeria monocytogenes)
- ❑ Viruses – (Hepatitis, Rotavirus)
- ❑ Fungi – (Aspergillus spp., Fusarium spp.)
- ❑ Parasites – (Fasciola hepatica, Giardia lamblia, Med. fly)
- ❑ Algae – (dinoflagellates, blue-green algae, golden brown algae)

Biological hazards in Bakery Industry

Hazards	Sources	Control
Bacteria-E.Coli	Contaminated water, poor personal hygiene	Analysis of water and get it treated, hygiene training to workers
Bacteria-Others	Unwashed eggs, rats, pigeons	Wash eggs properly, pest management
Virus – Hepatitis A	Open wounds, cuts	Proper care of opens wounds and sores
Moulds & Yeasts	More moisture, packaging material , uncontrolled atmosphere, dirty hands	Raw materials from approved supplier, Storage in proper packaging material and on pallets, raw material kept in proper ventilated area.

Some Facts on Microbiological contamination in Bakery Industry

- Spoilage of Most Bakery Products is caused mainly by Molds, Yeasts, and seldom by Bacteria.
- Most bakery products, are not considered as High risk food products as they are baked at relatively high temperature (180 to 250°C).
- Many bakery products have reduced Water Activity (aw) and Ph, which retards growth of microorganisms.
- Flour contains approx. 8000 mould spores in 1 g.
- It is very important to maintain the cold chain of frozen bakery products.
- Many ingredients like fresh and synthetic cream, cold custard, icings, spices and nuts, fruit toppings or fillings, are added after baking.
- Some Processing steps to control microbial spoilage:
 - Using preservatives (sorbic acid, calcium propionate)
 - Sourdough
 - Modified Atmosphere Packaging (MAP)*
 - Vacuum packaging
 - Microwave / Infrared radiation

Possible Microorganisms in Bakery Industry

- ❑ *Penicillium spp.* and *Aspergillus spp.*

- Most common bread spoilage spores
- Both can produce mycotoxins (**Ochratoxin A** and Aflatoxin); which are highly resistant and can survive heating process.
- ☐ **Rhizopus (nigricans) stolonifer** :
 - Is the common black bread mold.
- ☐ **Bacillus subtilis** and **Bacillus licheniformis**:
 - Can cause ropiness in wheat bread
 - Prevented by adding preservatives, following good bakery hygiene practices.
- ☐ **Bacillus cereus**:
 - May survive baking process, as Bacillus species form endospores.
- ☐ **Staphylococcus aureus**:
 - Major reservoir are humans, but some outbreaks have been involved with bakery products (e.g. filled pies).
- ☐ **Listeria monocytogenes**:
 - For bakery products which contains dairy ingredients
- ☐ **Salmonella spp.**
 - For cake mixes made with dry eggs

Control Measures for Biological Hazards in Bakery

Salmonella spp

Salmonella spp are destroyed in accelerated temperature conditions and remain viable under freezing and refrigerated conditions.

Eggs are the most common and obvious source of Salmonella in bakery products. Other ingredients which can cause Salmonella are flour, milk, cheese, butter, fruits, nuts, spices, which are used in any one or more bakery products. These causes Salmonellosis which is a common gastro-intestinal food borne illness.

Control measures:

Handling unclean and contaminated eggs can result in spreading contamination of work surfaces, hands and equipments. Therefore, thorough cleaning of eggs is required.

Also, the eggs should be used as soon as they are cracked; or the planning of a specified quantity of eggs should be developed such that there is no longer time wait between eggs cracking and using into processing. Strict personal hygiene and good manufacturing practices are also critical.

Staphylococcus aureus

The common source of this microorganism is human nasal passages, throats and skin. It is also found everywhere in water, milk, sewage and on food contact surfaces. Although *S. aureus* is destroyed by heating, the enterotoxin still is active and not removed even under

pasteurized conditions. Hence, food borne illnesses which caused by *S. aureus* may still occur even in the absence of viable cells.

Mostly the bakery products are kept at ambient temperature in retails and sometimes they are held manually by staff and customers at self-serve areas. This increases highly the contamination potential of *S. aureus* and subsequently the growth and production of enterotoxin at ambient storage temperature.

Control measures:

Improved sanitation, temperature control, use of preservatives, Good Manufacturing Practices (GMPs) are some factors which can effectively reduce the level of contamination.

Bacillus species

Bacillus spp. Are found very commonly in soils, dust and water. *Bacillus* spores are found in flour, flour based products i.e. bakery and bakery environment. These spores are heat resistant and can grow to toxin production levels under favourable conditions.

Control measures:

Proper sanitation and testing of raw materials helps to reduce initial spore counts. The control of spore growth is difficult in the finished products, therefore, use of preservative can delay the germination.

Listeria Monocytogenes

This is widespread in soil, vegetation and water. It survives in aerobic, anaerobic and microaerophilic and also at elevated levels of CO₂. It can also grow at low pH and aw conditions.

Control measures:

Under the above conditions, the only way to prevent contamination and growth of this pathogen is to maintain strict hygiene and temperature condition.

Mycotoxigenic Molds

Molds, though are visibly seen and rejected by consumer, yet some mold secretes mycotoxins into the bakery products which causes major health concerns.

Control measures:

Proper storage of wheat flour to avoid moisture pick-up and moisture migration therefore prevent mold growth. Antimycotic agents like – propionates and sorbates greatly reduce the risk of mold growth and mycotoxin production in breads.

Chemical Hazards & Control Measures

- ✓ Chemical compounds are used frequently in the food supply chain.
- ✓ Can present food safety risks if their use is not managed.
- ✓ Chemicals used like:
 - Cleaning Chemicals
 - Pesticides

- Allergens
- Toxic Metals
- Nitrites, Nitrates & Nitrous compounds
- PCB's

Chemical hazards in Bakery Industry

Hazards	Sources	Prevention
Pesticides, insecticides	Raw materials, untrained workers doing insecticides spray	Approved Supplier, use only certified agencies for pest control
Heavy metals	From water, processing equipment – grinders, cutters	Lab analysis of water from approved sources
Chemical Additives	If used more than permitted	Trained supervisors
Cleaning Chemicals	Untrained workers involved in cleaning	Train the workers
Lubricants, grease	Uncontrolled maintenance by untrained staff	Train the staff for proper maintenance

Grease

Vehicle grease can transfer from raw material packaging surfaces during transport. Grease may also transfer at metal detection station.

Control measures:

Vehicle inspection should be conducted regularly. Also control on cleanliness should be maintained from supplier's end.

Chemical contamination

Cross contamination of chemicals and raw materials / ingredients can occur in storage areas.

Control measures:

Adequate physical separation should be maintained between other non-edible chemicals and food items. All possible measures should be developed and effectively implemented to avoid any chance of cross contamination.

Food color

High level of food colors in bakery products cause severe health effects including asthma, hyperactivity, etc.

Control measures:

Food color concentration need to be controlled and approved levels shall be maintained.

Arsenic and heavy metals

Long term presence of arsenic in water and in products with water as an ingredient can cause cancer in skin, lungs, bladder and kidney. Also water that is used for cleaning and sanitation should be free of heavy metals.

Control measures:

Periodic water testing is necessary for control and monitoring.

Physical Hazards

May cause illness or injury to the consumer, and may occur due to:

- ✓ Glass
- ✓ Metal
- ✓ Stones, twigs, leaves
- ✓ Wood
- ✓ Pests
- ✓ Jewellery
- ✓ Plastic

Physical hazards in Bakery Industry

Hazard	Sources	Prevention
Glass	Raw materials, containers, light fittings, laboratory Equipment, processing equipment	Use approved suppliers, train employees, cover glass light fittings with plastic sheets, prohibit glass from food handling areas.
Metal	Raw materials, office equipment (thumbtacks, paper clip), electrical wire; shavings, cleaning equipment (e.g. scourers).	Use approved suppliers, train employees and contractors, prohibit metal from food handling areas, preventative maintenance, metal detectors.
Stones, twigs, leaves	Raw materials (usually of plant origin), environment around food premises.	Use approved suppliers, manage use of wooden crates and pallets, train staff.
Pests	Raw materials, environment around food premises, dirty premises.	Use approved suppliers, keep food premise surrounds clean, fly screens on windows, keep doors shut, regularly remove waste, keep food containers closed, clean-up food spillage as soon as they occur, clean premises regularly, train staff.
Jewelry	People	Train personnel in good hygiene practices, limit wearing of jewelry.
Plastic	Packaging (flexible, hard plastics)	Train personnel correct cleaning procedures, packaging design.

Metals, thread hair, rice bran

- from raw materials received in plastic containers and gunny bags and other processing areas

Wood

- raw materials received in liquid drums

Unacceptable odor

- inappropriate storage of butter and other raw materials
- due to spoilage and fermentation

Dust and dirt

- throughout processing areas

Control measures

Regular inspection plans, control and effective cleaning and maintenance

Control Measures for Physical Hazards

Glass Policies : All glasses and windows in the production areas need to be of safe break type.

In case of any glass breakage the glass shouldn't break and fall into the products . Tube lights and other lighting fixtures to be safe break even clocks placed need to be safe break.

Jewellery Policies : No Worker, working in a Bakery is supposed to put on any type of jewellery. Jewelleries could be hazardous and a strict Jewellery Policy should be defined for men and women folks to adhere.

Plastic Policies : Various plastic items are used in bakeries during process and storage e.g bottles, buckets, funnels , scoops , spoon and lab items (beaker ,jars and test tubes etc). A strict Plastic Policy could be drawn to avoid any contamination of food products from these plastic items.

Visitors Policies : To prevent any contamination from the visitors, a Visitor's Policy , giving instructions to visitors as to what are the basic requirements during visit to the Bakery, should be followed.

Assessing Risk and Severity

The Risk Assessment Matrix has two measuring elements to evaluate the level of risk:

Probability of Risk

- Frequency of occurrence of the risk at the identified Critical Exposure Points

Severity of Risk

- Degree of harm/consequences related to the risk

		PROBABILITY				
		Frequent	Likely	Occasional	Seldom	Unlikely
		A	B	C	D	E
SEVERITY	Critical	I	High			Medium
	Moderate	II	High	Medium	Low	
	Negligible	III	Medium	Low		
		RISK LEVELS				

ALLERGENS

An **allergen** is a 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 among select individuals 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. Crustacea 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.”

Source: <http://www.foodallergens.info/Legal/CODEX.html>

The allergens marked in bold maybe more commonly encountered in Bakery industries.

Allergen Hazards in Bakery

Gluten

free baking includes challenge of replicating functionality of gluten in absence of wheat fibre use. Gluten intolerance/ celiac disease is a lifelong illness that is caused by sensitivity to gluten. Flour is thus replaced with combination of fine rice fibre, potato starch, tapioca fibre and xanthan gum.

Lactose

is a double sugar found in milk and similarly, is replaced by Soy milk.

Whipped dairy cream

is replaced by combination of veg based cream filling. It is also replaced by soft or silken soybean curd in case of cheese cakes.

Eggs

are used to give moisture content. The moisture content can be replaced with milk or other liquids. Commercial egg can be replaced by combination of potato starch, tapioca fibre, chemical leavener and carbohydrate gums. Lecithin can also be added which improves overall volume, texture and eating quality.

Allergen Control Program

PEOPLE:

- ✓ Employee awareness through product and utensil identification
- ✓ Hand washing in between non-allergic and allergic materials
- ✓ Clothing- change of clothes wore while handling allergen materials.

- ✓ Rework control- Utmost care to be taken to handle allergen materials to avoid any accidental cross-contamination.
- ✓ Waste control- Allergen material wastes should not be allowed to pile up or spill which can result in environment cross contamination.

RAW MATERIALS & INGREDIENTS:

- ✓ Knowledge of ingredients from suppliers to avoid any possible cross-contamination.
- ✓ Clear labelling and identification of all raw materials and ingredients
- ✓ Safe transport from supplier to receiving place
- ✓ Allergen items to store separately in food processing units. Avoid any spillage

PACKAGING:

- ✓ Good and safe package integrity from supplier
- ✓ Correct labelling

CLEANING:

- ✓ Effective cleaning to avoid risk of cross contamination
- ✓ Dedicated cleaning equipment
- ✓ Cleaning schedule to be developed keeping in mind all the chances of cross contamination
- ✓ Regular cleaning of spillages of allergen materials throughout processing

PRODUCTION:

- ✓ Minimize movement of materials
- ✓ Scheduling of production runs with appropriate cleaning between the runs
- ✓ Physical barriers between allergen and non-allergen materials
- ✓ Schedule allergen containing product lost in production plan
- ✓ Control and trace reworked products

UNSAFE FOOD

Unsafe food refers to food that contain harmful bacteria, viruses, parasites, or chemicals making it unfit for human consumption. Also, physical contaminations like glass particles, stones, and other extraneous matter in food causes food to be unsafe.

Food spoilage, as a part of Unsafe food, means that the original nutritional value, texture, flavour of the food are damaged; the food become harmful to consumers and unsuitable to eat.

