



Training Manual
Food Safety Supervisor Course
Special — Edible Oil & Fats

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Welcome to the manual –

The manual is designed for small, medium and large scale edible oil processors, extractors and packers.

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

This manual presents bare minimum requirements 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 Edible Oil and Fats processing units, 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 Edible Oil industry.

What the law says –

The establishment in which oil seeds crushed, processed or solvent extracted, crude edible oils processed & edible oils are 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

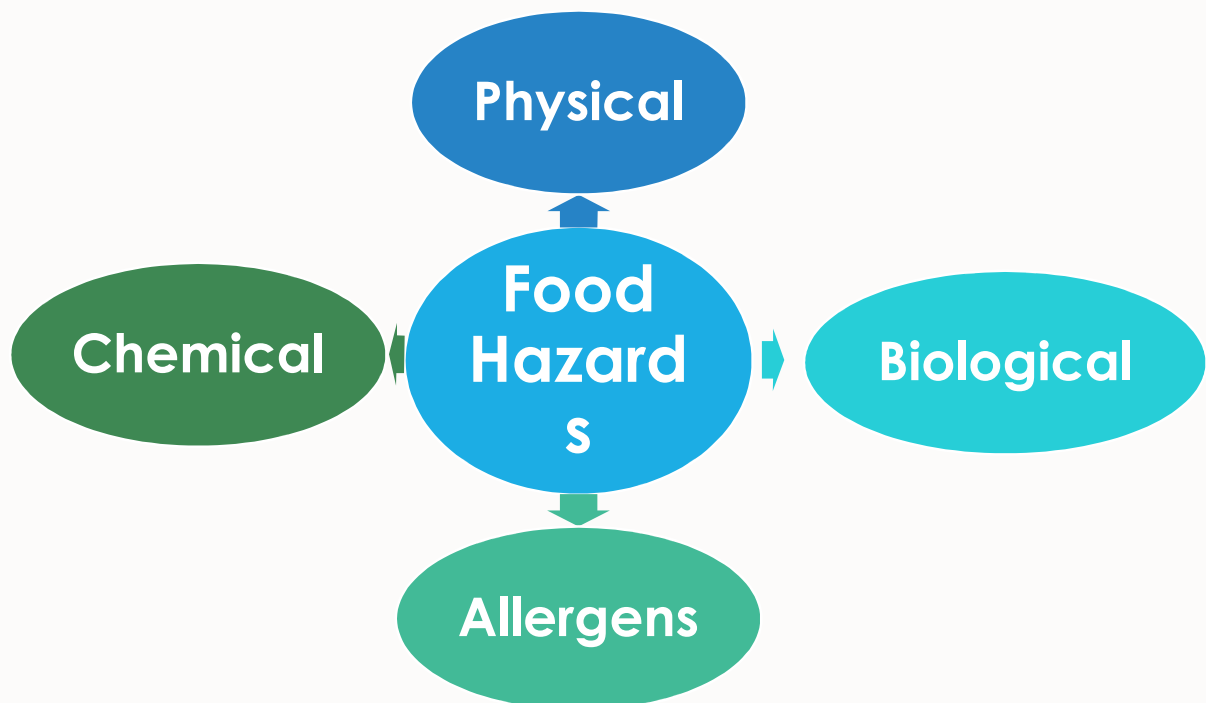
Food spoilage

FOOD SAFETY & FOOD SAFETY HAZARDS

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 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 four types of hazards -



1. Physical Hazards

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

Common Physical Hazards include:

- Glass
- Chipped pieces from equipment
- Metal shavings from cans and foils
- Stapler pins
- Blades
- Plastic or chipped pieces of disposables

- Lint and threads
- Band- aids
- Hair
- Finger nails
- Jewellery pieces

2. Chemical Hazards

Naturally occurring and process induced chemical substances that can cause a food borne illness are called a 'Chemical Contaminant or Hazard'.