Various causes of Unsafe Food

1. **Foreign matter:** Human hair, stapler, metal particles, fabric, plastic, alkali etc. are big threats to food safety. Anything that is not considered as food or food substance is considered as foreign matter.
2. **Pest:** Food infested with pest causes harm to human health. Contamination may be caused by body fluids like urine, fecal matter of rodents, reptiles, pests, nocturnal animals and birds present in the storage yard, marketing yard, transportation etc.
3. **Non- food grade equipment:** Non-corrosive, food grade material to be used for processing equipments; to prevent metal contamination, chemical contamination.
4. **Improper handling:** Unclean hands, wrong selection of equipment causing cross contamination, and packing in unsuitable material.
5. **Improper processing:** Wrong process methods 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 from crop contaminants, residues from 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 quality raw materials:** Quality of raw materials to be checked based on frequent sampling, before selection.
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. **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 as steam. It is also important for washing and sanitation operations. Potable water should conform to the specifications of IS 10500:2012.
11. **Improper storage:** Right combination of duration, temperature, ventilation and segregation defines a good storage. Any deviation in one of these could result in food becoming unsafe.
12. **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.
13. **Improper segregation:** Where certain ingredients/raw material contain/ or are allergens, the appropriate segregation of such materials, equipment, tools and final product is important to ensure consumer safety.
14. **Humidity:** Humidity is a major cause for enabling microbial growth, and rancidity. Food zones must have lesser than 65% humidity to ensure food safety.
15. **Temperature:** Temperatures of processing, holding, storing, transporting, are all important factor in food being safe.

16. **Time:** No raw material, or product should be held beyond designated shelf life.
17. **Non-food grade packing:** Intermediate and final product should be packed only in acceptable packing material to ensure food safety.
18. **Improper waste disposal:** Waste if not disposed in a hygienic manner, can breed pest and microorganisms which are a threat to food safety.

PART II

LOCATION, LAYOUT & FACILITIES

- **Location and surroundings**
- **Premises and rooms**
- **Equipment & containers**
 - Equipments used for food handling and monitoring
 - Containers for waste/inedible materials
- **Facilities/utilities**
 - Water supply, ice & steam
 - Waste disposal
 - Personal hygiene facilities
 - Air quality & ventilation
 - Lighting

LOCATION & SURROUNDINGS



Location and Surroundings

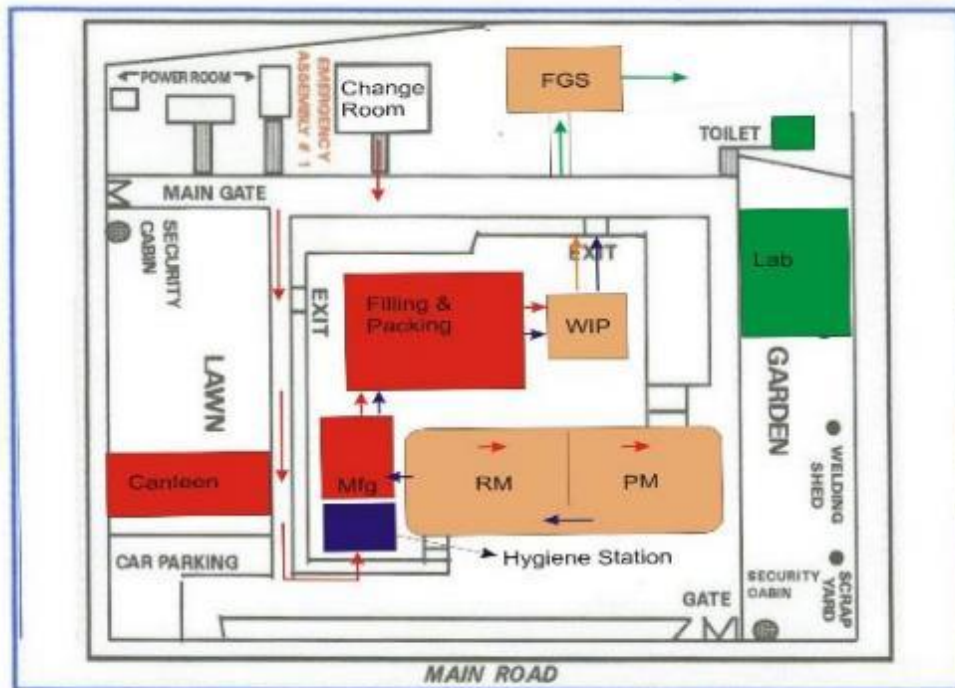
Selection of Location should be such that these are away from environmentally *polluted areas and industrial activities* , disagreeable *obnoxious odour, fumes, excessive soot, dust, smoke AND chemical or biological emissions* and pollutants. Areas which have high probabilities of *flooding, earthquakes*, areas prone to *infestations of pests*, areas where *solid or liquid wastes* cannot be removed effectively should be avoided. The location of food premises must :

- NOT be used for *residential purpose*, and should not open to any direct access to any residential area.
- should have appropriate Access control to prevent stray animals.

Establishment Surroundings

Land outside the factory including Roadways and Raw material receiving and Finished product dispatch areas must be free of debris, Vegetation, weeds, grasses. It should have adequate draining system .

A typical hygienic Layout of a food manufacturing premise is provided below:



■ High Hygiene Area ■ Hygiene Area ■ General Area ■ Hygiene Station

LAYOUT & DESIGN OF FOOD ESTABLISHMENT PREMISES

Internal design and layout

The Premises and Rooms Facilities should be appropriately maintained, cleaned and disinfected. Walls, Floors, Partitions, ceilings, windows should be designed and constructed for easy maintenance and cleaning.



Walls, Floors and Ceilings

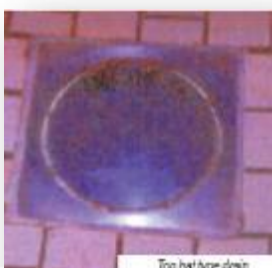
Buildings should be constructed and maintained so that floors, walls, and ceilings should be free of cracks, crevices and should be smooth and non flaky so that they can be properly cleaned and kept clean and in good repair.



Drains

Accumulation of waste water on the floor of food premises increases the risk of food contamination. Properly designed and constructed floor drains can eliminate water accumulation and prevent entry of pests to food premises.

Floor Drains must be constructed to prevent accumulation or backflow of waste water. These must be easily accessible for cleaning and must be properly trapped, vented and connected to the drainage system



Top hat Area drain



Drain Trap



Drain protected from outside

Raw material Storage

Raw material storage must ensure easy maintenance & cleaning, prevention of pest entry and harborage and protection of materials and baked products from contamination



X



✓



✓



✓



EQUIPMENT AND CONTAINERS

Equipment construction should not damage the product. It should be capable of being dismantled for cleaning/ CIP. The design should be robust & smooth so that outside surface does not allow dust, insects, and microbes to accumulate. The equipments and containers should permit easy and adequate maintenance and cleaning

Specific care should be taken on Food Contact Surfaces of Equipment and Utensils . All food contact surfaces /equipments should be constructed of suitable food grade material and maintained in good state of repair & working condition. These should be smooth, free of cracks and crevices and clean and free from obnoxious matters. Some key practices comprise:

- ✓ Regular cleaning and sanitizing to prevent accumulation of grease deposits, dirt and other residues
- ✓ Thermometer probes inserted in food or touching food contact surfaces to be cleaned and sanitized between uses
- ✓ Max. 5% acetic acid spray during summer/monsoon in specific areas / equipment
- ✓ Food Contact surfaces be maintained clean and sanitary.
- ✓ Cleaning and Sanitization of equipment and utensils - used for different food materials / ingredients between the uses prevents cross-contamination
- ✓ Chipped or cracked Equipment and utensils harbor dirt, bacteria. Cannot be effectively cleaned and sanitized and may cause infectious diseases.
- ✓ They may also contaminate food with its broken / chipped pieces.
- ✓ All equipment should be suitably designed for effective cleaning.
- ✓ Should be maintained to minimize the risk of product contamination.
- ✓ Regular maintenance program for equipment to prevent product contamination by foreign bodies arising from equipment failure.

Other important points to remember are:

- ✓ Cleaning of ventilation system (tubes, filters)- inside and outside surfaces must be ensured
- ✓ Paints and Lubricants
 - Paints and lubricants shall be suitable for intended use.
 - Lubrication or greasing of machines drive ,chains and sprockets could be done by food lubricants. Various food lubricants are available in markets .
 - Even certain guides requires lubrication these guides can be lubricated by food lubricants

Cleaning and Sanitizing

Cleaning is an important step. It should be carried out before Sanitization

- What is Cleaning
 - Removal of food residues, dirt, grease and bacterial film
 - Firstly, pre-scraping and rinsing with clean water
 - Secondly, washing with warm water and detergent by agitation- loosen remaining food residues, dirt
 - Lastly, rinsing with clean water to remove loosened residues and residues of detergent

Hygienic design of equipments



Hygienic Layout of Equipment



Hygienic Layout of Packing Machines

10 Principles of Hygienic design of equipments

1. Cleanable to a Microbiological Level:

- Food equipment must be constructed to ensure effective and efficient cleaning of the equipment over its life span.
- The equipment should be designed as to prevent bacterial ingress, survival, growth and reproduction on both produce and non-product contact surfaces of the equipment.

2. Made of Compatible Materials:

- Construction materials used for equipment must be completely compatible with the product, environment, cleaning and sanitizing chemicals and the methods of cleaning and sanitation.

3. Accessible for Inspection, Maintenance, Cleaning and Sanitation:

- All parts of the equipment shall be readily accessible for inspection, maintenance, cleaning and sanitation without the use of tools.

4. No product or liquid collection:

- Equipment should be self-draining to assure that liquid, which can harbor and promote the growth of bacteria, does not accumulate, pool or condense on the equipment.

5. Hollow areas should be hermetically sealed:

- Hollow areas of equipment such as frames and rollers must be eliminated whenever possible or permanently sealed.
- Bolts, studs, mounting plates, brackets, junction boxes, plates, end caps, sleeves and other such items should be continuously welded to the surface, not attached via drilled and tapped holes.

6. No niches:

- Equipment parts should be free of niches such as pits, cracks, corrosion, recesses, open seams, gaps, lap seams, protruding ledges, inside threads, bolt rivets and dead ends.

7. Sanitary Operational Performance:

- During normal operations, the equipment must perform so it does not contribute to unsanitary conditions or the harborage and growth of bacteria.

8. Hygienic design of maintenance enclosures:

- Maintenance enclosures and human machine interfaces such as push buttons, valve handles, switches and touch screens, must be designed to ensure food product, water or product liquid does not penetrate or accumulate in or on the enclosure or interface.
- Also, physical design of the enclosures should be sloped or pitched to avoid use as storage area.

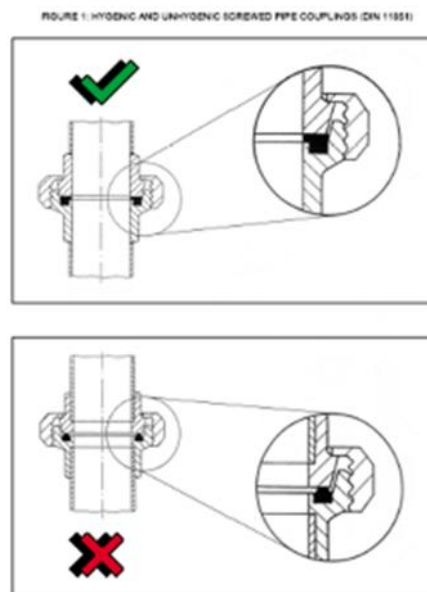
9. Hygienic compatibility with other plant systems:

- Equipment design should ensure hygienic compatibility with other equipment and systems, such as electrical, hydraulics, steam, air and water.

10. Validate cleaning and sanitizing protocols:

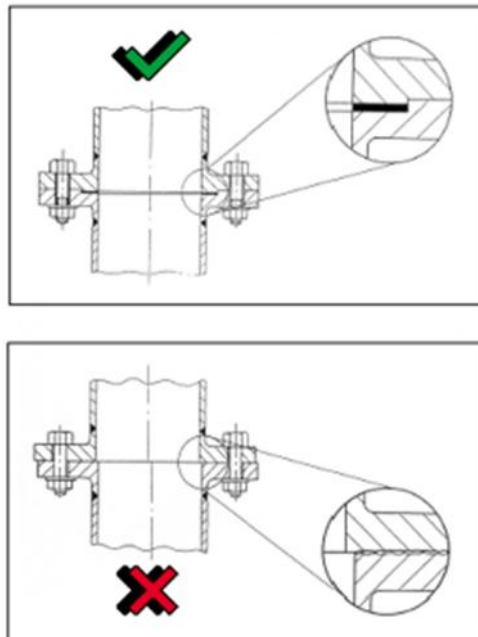
- Procedures for cleaning and sanitation must be clearly written, designed and proven effective and efficient.
- Chemicals recommended for cleaning and sanitation must be compatible with the equipment and the manufacturing environment.

Hygienic and Unhygienic screw pipe couplings



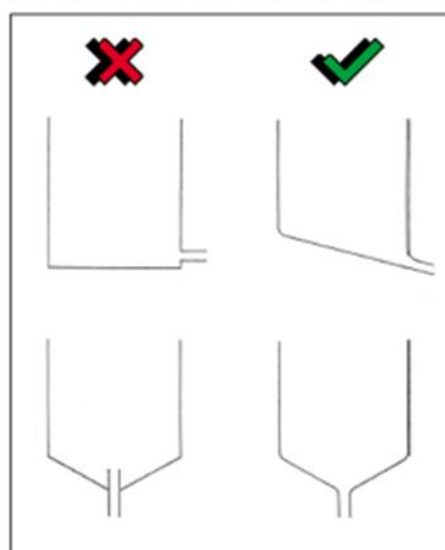
Hygienic and unhygienic flanged joints

FIGURE 2: HYGIENIC AND UNHYGIENIC FLANGED JOINTS



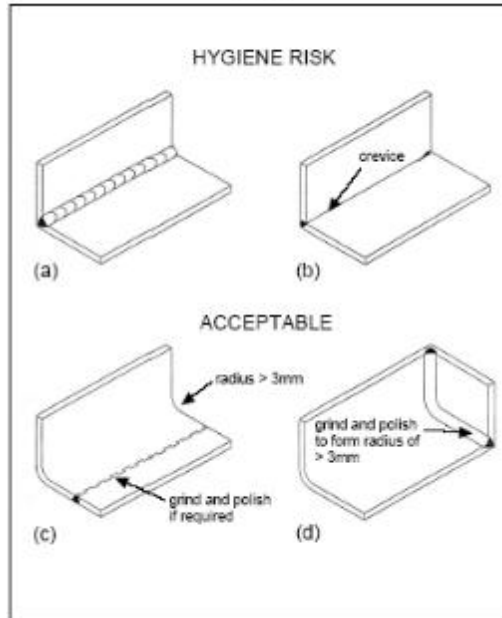
Equipment should be self-draining of Product and Fluids

FIGURE 3: EQUIPMENT SHOULD BE SELF-DRAINING OF PRODUCT AND CLEANING FLUIDS



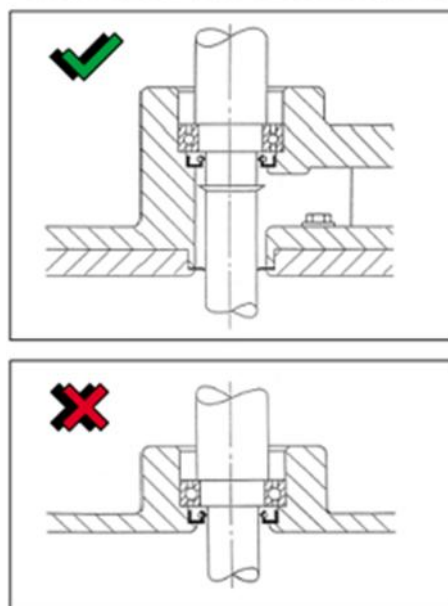
Internal angles and corners should be radial to facilitate cleaning

FIGURE 6: INTERNAL ANGLES AND CORNERS SHOULD BE RADIIUSED TO FACILITATE CLEANING



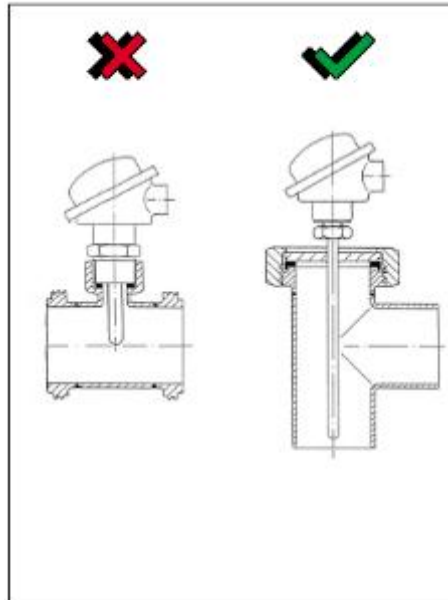
Bearings and Shaft Seals to indicate Seal Failure and Oil leaks

FIGURE 7: BEARINGS AND SHAFT SEALS TO INDICATE SEAL FAILURE AND OIL LEAKS



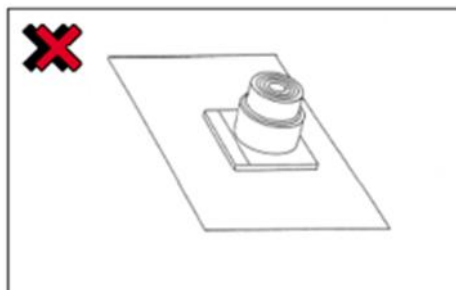
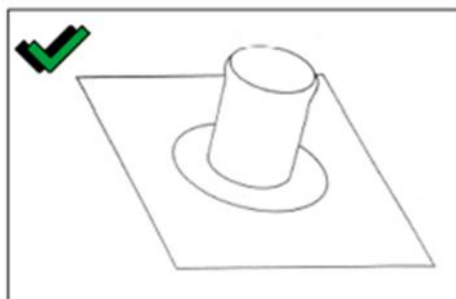
Poor positioning of instrumentation to create dead legs

FIGURE 8: POOR POSITIONING OF INSTRUMENTATION TO CREATE DEAD LEGS



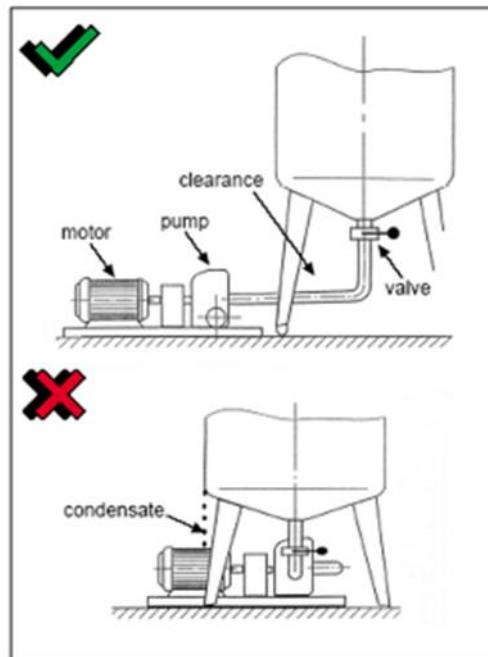
Rubber capped switches to allow easy cleaning

FIGURE 9: RUBBER CAPPED SWITCHES TO ALLOW EASY CLEANING



Installation of equipment to provide ease of cleaning and servicing

FIGURE 10: INSTALLATION OF EQUIPMENT TO PROVIDE EASE OF CLEANING AND SERVICING



Key design pointers

- ✓ Closed-box construction should never be done without the use of hermetically sealing the box.
- ✓ Places where any type of particle can get into should also have a wide enough access point for cleaning fluids to enter and adequate drainage.
- ✓ Crevices, overlapping parts, bolt threads, and other contamination collection points should be eliminated through simple uncluttered design.
- ✓ Porous metals should never be used.
- ✓ Parts need to be connected in one of two ways: smooth welds, or spacers and bolts with unexposed threads.
- ✓ Disassembly should be easy and not require the use of tools in instances where machine parts need to be taken apart for cleaning.
- ✓ Material of construction of all bakery equipment and machinery – Made of stainless steel (SS) Food grade plastic.

FACILITIES / UTILITIES



Water Supply

Adequate Water from public mains or from an approved source is likely to ensure Clean & safe water to drink and avoids contamination of food or equipment. Some key parameters for safe water are:

- Potable Water to be used for food Processing and cleaning
- Ice, Steam to be potable if it comes in contact with food items
- Chlorination, Hot water are to be used for cleaning and sanitation
- Safe, Contamination free Storage for potable water is essential
- Prevent Cross Contamination of Potable, Non- potable through colour coded distribution lines

Water Storage and Treatment

Water Storage and treatment must be at a **convenient location** to feed entire facilities. It need to provide for **receiving and supply**. **The important steps are :**

- **In line disinfection** devices like Chlorine dosing pumps / Venturi-meters / UV etc
- Must be **made of material that will not support microbial** / weed growth & remain cleanable & easy to maintain
- Must be **protected against pest entry**
- The **purity** has to be checked for the presence of microbes and certain minerals and contaminations if any .
- **Filters** to be provided at various places in process.
- **Water storage tanks to be cleaned** at regular intervals .



Waste Storage and Disposal

Waste is a potential source of pathogens and food contaminants. Proper disposal of waste is important for preventing the spread of pathogens inside food premises and contamination of food. Properly maintained waste containers can discourage the access of pests and Animals.



Solid waste management

All solid waste should be preferably stored in garbage bags and to be shifted to outside garbage yard. Garbage should always be covered and should not be open in any case. Bins with covers should be used where ever possible. Plastic Crates can be used to store defectives and unpacked products.



Drainage system

A good drainage system has to be designed for smooth flow of domestic waste water and trade waste water to the collection pit. The Effluent and sewerage treatment plant has to be installed as per regulatory requirement.



Personal Hygiene Facilities

Provision of well-equipped and properly located changing and toilet facilities prevents equipment and food from faecal contamination that may be carried by insects, hands or clothing.

A properly maintained changing and toilet facility can reduce the likelihood of spread of food borne diseases.

Changing facilities and toilets must be adequate in number and suitably and conveniently located.

Some key parameters are:

- Walls, floors and sanitary fitments made of smooth durable and impervious material
- Designed for hygienic removal of waste matter
- Well lit
- Well ventilated with exhaust fans
- Not open directly on to food handling areas
- Hand washing facilities with hot/ cold/ mixed, warm water
- Hand cleaning chemical/soap
- Hand drying facility
- Paper towel dispensers and receptacles
- Non-hand operable taps - min. 20 sec. Continuous supply
- Self-closing doors

Hand washing facilities

Wash Basins Should be Clean and adequate in numbers. These must be:

- Equipped with supply of Hot / cold or warm water
- Provided with liquid soap and hand drying facilities
- Liquid soap through dispenser
- Hand- drying facility of single-use (Paper towel) or
- electric hand dryer
- Suitably and conveniently located
- Accessible easily and without obstruction for use and cleaning

- Dedicated for hand wash – Displays – “ For Hand Wash only”
- Hand wash notice
- Facilities checklist
- Properly trapped waste pipes to drains



Air Quality & Ventilation System

Excessive fumes, smoke, grease or vapor pose potential hazards to health of workers and are potential sources of food contamination. Dripping grease or condensation can contaminate food or food contact surfaces. Provision of adequate natural and mechanical ventilation can keep the air clean and healthy by removal of excessive fumes or vapor, and introduction of fresh air.

The Ventilation System must be kept in operation and maintained in good condition and repair. There should be periodic checks / annual Inspection. Other checks comprise:

- Air Filters and Filter Flag Indicator
 - Removable. Cleaned to prevent dirt, dust accumulation
 - Cleaned by water and detergent or replaced if required
 - Grills tightly fixed to prevent rodent entry
 - Natural or Mechanical
 - To remove fumes, smoke, steam, heat, condensation and supply of fresh air
 - Adequate propulsion and extraction
 - Intake and discharge point in open air free from obstruction
 - Height not less than 2.5 m from ground
 - Intake through fly proof mesh
 - Extraction through louvers / fly proof mesh
 - Mesh easily removable and cleanable
 - Direction of air flow from “Clean” to “Dirty areas”

Ventilating System of Bake House / Bread Cooling

Metal hoods, ducting, extraction fans, grease filters and water scrubbers of exhaust and extraction system maintained clean – free from grease and dirt

Systems be operational and efficient during business hours – Absence of fumes or condensation in Bake house etc.

Grease filters or air pollution control equipment like water scrubber should be

- Regularly washed or changed to clean grease or dirt on filter
- Fixed in their position except during cleaning / repair

Propulsion fans maintained in good working condition and working during business hours

Louvers on exhaust fan operational

Fly proof mesh on windows / exhaust fans cleaned regularly

Suggested Air Changes

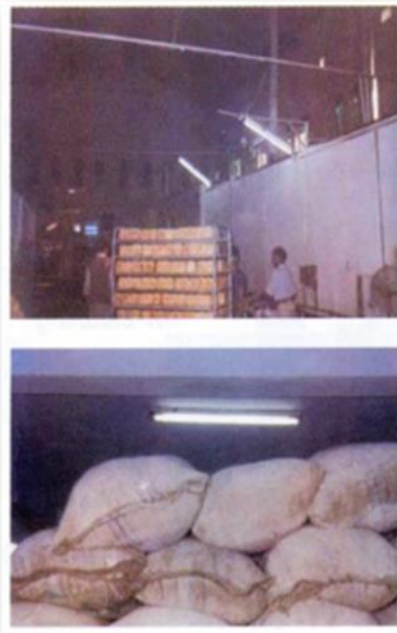
Air supplied to food premises should be of sufficient quality and Quantity to replace contaminated air for health of workers and product safety.

Type of premises/Work Room	Air Changes/Per Hours
Bars, Public Rooms, Cafes	8 - 10
Cellars	3 - 5
Kitchens	20
Toilets	6 - 10
Store Rooms	3 - 6
Offices	6 - 10
Bakehouses	20 - 30

Lighting

Adequate lighting facilitates easy identification of dirt, helps maintain the hygienic condition of food premises and promotes safe food production. Lighting should be adequate, natural and / or artificial for safe production of food and facilitate cleaning. Lighting fixtures should be designed to prevent accumulation of dirt and easy cleaning

Lighting should also be In line with Glass Policy i.e Shatter proof covers to be placed in risky areas



Protection of lights by shields is important for preventing contamination of food by glass fragments.

Recommended Levels of illumination

Activity	Level of luminance(lux)
Food and equipment storage areas	110-150
Retail, dishwashing, handwashing, toilet areas	200-300
At food preparation surfaces	500
For reading, inspection and monitoring equipment (by provision of local lighting)	600-1200

PART III

MATERIAL HANDLING

PROCUREMENT OF RAW
MATERIALS
HANDLING OF RAW MATERIALS



PROCUREMENT OF RAW MATERIALS

A wide variety of bakery products comprise wheat loafs, rye breads, buns, coffee breads, cakes, cookies, pizzas, pies and others. **Food hygiene for bakery is vital** throughout the whole food chain right from raw material to transportation of ready products.