Natural Chemical Contaminants include:

- Allergens
- Mycotoxins

Process Induced Chemical Contaminants include:

- Toxic metals in the processing set up or supply chain
 - Pesticides, Colorants
 - Cleansing products and sanitizers
 - Equipment lubricants
 - Chemical Food Additives, Preservatives
 - packaging materials-migration of residues from packaging material to oil.
 - adulteration with other oils or mineral oil

3. Biological Hazards

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

Major biological hazards include –

- **Bacteria** ex: Salmonella spp., Enterohaemorrhagic *Escherichia coli*, Listeria monocytogenes, Staphylococcus aureus, Clostridium botulinum,
- **Yeast & Mold** ex: Candida, Aspergillus sp, Helicospodium

Biological Hazards causes -

1. **Food Borne Infections** - This result when a person consumes food containing pathogens; which grow in the human intestine and cause discomfort or disease. Typical symptoms of a 'food borne Infections' do not appear immediately.
2. **Food Borne Intoxications** - This result when a person consumes food containing toxins in it; that cause discomfort or disease. Typical symptoms of a 'food borne Intoxication' appear

quickly. **Food Borne toxin** are mediated infections, that result when a person consumes food containing toxins produced by the pathogens in it; which grow in the human intestine and produce toxins that cause discomfort or disease.

Conditions favouring growth of Microorganisms

FAT TOM

Conditions	Definition
Food	Food borne Microorganisms draw nutrients from Potentially hazardous foods
Acidity	Food borne Microorganisms grow well between the pH range of most foods
Temperature	Microorganisms grow well between the temperature range of 5°C – 60°C, most commonly known as the 'Danger Zone'
Time	Microorganisms need sufficient time to grow; when exposed to the 'Danger Zone'
Oxygen	Microorganisms require oxygen in free or combined state; to favor their growth
Moisture	Microorganisms require moisture to grow and is measured in the form of 'Water Activity (Aw)'

ALLERGENS

(Informative purpose)

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

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

A food allergy occurs when the immune system:

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

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

1. Cereals containing gluten; i.e., wheat, rye, barley, oats, spelt or their hybridized strains and products of these;
2. 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 Edible Oils and Fats processing



Fig 2 – Food Allergens

Handling Allergens

1. Raw Material –

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

2. Store –

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

3. During production –

- a. Ensure the traffic patterns of raw materials, packaging supplies, and employees are limited during the production of allergen containing products and do not lead to cross-contact.
- b. If possible, have dedicated processing equipment and containers to prevent allergen cross-contact.
- c. Declare allergens on labels, for all product, including rework, and intermediate products.