It is thus important to begin with Supplier Control which comprises evaluation of supplier's Environmental Hygiene, Hygienic processing of raw materials, Handling storage and transport, Cleaning, Maintenance and personnel hygiene

Incoming material Requirements

Raw Material (Maida, Sugar, H.V.O., Shortenings)

- ✓ As per FSSAI Requirements and Company Specifications
- ✓ Free from contaminants e.g., pesticide residues; metal filings, jute fibers

Packaging Material

- ✓ Food Grade
- ✓ Free from foreign matter e.g., Hair, Staple pin

When Procuring raw materials, there is a need to ensure:

- Quality and safety of baking ingredients** – flour, yeast, other ingredients.
- Cold chain** for fast-spoiling ingredients (transport)
- Visual control** (broken and dirty package, foreign materials-stone, glass, hair, jute thread, etc. shelf life)
- Controlling the **temperature of fast-spoiling ingredients**

- Quality records and Certificates** (Incoming inspection, COAs, COCs)
- Safe handling and storing.** Storing at required humidity and temperature. Away from non-food materials.
- FEFO** (First Expiry First Out) principle



Eggs

- Discard cracked eggs.**
- Store in chillers.** Store at room temperature only for current batch of eggs.
- Utmost care to **prevent cross contamination**: wash hands, utensils, surfaces and sanitize after using eggs.
- Pool** the number of eggs required, just before use.
- Prepare raw eggs **away from cooked/ ready-to-eat foods.**
- Wash and clean** all eggs before use.

Dry Ingredients- *wheat flour, sugar, milk powders, minor ingredients and cocoa powder*

- Visual inspection** to control foreign objects.
- Use **appropriate test sieves.**
- Reject infested stock** with larvae/ weevils.
- COAs/ COCs** mandatory to receive and record.
- Store at **appropriate temperature and humid conditions.**
- Away from non-food materials.**



Ready- to –eat materials- *mayonnaise, cream, icing, mousse, butter*

- Observe **good personal hygiene practices** while handling/preparation.
- Small Batches
 - Prepare only what is required in **small batches** (estimate the demand to avoid over- production and prolonged storage)
 - **Minimise the time of products left out of the chiller.** Store the products in the chiller as soon as possible after use.
- Use **liquid eggs / egg powder** instead of egg shells, where possible.

Wet Ingredients- *Oils and Fat*

- Ensure **Seal integrity** of oil containers / tankers.
- Incoming sieve and magnet in the hose while **Unloading**. Preferably 30 BSS sieve to arrest and identify contaminants.
- Use proper plungers to homogenize the lots, while **Sampling**.

Specialty Ingredients- *Nuts & Dry fruits*

- Nuts received should be **free of infestation**.
- The **storage condition** for nuts should be **below 4 degree centigrade** to assure dormancy of the eggs, if any in the nuts

HANDLING OF RAW MATERIALS

Key Checks

- ✓ All raw materials should be stored **off the floor and off the walls** (easy and adequate cleaning) , must be **Free from insect and rodent infestation** or adulteration and should be **Free of contamination** from other sources, e.g. birds, moisture, mould etc.
- ✓ If bulk flour handling and storage is in use:
 - **Hose couplings**, inside and outside plant, should be adequately protected from rodents, clean and in good repair
 - **Dust collectors or ventilation bags** at top of the bulk tank should be clean and insect free
 - **Inspection ports** - cleanable/covered and free from contamination
 - **Tailings from sifting operations** should be free from contamination.
- ✓ All containers for storing raw materials are to be kept **covered**.
- ✓ **FEFO (First Expiry First Out)** system should be applied to release the raw material from the store.
- ✓ **Expired material** should be discarded and not enter into the manufacturing process.
- ✓ **Food colours and additives** should be used within the safe limits prescribed in FSSAI Regulations.

PART IV

PRE- PRODUCTION PROCESSING

Mixing

Mixing is the process of converting flour & water into dough by blending the dough ingredients and developing the gluten matrix into a continuous matrix.

The consistency and requirement of mixing depends on

- *The type of biscuit dough*
- *Flour characteristics*
- *Particle size of various ingredients*
- *Type of Fat / Oil used*
- *Forming machine &*
- *Finished product characteristics*

- ✓ **Mixing room** - clean & dry without any spillage
- ✓ **All mixing utensils** - free from grease and old batter. Wash before Use.
- ✓ **Mixing bowls, beaters and scrappers** - wash with hot water at least once in 24 hours
- ✓ Use **strainer to add Egg whisk in mixing**.

[The strainer is 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.]

- ✓ **Mixing room floor** - clean with hot water followed by mopping with hypochlorite solution.

Cross Contamination

The main roots of contamination are from – **Surface, Air, Water, People and Pests**

- ✓ **Physical contamination:** pieces of glass, wood , metal, plastic, film, human hair and fingernails, plasters, jewellery, small personal belongings, pests, paper, cardboard.
- ✓ **Chemical contamination:** residues of cleaning and disinfection chemicals, machinery lubricants, synthetic preservatives, food additives, pesticides.
- ✓ **Biological contamination:** microbiological (bacteria, yeast, mould, mycotoxins) and pests.
- ✓ **Allergen contamination:** Systems should be in place to prevent cross contamination within ingredients; or within different production lines; during storage and during work-in-progress.

Prevention against Cross Contamination

- ✓ **Flour sieving** to be done through a minimum of 32 size mesh and the sieve should be cleaned regularly
- ✓ If **weevils** are found, such consignments should be rejected.

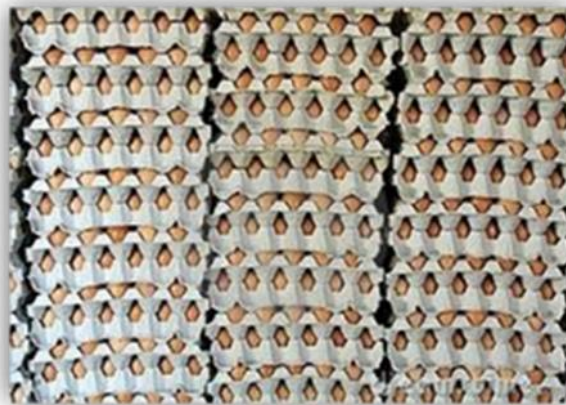
Periodic cleaning mechanism ensures prevention of cross-contamination and dust generation and to ensure safe collection of unwanted materials like dust, dirt.

(Best Practices; such as vacuum cleaning, collection of debris through hypochlorite can be used)

- ✓ Sieved ingredients/ additives should be **kept in clean and dedicated containers / jars** with proper identification, suitably above the floor.
- ✓ **Sugar**
 - passed through magnetic grill before use
 - periodic cleaning of magnetic grill to be ensured
 - Sugar bags to be free from any external contamination like dust, dirt, rice bran, etc.
 - Keep appropriately- off the floor and away from wall
 - Don't stack too much vertically



- ✓ **Egg trays**
 - should be free from dirt or pests
 - Broken egg- shells to be stored in plastic bags and disposed off at regular intervals.



- ✓ **Fruit cuts, when used** to be washed with ozonized water before use.

✓ **Potassium sorbate, if used** to be dissolved thoroughly in water before use. Only freshly prepared sorbate solution to be used.



PART V

PRODUCTION

Baking

***Baking** is about development of the product and removal of water.*

A Baking room must be clean & dry. It should be mopped with 500ppm Sodium Hypochlorite solution, at least once in each shift. Some good practices comprise:

- ✓ Ozonizer at the baking room - maintain at 5gm per hour level
- ✓ Cake cooling trolleys mopped with 500ppm hypochlorite solution daily.

During baking, a series of modifications to the dough takes place. These are Textural modifications, Development of flavor and Development of color



Cooling

Ambient temperature cooling of cakes at room

After baking, bar cakes are transferred immediately to the **ambient room**. A **Positive pressure** at ambient room is to be maintained. An **Ozonizer** maintain at 2gms per hour level. **UV lights are used** during cooling of cakes. Personnel entry is to be restricted in this room. **Workmen unloading cakes - use a disinfectant solution** to disinfect their hands.

Forced cooling at slab cooling room:

UV lights should always be put on during cooling of cakes. Personnel entry is to be restricted in this room

Temperature of this room to be maintained at 8-10°C. The same is to be noted & recorded.

Sandwiching/ Mallow/ Center filled and Enrobing

PIE Preparation:

Steps for Crème/ Mallow/ Centre filled preparation-

- i) Weigh raw materials applicable for crème preparation as per recipe.
- ii) Sieve specific ingredients of crème and/ or mallow. Pass through magnetic grills.
- iii) Pass through metal detector to avoid any metal contamination.
- iv) Reference samples of each batch of the crème has to be kept to see and control batch to batch colour variations.

Steps for Enrobing

For Pie enrobing - enrobed cake weight should be monitored

- Pass enrobed cake through cooling tunnel at a pre-defined temperature.
- Pass enrobed cake through metal detection – after cooling tunnel.
- Pass through UV light to ensure surface sanitation.

Metal Detection

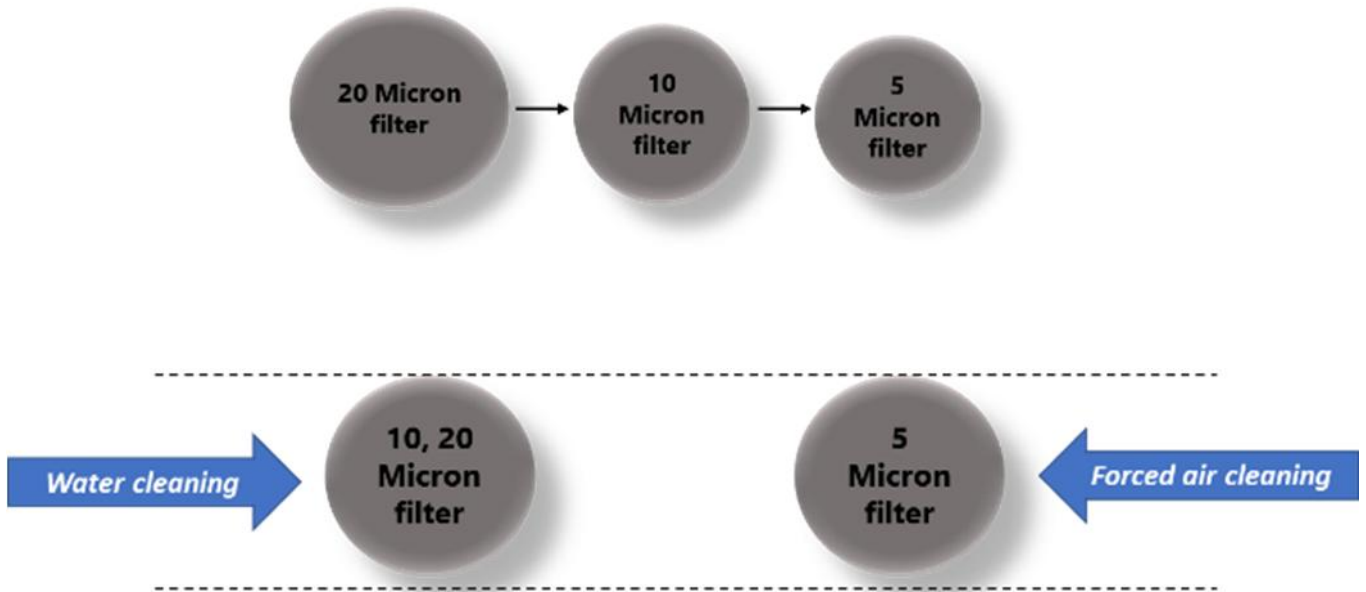
Methods for Metal Detection include :

- Magnets- Magnets to be installed at all the places where ever required to detect metal particles in the raw material.
- Sieves- Materials to be passed through sieves wherever possible to check for any foreign particles and contamination.
- Metal Detectors - Metal detectors can be placed in the process to check for any metal and non metal contamination.
- Filters -- Liquid ingredients to be passed through these filters to prevent any contamination.

Air Handling Unit (AHU)

AHU is maintained inside the pre-slab and oven room. A positive pressure is maintained in the Pre-slab room > oven room.

- ✓ Air is blown inside the oven and Pre-slab room through sets of micro filters – first through 20 micron, then through 10 micron and finally through 5 micron filter for the oven room.
- ✓ Additionally the air is passed through Hepa filter for pre-slab room.
- ✓ 20 and 10 micron filters are cleaned by water and 5 micron filter is cleaned by forced air at least once in a fortnight or as required.
- ✓ Hepa filter is changed when the same is choked or non-functional.



Role of Process Control in Food safety

More than 90% of contamination of bread occurs during cooling, slicing, or wrapping operations.

Process control includes the following:

- ✓ **Foreign body detection** - sieves, magnets, metal detectors, x-ray detectors.
- ✓ Control of **Usage of preservatives and food additives**.
- ✓ Process control for **Temperature and Cooling Time** is critical.
- ✓ Control of **Cooling and Freezing temperatures**.
- ✓ **Microbiological check** on samples from –
 - *production air,*
 - *water,*
 - *product equipment,*
 - *crates,*
 - *employee hands,*
 - *Others*

Good Practices in Bakery Industry



Wheat Flour Sifter



Pouch Storage Pigeon Holes



Baking Tins Stacked inverted



Semi Processed items kept in covered condition



Hygienic Layout of Equipments & Packing materials

PART VI

PACKING & TRANSPORT- ATION

Steps in Slicing and Packing of Bakery products

- ✓ Cool baked products on **clean racks and trays**. **Cover** during cooling.
- ✓ **Clear leftover crumbs** 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.
- ✓ Only **food grade packaging material** (printed/unprinted) for wrapping and packaging of food items. **Check COA** during receiving of the materials.
- ✓ All the products should be labelled according to the **Food Labelling Act**.
- ✓ **Slicer blades & conveyor belts** to be sterilized with isopropyl alcohol at least 3 times in each shift or as & when required.
- ✓ **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 unpacked 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.
- ✓ **Handle unpacked cakes with sterilized gloves**. **Disinfectant solutions** to be used by all packers as and when required.

Packaging, Storage and Transportation of Final Product

Final products must be Stored under hygienic conditions in a room intended for the purpose.

Immediately after packaging, finished products are placed under **Controlled temperature and humidity conditions**. **FEFO (First Expiry First Out)** system should be applied for dispatch of all products. **Exit Temperature of cake slabs from Slab cooling room** should be within the range of **14 – 19°C**. **Other important parameters are:**

- ✓ **Contact parts of packing machines** to be cleaned with 500 ppm hypochlorite solution.
- ✓ **Exposure of UV light on PVC trays, cakes & wrappers** during packing
- ✓ **Store Finished Products** > in covered containers at appropriate temperatures.
- ✓ Ensure they are stored on separate shelves above raw food (including shell eggs).
- ✓ Procedure to guarantee product safety during storage, loading and transportation.
- ✓ Cleanliness of storage areas and vehicles
- ✓ Controlling temperatures, cold-chain (Frozen bakery products)
- ✓ Use of castors or pallets under crates.
- ✓ Do not leave products outside
- ✓ Maintenance of vehicles

Dispatch and Loading

The loading of goods should take place in separate designated area and no despatch work must be carried out in garages. Sufficient ventilation, with cross-ventilation of the loading room should be maintained.

Retail and Display

Products must be stored in clean display cases which are covered at all times, at appropriate temperatures (e.g. cakes with fresh cream should be stored in chiller display units at 4°C and below). Products with perishable fillings must not be displayed beyond 4 hours at room temperature. A first-in-first-serve approach must be adopted in the display of products for sale.

Time stamp is used for the products to inform consumers on the “consume-by” date.



Control of Storage Conditions

Specifications for Warehousing & Storage are used to describe the conditions required. Where specified, **monitoring of temperature and humidity** must be carried out using calibrated recording equipment. A reporting system with corrective action plans for out of range results shall be defined. Some of the common terms in use are:

Ambient Storage : Prevailing conditions with no control over temperature or humidity required or expected.

Dry Storage : Prevailing conditions controlled to avoid absorption of humidity from air.

Temperature range 15 to 25°C (59 to 77 °F), relative humidity < 65%.

Conditioned Storage : Temperature controlled within a defined range of 10 to 20°C (50 to 68°F). Humidity 65% maximum.

Control of Transportation Conditions

Appropriate temperature ranges during Transportation is important for food safety. Effective operation of vehicle chiller units shall be verified by temperature measurement.

Documented procedures defining **shipping parameters for all stages of the distribution** process shall be in place. Procedures for reporting stock or delivery issues (e.g. shortages, delayed deliveries) shall be taken into consideration

- Transportation: Vehicles must be clean, free from odours, and be fitted with appropriate temperature control and monitoring devices where required.

PART VII

PERSONAL

HYGIENE

Health status

Behavioral & personal cleanliness

Visitors

HEALTH STATUS

Good Hygiene Practices

It is divided into three parts:

I. Personal Health

II. Personal Hygiene/Cleanliness

III. Personal Training and Habits

For Hygiene maintenance in a Bakery Plant, the following are necessary :

- Establishing specific guidelines for bakeries, governing personnel requirements, hygiene, sanitation, and food-handling practices.
- Ensuring that persons working in a bakery understand the importance of personal cleanliness, sanitation, product controls and hygienic practices.
- Ensuring that bakery products are free from contamination and meet agreed customer requirements.
- Employees at all level need to understand importance of food/product borne risks of health such as food infections/poisoning and illness
- Display of the instructions, at strategic locations in the site, on hygiene/ housekeeping / health helps a lot in ensuring compliance to them
- Medical Examination
 - Prior to employment
 - Annual Check up
 - Check up after prolonged absence/ sickness
- Communicable Diseases
 - No person to work in food handling if
 - . Suffering from or carrier of infectious disease
 - . Afflicted with infected wounds
 - . Skin infections
 - . Sores or diarrhoea
 - Immediately report



Open Cut



Open Cut being dressed

Illness & Injuries - Jaundice, diarrhea, vomiting, fever, boils, cut skin lesions, discharges from ear, eye or nose etc. should be reported to Management. Injuries like Cut or Wound must be protected by water proof covering, firmly secured and conspicuous in colour.



The Risks associated with hygiene & health lapses are that many hygiene or consumer safety incidents happen due to short cuts or ignorance associated with personal hygiene and health. Dangerous from cross contamination point of view are diarrhoea, vomiting, skin lesions, unhygienic habits such as spitting eating / pecking / avoiding hand wash or skipping hand drying / not wearing caps / beard nets.

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)

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.

Sample-Annual medical certificate for food handlers

The information provided in this questionnaire is confidential and, following any necessary action taken on behalf of the Company, the form should be retained in the Occupational Health records (or personnel records if no OH Department).

Name Job Title Employee ref. No.

HISTORY: Initial/Since last Certificate

- | | | | |
|----|--|-----|----|
| 1. | Any history of diarrhoea and/or vomiting lasting 24 hours or longer? | YES | NO |
| 2. | Any history of, or contact with, typhoid, paratyphoid, or enteric fever | YES | NO |
| 3. | Any history of, or contact with, yellow jaundice? | YES | NO |
| 4. | Any history of skin conditions, eczema, dermatitis, boils or septic fingers? | YES | NO |
| 5. | Any history of disease of, or discharges from, the ears, nose or eyes? | YES | NO |

EXAMINATION

General Cleanliness	Nose	Stool Test
Skin	Throat	
Hair	Ears	
Nails		

OPINION: PASS FIT / REFER TO DESIGNATED OH STAFF

Signed: _____ Date: _____
Designated OH Staff:

HYGIENE OF FOOD HANDLERS (Behavioral & Personal Cleanliness)

Documented hygiene rules MUST BE communicated to all food handlers. These comprise:

- ✓ Regular and effective hand washing:
 - Before starting work
 - Regularly during work
 - After eating/smoking/using toilet
 - After undertaking cleaning operations and equipment maintenance
- ✓ Appropriate and clean clothing is critical to safety of products
- ✓ Jewelry and watches- shall not be worn
- ✓ All cuts and grazes- covered with colored plaster
- ✓ Fingernails- short, clean, unvarnished
- ✓ Scalp hair – fully covered
- ✓ Rules for mechanics, subcontractors, and visitors

Keep finger Nails Short and Clean.

Long finger nails harbour dirt and germs which get entry into food you are eating or Serving. In either case it is undesirable.



Hair contributes greatly to sanitation problems. Research shows that most people lose 50-75 strands of hair a day



Personal Hygiene- Food Handlers

Pathogens often transmitted by food contaminated by infected food handlers

Name of pathogen	Name of disease
Hepatitis A	Hepatitis A
Norwalk and Norwalk-like viruses	Norwalk disease or Norwalk-like disease
<i>Salmonella typhi</i>	Typhoid fever
<i>Shigella species</i>	Shigellosis
<i>Staphylococcus aureus</i>	Staphylococcal disease
<i>Streptococcus pyogenes</i>	Streptococcal disease

Pathogens occasionally transmitted by food contaminated by infected food handlers

Name of pathogen	Name of disease
<i>Campylobacter jejuni</i>	Campylobacter enteritis
<i>Entamoeba histolytica</i>	Amoebiasis
Enterohaemorrhagic <i>Escherichia coli</i>	Diarrhoea caused by <i>Escherichia coli</i> (enterohaemorrhagic strains)
Enterotoxigenic <i>Escherichia coli</i>	Diarrhoea caused by <i>Escherichia coli</i> (enterotoxigenic strains)
<i>Giardia lamblia</i>	Giardiasis
Non-typhoidal <i>Salmonella</i>	Salmonellosis
Rotavirus	Rotaviral enteritis
<i>Taenia solium</i>	Taeniasis
<i>Vibrio cholerae</i> O1	Cholera
<i>Yersinia enterocolitica</i>	Yersiniosis

Personal Behavior

Personnel engaged in handling of raw material, work-in-progress and baked products should refrain from smoking, spitting, chewing or eating and sneezing or coughing over unprotected material and products.

Some of the Don'ts in Food Handling Areas are:

- . Eating
- . Use of Tobacco
- . Chewing (Gum, Sticks, betel nuts etc.)
- . Spitting
- . Touching body parts
- . Nose / ear pecking



Personnel Cleanliness

Persons engaged in food handling must have a high degree of personal cleanliness, wear suitable protective clothing and have trimmed clean nails. There should also be no loose jewellery.



Bathing



Shaving

There is a need to inculcate habits of bathing / shaving in workers. For this training is necessary on hygiene facilities like toilets, uniforms, canteen etc.

Personnel hygiene Cloak room



Cloak Room Locker



THE DIRTY DOZEN

The 12 Most Common Infectious Diseases Preventable by Effective Handwashing

- *Shigellosis*
- *Hepatitis A*
- *E.coli 0157:H7*
- *Salmonellosis*
- *Campylobacteriosis*
- *Common Cold*
- *Influenza*
- *Giardiasis*
- *Impetigo*
- *Fifth Disease*
- *Conjunctivitis (Pink-Eye)*
- *Enterobiasis (Pinworms)*



If the microorganisms are on the hands they can enter your body via food or water, or by placing contaminated hands in the mouth, nose or eyes, or by touching open sores as in the case of impetigo.

Hand washing - Importance

Improper hand washing is a major contributing factor to outbreak of food borne illnesses. Provision of proper and adequate hand washing facilities is essential to minimizing food contamination and maintaining personal hygiene. Hand washing with hot water can help remove oil / grease from hands.

The View ~ How effective is washing and sanitizing!



Sanitation uses an antimicrobial agent on objects, surfaces or living tissue to reduce the number of disease-causing organisms to non-threatening levels.

How to wash Hands effectively?

Hands must be washed:

- ◆ Before working
- ◆ Before preparing food
- ◆ After going to toilets
- ◆ After handling raw foods
- ◆ After licking fingers, coughing, sneezing, eating, drinking or smoking
- ◆ After touching ears, nose, hair, mouth or other bare body parts
- ◆ After touching pimples or sores
- ◆ After handling waste
- ◆ After carrying out cleaning duties
- ◆ After changing soiled clothes
- ◆ After handling animals
- ◆ After any other unhygienic practices

HOW TO WASH YOUR HANDS

Wet hands with warm running water	Apply Soap	Rub hands for 20 seconds (if necessary, use a nail brush to clean nails. However, the brush must be kept clean and sanitary.)	Rinse hands thoroughly	Dry hands with a paper towel (the paper towel can then be used to turn off the tap)	Turn off the tap with the paper towel



Refrain from sneezing or coughing on to food;
Sneeze or cough into a handkerchief or-in case
of "surprise attack" - into the hands. In either
case immediately wash your hands to remove
dangerous bacteria.

Protective Clothing

- ❖ Wear all protective clothing in an appropriate order.
- ❖ Keep them clean
- ❖ Replace when unclean

Wear Your Gloves The Right Way!

- Maintained sound
- Clean
- No substitute for hand wash
- Always wash hands before wearing gloves
- Change your gloves when unclean and at every hand wash
- Don't use same gloves for handling raw and ready-to-eat food



Head Covers

Apron



Protective Shoes

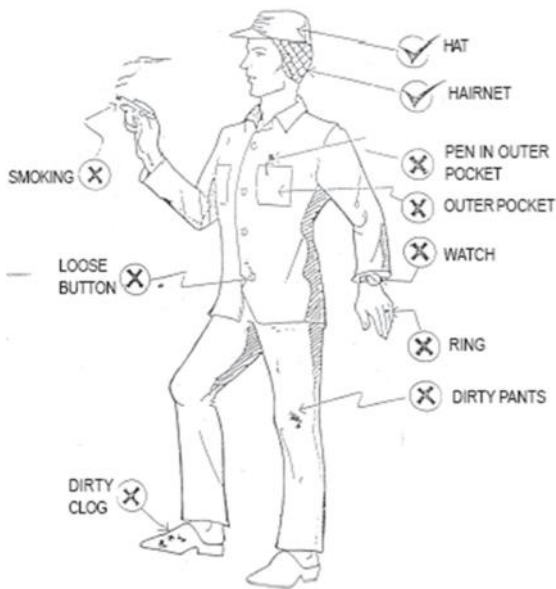
Hand Gloves



Shoe Protection- Roll over bench

Protective Clothing- Do's and Don'ts

**YOU CAN AVOID
FOREIGN MATTER BY:
DRESSING PROPERLY**



Protective Clothing



VISITORS

Visitors when entering food manufacturing, cooking, preparation and storage or handling areas shall wear protective clothing and footwear. They would need to adhere to the personal hygiene provisions as mandated for all 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.