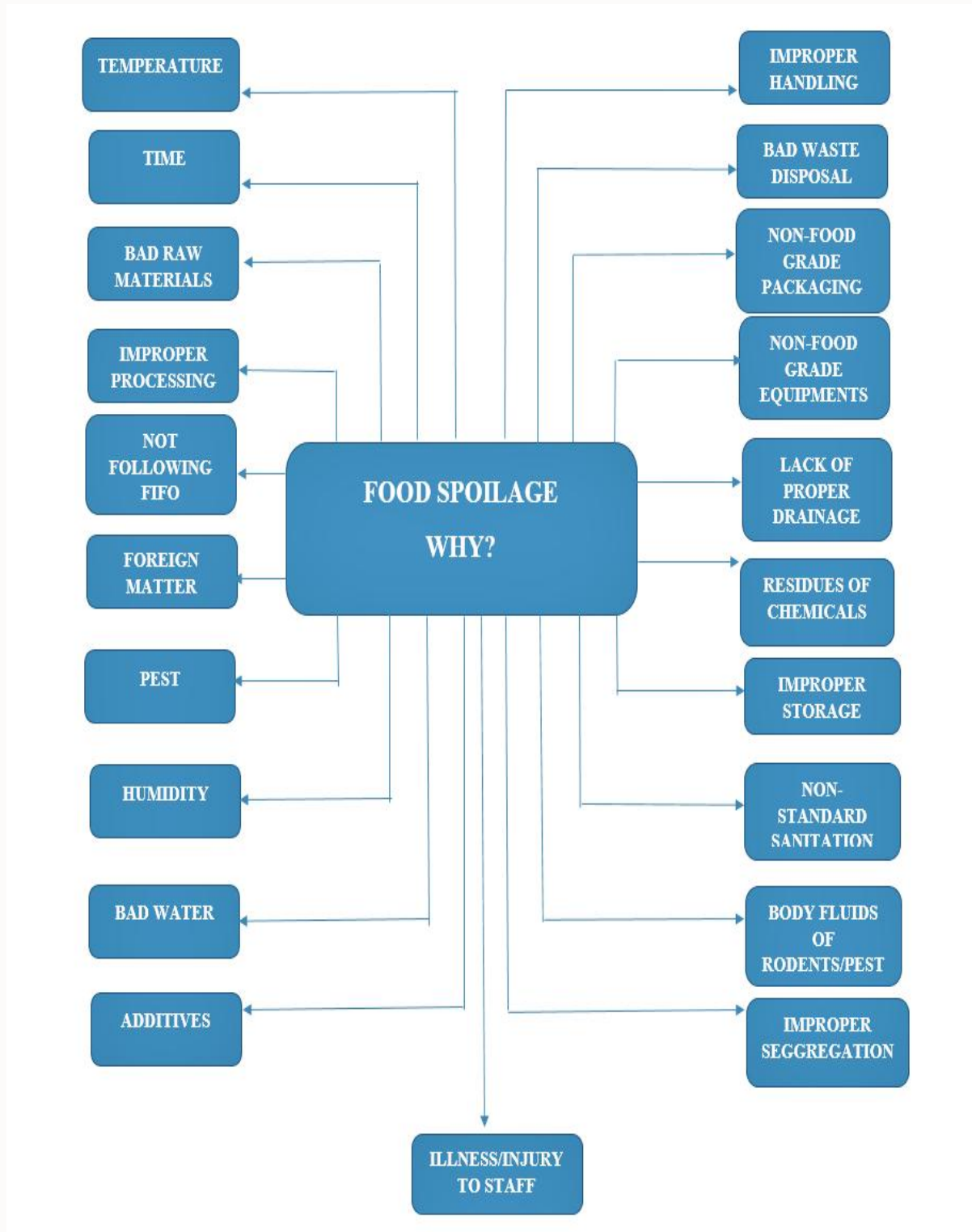
4. Sanitation –

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

FOOD SPOILAGE

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

Major reasons for food spoilage are -



1. **Foreign matter:** Human hair, stapler, metal particles, fabric, plastic, alkali etc. are big threats to food safety and can cause food spoilage. Anything that is not considered as food or food substance is considered as foreign matter.
2. **Lack of proper drainage:** A drain in a food processing area must be flowing with no back flow and should be easy to clean, preventing re-entry of pest from a common drain.
3. **Non- food grade equipment:** There are many equipment that are used in edible oil processing, and it is essential that non-corrosive, food grade material such as Stainless Steel is used for the equipment in order to prevent metal contamination, chemical contamination and ensure food safety.
4. **Improper handling:** Unclean hands, wrong selection of equipment and packing in unsuitable material could result in food safety issues.
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 come into contact in food as crop contaminants then later in the process of sanitizing voluntarily by our process. The next involuntary entry of chemicals into food can be through residues of equipment or utensil sanitation operations. It is important to ensure thorough washing is done before equipment is taken into production.
7. **Non-standard sanitation:** Sanitation must be based on strict guidelines of either historical data or validation. If chemicals are used in less or more quantity or in an unverified process or method, sanitation will fail to achieve proper results giving way for food to become unsafe.
8. **Poor raw materials:** Raw material selection must be based on strict scientific reference and frequent sampling.
9. **Additive:** Additives of any nature like essence, flavors etc can spoil food if not used in the right quantity. Unauthorized additive also must not be used.
10. **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:** Storage must not only be done by FIFO(First In First Out)or FEFO (First Expiry First Out) method but also properly segregated and with required ventilation. Right combination of duration, temperature ventilation and segregation defines a good storage. Any deviation in one of these 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 oils / oil based products contain allergens, the appropriate segregation of RM, 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. **Pest:** Care must be taken to plan pest control devices and other forms of controls to ensure that they are highly restricted from either getting into product or contaminating product resulting in food safety issues.
19. **Body fluids of rodents/pests:** 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.
20. **Improper waste disposal:** Waste is an outcome of process but often present very close to the process region. If it is not disposed in a hygienic manner it can breed pest and micro organisms which are a threat to food safety.

PART II

LOCATION, LAYOUT & FACILITIES

Location & surroundings
Layout & design of food establishment premises
Equipment & containers
Facilities

LOCATION & SURROUNDINGS

Manufacturing / processing / packaging premises shall be located away from sources of pollution like open drains, garbage yards, industries that emit fumes or gases and dense vegetation. In order to avoid contamination from external sources such as odor, pests, dust etc., appropriate measures shall be taken to protect the processing area from environmental contamination. Processing area shall not have direct access to any residential area.



Well Guarded Entrance of the Plant



Demarcation of the area



LAYOUT & DESIGN OF FOOD ESTABLISHMENT PREMISES

1. **Layout & design** of Edible Oil unit shall be unidirectional to avoid from raw material, intermidate product & finished product. The material movement should be done in one direction only (no backward flow), to prevent crosscontamination.



Premises with tarred and concrete to avoid dust



Plant entrance with hygiene station



Clearly Defined walkways



Clearly Defined walkways



Vegetation growth near premises



Stagnant water near the surroundings

2. **Floors, ceilings and walls** of the establishment must be made of impervious material. They should be smooth and easy to clean with no flaking paint or plaster and maintained in a sound condition to minimize accumulation of dirt, condensation & growth of moulds

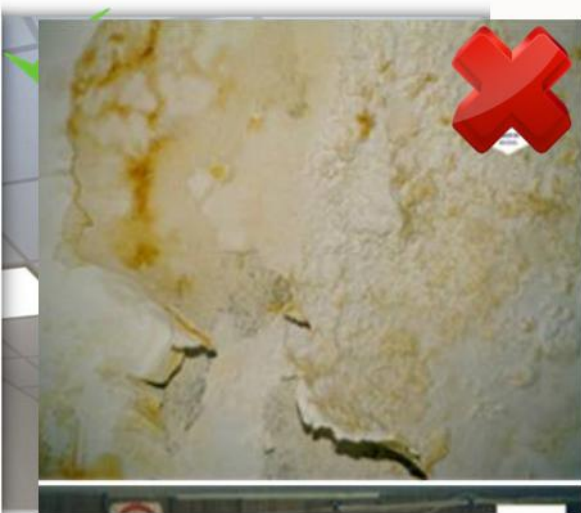
Floors, ceilings and walls -



Cleanable, durable, impervious to moisture



Cracks allow bacteria and molds to accumulate



Fungal growth on the walls

Ceiling made of Impervious Material

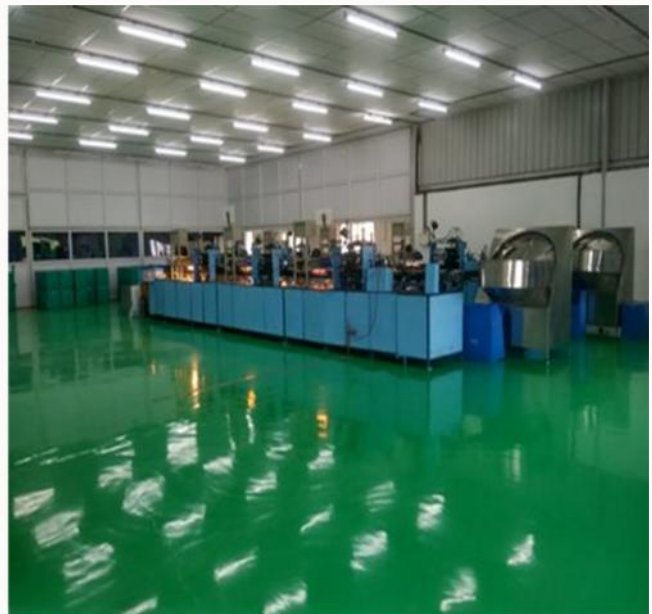
3. The **doors** in the establishment shall be made of smooth and non-absorbent surfaces and they shall be easy to clean and disinfectant. Doors can be fitted with automatic closing spring, strip or air curtain.



4. The **floor** shall have adequate and proper drainage with appropriate slope and they should be easy to clean and disinfect. The drainage shall flow in a direction opposite to the direction of food preparation area to avoid contamination.



Special stone flooring to avoid slippery and easy cleaning, cleaning with machines to improve hygiene



Epoxy and smooth flooring in operational, easy for cleaning and avoids dust and microbial contamination.