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PART VIII

SUPPORT SERVICES

- Management & Supervision
- Food Testing facilities
- Pest Control
- Cleaning & Maintenance
- Water handling
- Training
- Record Keeping
- Consumer Awareness

MANAGEMENT & SUPERVISION

Documented procedure: Detailed Standard Operating Procedures (SOP) should be developed and implemented for all the necessary actions to be taken on food hazard so, that the course of damage control would be faster.

Food safety trainings & skills: All technical managers and supervisors should have appropriate qualifications, adequate knowledge, induction and refresher food safety trainings and skills on food hygiene principles and practices. This will enable them to:

- ensure food safety and quality of its products,
- judge food hazards,
- take appropriate preventive and corrective action, and
- to ensure effective monitoring and supervision

FOOD TESTING FACILITIES

- A well-equipped, in-house laboratory for testing of food materials (raw materials, ingredients, packaging materials) and/ or finished product for physical, microbiological and chemical analysis in accordance with the specification/standards laid down under the rules and regulations, shall be in place. The laboratory should be preferably inside the premise for regular/ periodic testing and whenever required. If there is no in house laboratory facility, then regular testing shall be done through an external NABL accredited laboratory outside, approved by FSSAI Regulation. In case of any suspicion or possible contamination, food materials / food shall be tested before dispatch from the factory. In case of complaints received and if so required, the company shall voluntarily do the testing either in the in-house laboratory or from a designated accredited lab outside.

Refer to approved external laboratory list by FSSAI Regulation- <http://www.fssai.gov.in/Lab.aspx>

- The laboratory staff must be competent and trained to understand and assess the quality control parameters during food sample testing.
- A separate space should be maintained for keeping the retention samples in the manufacturing plant.
- Signed test records conducted in the laboratory should be maintained.



PEST CONTROL

Sources of Pests

All food establishments provide ample food sources and numerous harborage places. Birds, insects and rodents are potentially a major contamination problem in bakeries. Improper handling of food and food debris, accumulation of motley articles and presence of structural defects render food premises highly susceptible to pest infestation. Pests not only pose food safety problems but also transmit diseases to human. They can carry pathogenic organisms to foods physically by their bodies, hair and excreta

Signs of Pests in Bakeries

Regular inspection

Rats – droppings, holes, runways, gnawing marks feet marks and smears

Cockroaches – Hide behind stoves, hot water pipes, sinks, cupboards, cracks and crevices, broken tiles Signs- eggs, droppings and disagreeable odour

Flies infest places with food attraction Signs – Faecal specks and vomitus

Lizards – Hide behind switchboards, wall panels Signs - Droppings

Pest Management Methods

The first and best line of defense is to prevent entry of pests by proper inspection and maintenance of the premises. The second line of defense is to deprive pests of food source by proper storage of food and prompt removal of refuse, food remnants and spills.

Few pest control methods:

- Fumigation
- Pheromone Insect Trap
- UV lamps
- Insecticides
- Rhodenticides

Other measures are as follows:

- Appropriate design of production building, ceilings and walls
- Written preventive pest control program and regular inspection of all areas
- Regular cleaning of flour dust from everywhere
- Properly cleaned to prevent infestation- Silos, ingredient dosing systems, mixers, curling chains, conveyor belts, ovens, cooling conveyors, packaging machines, walls, etc.
- Monitoring birds, pests, insects & rodent menace
- Third Party Contract:
Private Pest Control Services with well laid down terms and conditions in contract for

inspection, various treatments, treatment site plan, chemicals, frequencies, monitoring and control etc., can effectively control pest.

4Ds of Pest Control

- 1D – Deny Entry**
- 2D - Deny Shelter**
- 3D – Deny Food**
- 4D - Destroy**

- Pest Control 4Ds

- 1D – Deny Entry- Preventing Entry**

- Seal all holes, crevices at ceilings, walls and floors

- Threshold clearances of doors < 6mm ,fix metal kicking plates

- Double door / air curtains / strip curtains / mesh screens, self-closing doors at appropriate locations Missing / damaged gratings of drains installed / replaced

- 2D – Deny Shelter – Elimination of Harborage of Pests**

- Avoid False sealing in Bake house and storage area

- Repair defects on walls, floors, ceilings, woodwork & other structures

- Remove disused / obsolete articles from food premises

- 3D – Deny Food- Eliminate food sources to pests**

- Store all foods and condiments in sealed / covered containers

- Floor free from food remnants

- Prohibit preparing food and utensils cleaning at other places

- Store refuse in dedicated closed container

- Surface channels and gratings clean and clear of food remnants

- 4D – Eradication of Pests**

- Clean & disinfect pest infested places, clothing and equipment

- Insecticuter to be placed 4.5 to 6 m away from food handling area

- Use low wall mounted insecticutors

- Clean insecticutor every week

- Cover all foods during Pest control treatment

- Glue Pads for rodents

- Pest or chemical contaminated food be discarded



Strip Curtain



Air Curtain

Bird / Fly proofing



Rodent Control



Sample of Pest Control Record

Pest Control Inspection Record Form

Date	Location	Signs of pests (Yes/No)	Action taken	Signature

Pest Control Monitoring Record Form

Date	Location checked	Type of baits	Evidence of infestation	Action taken	Signature

- * Keeping Records
 - Audit / inspection records
 - Contracts
 - Storage & MSDS

CLEANING AND MAINTENANCE

All pieces of food contact equipments should be **clean and in good repair; smooth edge and devoid of spot welding, paint flakes**. Examples of equipments are:

- *Dough mixers*
- *Conveyors*
- *Rounders*
- *Dough dividers*
- *Racks*
- *Proofing equipments*
- *Oven*
- *Rollers*
- *Slicers*
- *Sifters*



Dough mixer



Racks



Oven



Rollers



Conveyors

- ✓ All the equipments and their surroundings should be **free from dirt, dust and evidence of rodent or insect activity**

- ✓ **Inspection cleaning ports on flour conveyor systems** should be accessible and easy to open, free from pest activity.
- ✓ **Proofing equipment:** free from evidence of insects or rodents; temperature and humidity of proofing equipment, ovens and cooling area should be maintained.
- ✓ **Baking pans or storage bins:** should be clean
- ✓ **Equipments should be cleaned before use**
- ✓ **Utensils** like spoons, beaters, pans, bowls, trays, spatulas etc.: clean and free from adulterants
- ✓ **Cleaning agents and compounds** should be labelled properly and kept separate from food items to prevent cross-contamination
- ✓ **Weighing practices** should be accurate to ensure the declared quantity of contents would be achieved.
- ✓ All **high temperature equipment** should be equipped with high-temp cut-off devices which cut off the fuel or power source if the upper safe limit is exceeded.
- ✓ **Working area** as well as the outside premises should be free from spilled powders or liquids, trash etc. which may attract or harbour pests, rodents or micro-organisms.
- ✓ **Protective Equipment:** - For silo cleaning and for other heavily dust-laden activities, a fine dust Mask should be used



Equipment Maintenance- Do's

- ✓ Ensure food come into contact with appropriate food grade materials (non-corrosive, non-absorbent, unpainted, easy to clean)
- ✓ Ensure food come into contact with non-toxic materials which is free from odor.
- ✓ Ensure permanent joints are smooth for easy cleaning.

- ✓ Ensure dismountable joints have a true and hygienic fit.
- ✓ Ensure projections, edges and recesses are kept to a minimum.
- ✓ Ensure internal curves allow thorough cleaning.
- ✓ Ensure all fluids, including those from foods and cleaning machine, can be easily discharged from the machine.
- ✓ Ensure shafts and seals are self – or product- lubricated or use food grade lubricants- ensure cleaning.
- ✓ Ensure appropriate materials used in machine construction.

Equipment Maintenance- Don'ts

- X Don't allow dead spaces or bends in pipework in food area which allow product accumulation. In case unavoidable, ensure good drainage and cleaning.
- X Don't allow bearings in the food area unless this is unavoidable – use food grade lubricants and ensure cleaning and disinfection
- X Don't se screws, screw heads, rivets in contact with food.
- X Don't allow liquids, pest or organic matter to enter parts of machines which cannot be cleaned.
- X Don't allow ancillary substances (e.g. lubricants) to come in food contact.

Fumigation

Periodic fumigation to be ensured. **The Method of fumigation** should be **approved** (like use of *Aluminium phosphite* which is an approved fumigant). Fumigation is recommended to be **practiced minimum once in a year**. It should be **carried by an approved third party** (expert and experienced). **Post fumigation**, the area should be inspected and verified for absence of any fumigant residue.



Sanitation is key to food safe practice. The Eight Key Conditions of Sanitation are:

- I. Safety of water that comes in contact with food.
- II. Condition & cleanliness of food contact surfaces.
- III. Prevention of cross contamination from unsanitary objects.
- IV. Maintenance of hand washing and sanitizing & toilet facilities.
- V. Protection of food, food packaging materials from adulteration.
- VI. Proper labeling, storage & use of non-toxic compound.
- VII. Control of employee health conditions to control microbiological hazards.
- VIII. Exclusion of pests from the food plant.

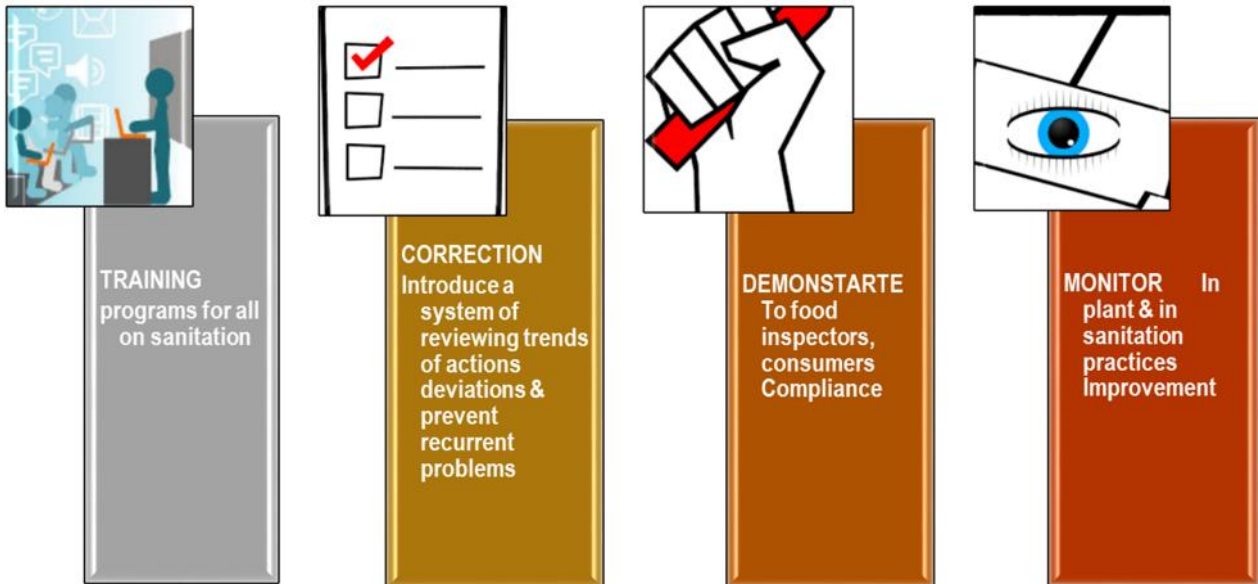
What is Sanitation Standard Operating Procedures SSOPs?

SSOPs are extracted from GMPs with introduction of additional controls. It controls the overall sanitation in the plant through monitoring, corrective actions & record keeping. The process requires documentation of SSOPs plan. The hazards associated with the processing environment or personnel are usually controlled with sanitation control procedures

SSOP Plan:

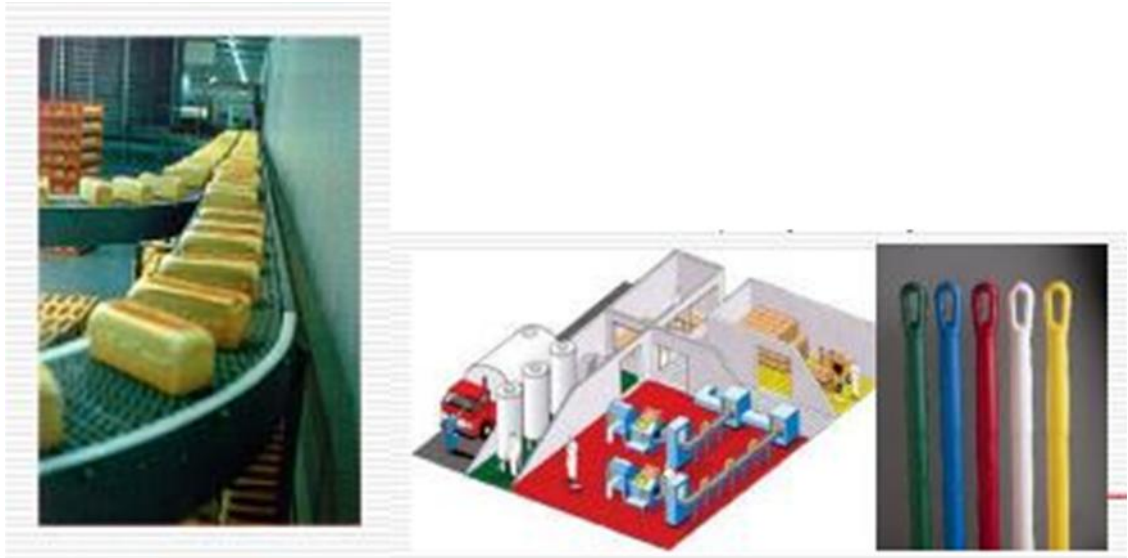
- What** : Describe the plant sanitation procedure
- When** : Establish schedules of sanitation
- Monitor** : Establish monitoring parameters to check that sanitation has been completed

Corrections : Pre - planned corrections in case of deviations from the sanitation procedure



Cleaning and Sanitation Programs

- Sanitation procedures- for all facility areas
 - Cross Contamination Procedures- *Raw materials and baked products*
 - Cleaning Procedure and methods
 - Pest Control program
-
- Documented and monitored programs** for building, utilities, plant and all equipment.
 - Appropriate, effective and **regular** cleaning methods.
 - Regular cleaning - **Proofing cabinet**
(*Proofing conditions with Temp . 30-40 C, Humidity 60-80%- appropriate for growth of bakery yeast and molds*)
 - Regular cleaning - **Conveyor belts, cooling conveyors**
 - Recommended to Disinfect **Slicing and Packing machines.**



An average shelf-life of bread is 3-5 days, but if the hygiene and sanitation of a bakery is poor, the shelf life of bread, esp. some wheat bread, can be shorter.

Cleaning and Sanitation For Non—food contact surfaces

Similar to food contact surfaces, non-food contact surfaces should also be kept clean and in good repair to help minimize the possibility of food contamination.

Cleanliness and maintenance

- Should be kept clean and in good repair and working condition such as cupboards, refrigerators & racks.

Cleaning

- Cleaned at appropriate frequency to prevent accumulation of dirt, grease
- Cleaning systematically from walls, cupboards, floor, windows.

Maintenance of Refrigerators

(Including Chillers and Walk in Freezers)

Temperature for storing perishables not exceeding 10⁰C preferably at or below 4⁰C

Yeast in Bakeries to be transported and stored below 4⁰C

Keep doors closed at all times except during use

Avoid overloading for free circulation of cold air

Inside surfaces including rims to be cleaned regularly

To achieve thorough cleaning on non-food contact surfaces

Remove food debris and soil by clean wiping cloths and brushes

Rinse with clean water

Apply detergent and washing. Remove remaining debris or soil with brush

Rinse with clean water

Air dry

A Sample of cleaning and sanitation program

Item	Frequency	Equipment and Chemicals	Methods	Responsible Person
STRUCTURE				
Floors	End of each day or as frequently as required	Broom, damp mop, brush, detergent and sanitiser	<ol style="list-style-type: none"> Sweep the area Apply detergent and mop the area Use scrub for extra soil Rinse thoroughly with water Remove water with mop 	
Walls, window and ceiling	Monthly or as Required	Wiping cloths, brush and detergent	<ol style="list-style-type: none"> Remove dry soil Rinse with water Apply detergent and wash Rinse with water Air dry 	
FOOD CONTACT SURFACES				
Work tables and sinks	After use	Wiping cloths, detergent and sanitiser	<ol style="list-style-type: none"> Remove food debris and soil Rinse with water Apply detergent and wash Rinse with water Apply sanitiser Air dry 	

Some Disinfectant Facts!

- ❑ Quaternary ammonium compounds, 70% ethanol, 70% isopropanol and 30% hypochlorite were effective on yeasts.
- ❑ It is suggested to use different types of disinfectants at the same time to prevent resistant problems.
- ❑ Problems with mold usually occur more in spring and summer.

WATER HANDLING

Water Supply in Bakery

Adequate water supply is necessary to ensure effective cleaning and Safe food production.

Water used for dough making, Cleaning food contact parts should be of potable quality to avoid contamination of the product or food contact equipment. Water pipes are to be maintained in good condition to prevent leakage contamination. The storage tanks are to be regularly cleaned and disinfected. Check at least once a year against BIS Standards. Also Check regularly for microbiological quality and chlorine level



TRAINING

Food hygiene training for bakers, packers , other operators, warehouse workers, mechanics, supervisors, cleaners, dispatch workers, drivers is important. Understanding of HACCP, CCPs , Critical limits, GMP, GHP, Cleaning and sanitation process, Housekeeping rules are some of the key topics to be covered. Employees should also be trained to understand risk associated with cross-

contamination from raw foods and dirty surfaces coming into contact with equipments, clean surfaces and ready product.



RECORD KEEPING

A periodic audit of the whole system according to the SOP be done to find out any fault / gap in the GMP / GHP system. Appropriate records of food processing / preparation, production / cooking, storage, distribution, service, food quality, laboratory test results, cleaning and sanitation, pest control and product recall shall be kept. Records must be retained for a period of one year or the shelf-life of the product, whichever is more.



CONSUMER AWARENESS

All packaged food products shall carry a label and requisite information shall be there as per provisions of Food Safety & Standards Act, 2006 and Regulations & Regulations made there under so as to ensure that adequate and accessible information is available to the next person in the food chain to enable them to handle, store, process, prepare and display the food products safely and correctly and that the lot or batch can be easily traced and recalled if necessary.



Food Safety & Legislation

- Can be defined as “the degree of confidence that the food will not cause any harm or sickness to the consumer when it is prepared, distributed, served or consumed according to its intended use”.
- “Protecting the food from Physical, chemical and microbial hazards and contamination that may occur during receipt & storage of materials, processing, transporting, storage, distributing and preserving” is the primary objective of food safety.
- Various systems like HACCP, ISO, etc. provide the necessary guidance to ensure reasonable “Food Safety”.
- In India, various legislations like FSSAI are in vogue to guide & control the Food industries towards adherence to food safety.
- All Processing Units have to take Licenses to carry on Food Business Operation.

Specific Regulatory requirements for Biscuits

As per Sub regulation 2.4 of Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011

- Biscuits including wafer biscuits shall be made from maida, vanaspati or refined edible oil or table butter or desi butter or margarine or ghee or their mixture containing any one or more of the following ingredients, namely:

Edible common salt, butter, milk powder, cereals and their products, cheese cocoa, coffee extract, edible desiccated coconut, dextrose, fruit and fruits products, dry fruit and nuts, egg, edible vegetable products, ginger, gluten groundnut flour, milk and milk products, honey, liquid glucose, malt products, edible oilseeds, flour and meals, spices and condiments, edible starches such as potato starch and edible flours, sugar and sugar products, invert sugar, jaggery, protein concentrates, oligofructose (max 15%) vinegar and other nutrients and vitamins:

- Provided that it may contain permitted food additives
- Provided further that it may contain artificial sweetener with label declaration
- Provided also that it shall conform to following standards, namely:

It may contain Oligofructose (dietary fibres) upto 15% maximum subject to label declaration under Regulation 2.4.5 (43) of Food Safety and Standards (Packaging and Labelling) Regulations, 2011.

Specific Regulatory requirements for Breads

- **BREAD** whether sold as white bread or wheat bread or fancy or fruity bread or bun or masala bread or milk bread or of any other name, shall mean the product prepared from a mixture of wheat atta, maida, water, salt, yeast or other fermentive medium containing one or more of the following ingredients, namely:—
- Condensed milk, milk powder (whole or skimmed), whey, curd, gluten, sugar, gur or jaggery, khandsari, honey, liquid glucose, malt products, edible starches and flour, edible groundnut flour, edible soya flour, protein concentrates and isolates, vanaspati, margarine or refined edible oil of suitable type or butter or ghee or their mixture, albumin, lime water, lysine, vitamins, spices and condiments or their extracts, fruit and fruit product (Candied and crystallized or glazed), nuts, nut products, oligofructose (max 15%) and vinegar:
- Provided that it may also contain permitted food additives.
- Provided further that it may also contain permitted artificial sweetener with label declaration .
- Provided also that it shall conform to the following standards, namely:—

- Provided also that it shall be free from dirt, insect and insect fragments, larvae, rodent hairs and added colouring matter except any permitted food colours present as a carryover colour in raw material used in products.
- It may contain Oligofructose (dietary fibres) upto 15% maximum subject to label declaration under labelling regulation 2.4.5 (43) of Food Safety and Standards (Packaging and Labelling) Regulations, 2011.

Packaging and Labelling Requirements

- The below packaging and labelling requirements are specific for bakery and bakery products. For all general requirements; please refer to “Food Safety and standards (Packaging and Labelling) regulation, 2011”.
- The food, in which hydrogenated vegetable fats or bakery shortening is used shall declare on the label that ‘hydrogenated vegetable fats or bakery shortening used- contains trans fats.
- Every container of refined salseed fat shall bear the following label, namely,
‘REFINED SALSEED FAT FOR USE IN BAKERY AND CONFECTIONERY ONLY’
- Every package of Bakery and Industrial Margarine made from more than 30 per cent of Rice Bran Oil shall bear the following label, namely,— This package of Bakery & Industrial Margarine is made from more than 30 per cent of Rice Bran Oil by Wt.
- In case of package or bottle containing sterilised or Ultra High Temperature treated milk, soya milk, flavoured milk, any package containing bread , dhokla, bhelpuri, pizza, doughnuts, khoa, paneer, or any uncanned package of fruits, vegetable, meat, fish or any other like commodity, the declaration be made as follows :—
“BEST BEFOREDATE/MONTH/YEAR”
OR
“BEST BEFORE.....DAYS FROM PACKAGING”
OR
“BEST BEFORE DAYS FROM MANUFACTURE”
Note: (a) blanks be filled up (b) Month and year may be used in numerals (c) Year may be given in two digits
- Every package of biscuits, bread and cakes containing Oligofructose shall bear the following declaration, namely,—
Contains Oligofructose (dietary fiber) — gm/100 gm

- Provided that for Ingredients falling in the respective classes, the following class titles may be used, namely

Class: Cakes

Class Title: Cocoa solids (if used)

PART IX
Food Safety
Management
System (FSMS)
Plan

FSMS Plan

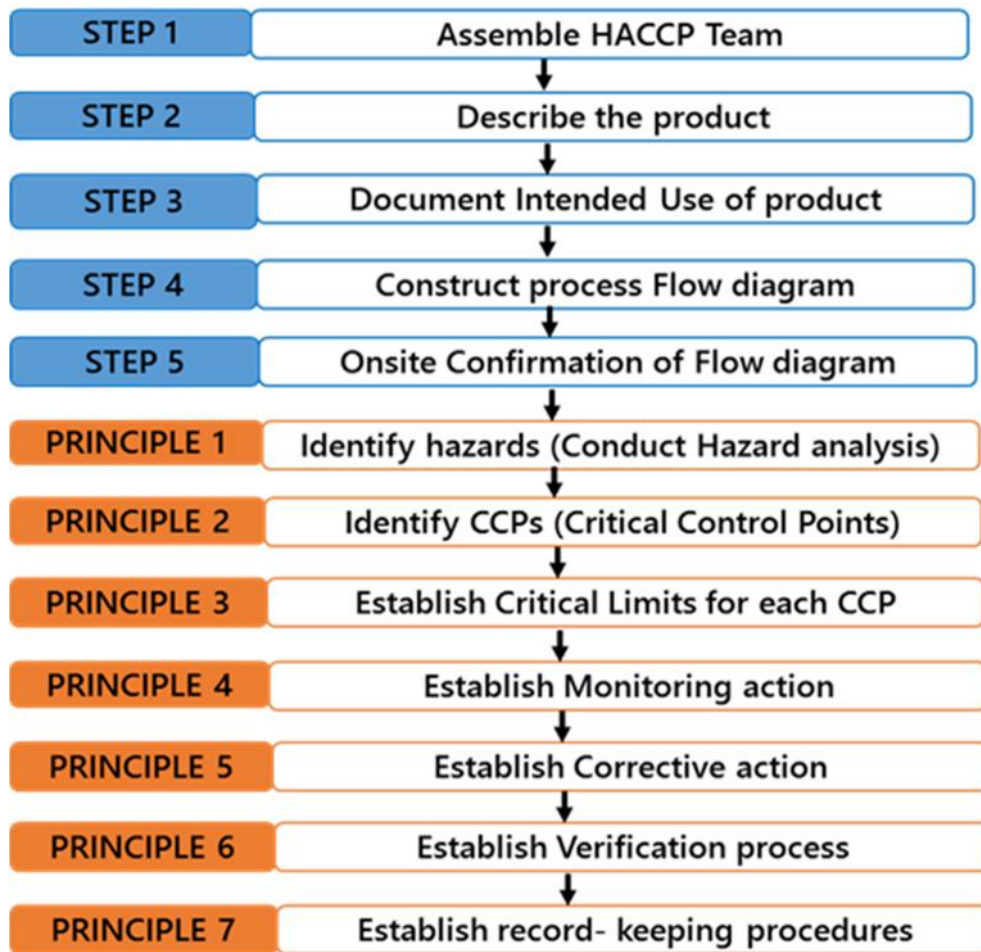


- ❑ Is carried out to identify the weakness of the production line and to suggest critical limits in compliance with legislation and therefore the preventive and corrective measures.
- ❑ Aims zero defect products, yet it is not feasible to achieve 100% defect free products.
- ❑ Sanitation Standard Operating Procedures (SSOPs) along with Good Manufacturing Practices (GMPs) should be considered as Pre-Requisite for HACCP.
- ❑ HACCP PLAN covers the total supply chain, from inbound logistics, through storage, processing, sanitation and maintenance to the final use by the consumer.

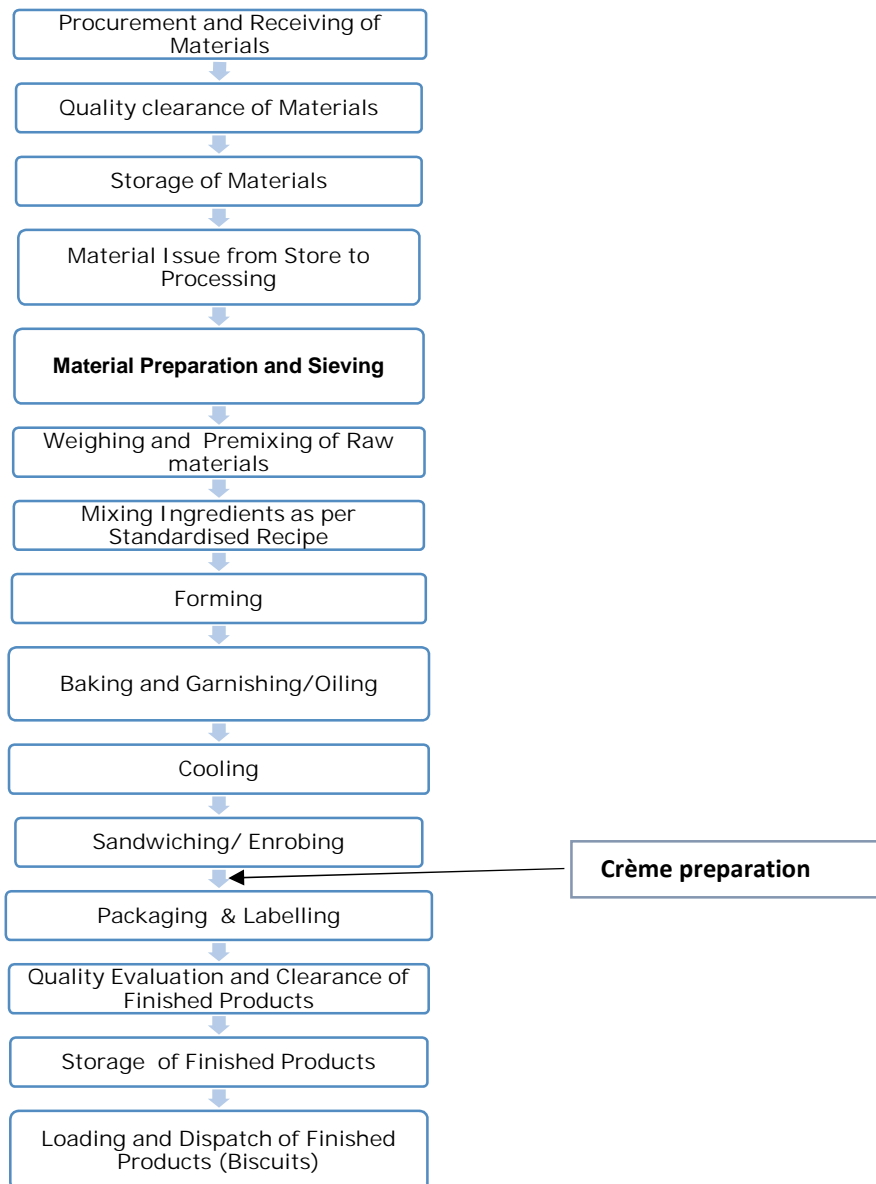
Risk assessment is a critical step in a HACCP plan. Below is a template to determine what severity and probability a processing step is involved with and therefore what level of criticality is holds in the processing line.

		Consequence/ Severity					
		How severe could the outcome be if the risk event occurs?					
		Severe	Major	Significant	Minor	Insignificant	
Probability/ Likelihood	What's the chance of the risk occurring?	Frequent	Extreme	Extreme	Very High	High	Medium
	Likely	Extreme	Very High	High	Medium	Medium	
	Occasional	Very High	High	Medium	Medium	Low	
	Seldom	High	Medium	Medium	Low	Very Low	
	Unlikely	Medium	Medium	Low	Very Low	Very Low	

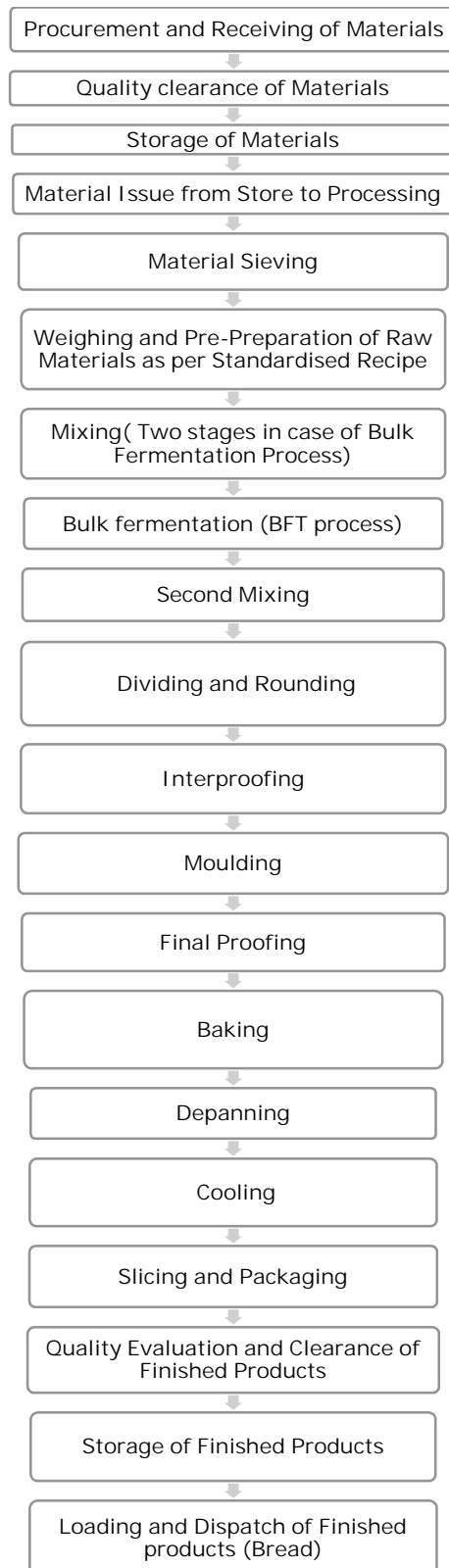
A HACCP plan consists of 5 initial steps and 7 major HACCP principles



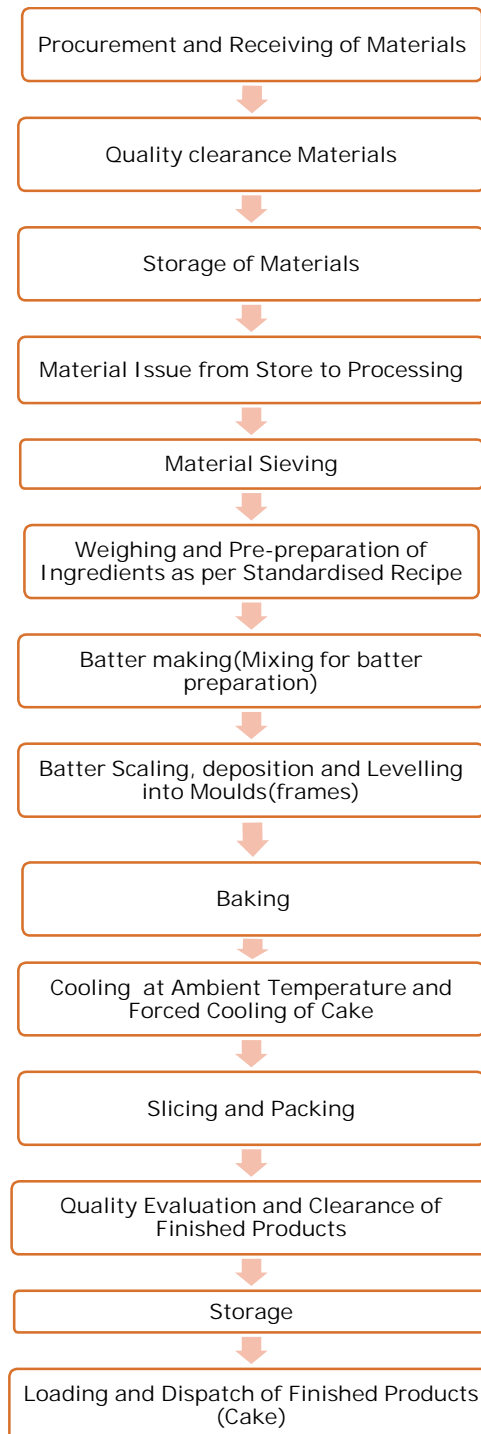
Manufacturing Flow Diagram for Biscuits



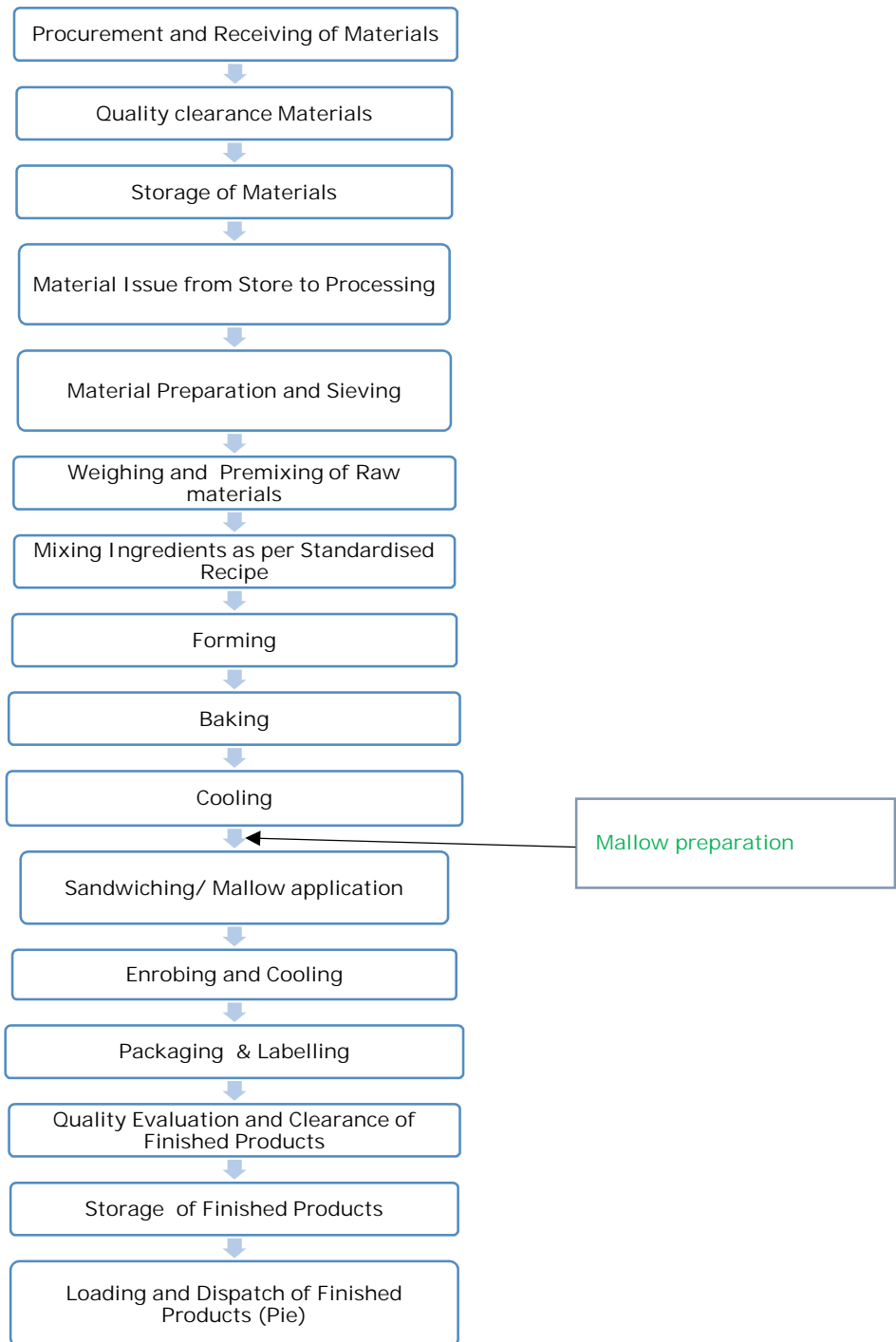
Manufacturing Flow Diagram for Bread



Manufacturing Flow Diagram for Cake



Manufacturing Flow Diagram for Pie



Sample FSMS Plan for Bakery Processing:

Operational Step	Hazard	Control Measure	Critical Limit	Monitoring Method	Corrective Action	Responsibility	Record
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Problems can be caused by various physical, chemical & microbiological hazards. Sometimes allergens may also be considered as hazard to the product depending on the end product characteristics.

The above given example of FSMS Plan needs to be prepared / customized on the basis of process criticality and product characteristics. It will be different for each process and industry for which guidance of a Food Safety Expert is essential, who can help you in reviewing your PRPs, preparing flow chart, considering the probable hazards occurring at each step and preparing the FSMS Plan which is suitable for your industry.