5. The **drains** should be covered to prevent insects and rodents from entering the processing area.



Drains should be covered to prevent insects and rodents



Floor with proper drainage



Floors should be sloped to ensure easy drainage

6. The windows, doors & all other openings to outside environment in the establishments shall be well screened with wire-mesh or insect-proof screen to protect the premise from pests. The doors shall be fitted with automatic closing springs to keep them closed at all times and also the mesh should be easy to remove & clean to avoid accumulation of dust & dirt.



Netlons and mesh in windows to avoid pest entry



Pavers block in the premises

EQUIPMENT & CONTAINERS



During preparation / handling / processing / storage of raw material like oilseed, crude oil, refined oil or intermediate product or finished product like refined oil and fat, certain equipment e.g. tanks, siloes, hoppers, expellers, pipes, packaging machines, filters, etc. come into contact with food. All these food contact surfaces shall be:

- a. made up of non-corrosive / rust free material
- b. smooth, free from any grooves
- c. easy to clean and maintain
- d. non-toxic and non-reactive
- e. of food grade quality

Generally food grade stainless steel or galvanized iron material is preferred as it complies with the above requirements.



- All processing equipment used during oil extraction, refining, packaging shall be designed, located and fabricated to facilitate easy cleaning and shall be kept away from impure air and dust.
- Every utensil or container containing edible oil shall at all times be either provided with a properly fitted cover/lid or with a clean gauze net or other material of texture sufficiently fine to protect the food completely from dust, dirt and flies and other insects.
- No utensil or container used for the edible oil manufacture shall be kept in any place in which such utensil or container be contaminated and thereby render the food noxious.
- All equipment shall be kept clean, repaired and maintained in sound condition all the time.
- All measuring instruments / equipment like temperature gauges, pressure gauges, weighing balances, etc. shall be calibrated periodically for correct measurement.



FACILITIES

- a. **Water Supply:**Water used in conditioning of oilseed, refining, oil washing, cleaning of equipment should be potable and should not introduce any hazards or contaminate finished products. Clean and safe water storage facilities shall be provided. Steam use for heating oilseeds or for refining process shall be generated from potable water. If non-potable water is used anywhere in the process then the concerned pipeline shall be identified as such or differentiated from potable water.



Colour coding of water pipes to avoid contamination



Cleaning of water storage tanks

- b. **Drainage and waste disposal:** Waste generated during processing like spillage of products, bleaching earth, spent wash, de-gummed oil, ash from boiler, etc. shall be collected regularly and such collected waste shall be stored in such a manner that it will not contaminate the food process and storage area inside / outside the environment of the premises. Waste generated in processing area shall be collected in dustbins and dustbins shall be provided with lid, identified to a specific area and cleaned regularly. Collected waste shall periodically be handed over to a local waste-collecting body or disposed of in an appropriate manner that will not cause any hazards.

An Effluent treatment plant is required for oil refinery unit / solvent extraction unit as per Environment Pollution Control Board.



If required, waste water disposal system / effluent treatment plant shall be put in place.



Sr. No.	Material	Dustbin Colour	SYMBOL
1	Oily Cotton Waste	Red	
2	Paper	Green	
3	Plastic Jars, Sampling Bottles	Blue	
4	Plastic Bags	Yellow	
5	Polish Filter	Grey	
6	Food Waste	Orange	
7	Glass Bottles	Black	

Waste Categorization with dedicated containers

- c. **Personnel facilities and toilets:** Personal facilities include hand washing and drying system with potable water supply, adequate and separate lavatories and changing facilities. Hand wash facilities shall be provided with hot or cold running water with self-closing / or elbow operated tap, soap solution, hand drying system / towel and disinfectant. Adequate number of separate clean toilets for males and females, refreshment rooms and changing rooms shall be provided at suitable locations and these shall not have direct access to the process / storage area.

To generate awareness in food handlers, display boards for 'Do and Don't', personal hygiene, personal behavior and good manufacturing practices shall be put up at prominent places with pictorial information and instructions in an understandable language or the local language.



Separate lockers for men and women for changing work clothes



- d. **Air quality and ventilation system** shall be designed and constructed so that air does not flow from contaminated areas to clean areas.

Adequate ventilation or aeration of the seeds or nuts during storage ensures that low moisture levels are maintained and microbial development is avoided. This is important in the storage of groundnuts which are highly susceptible to aflatoxin contamination

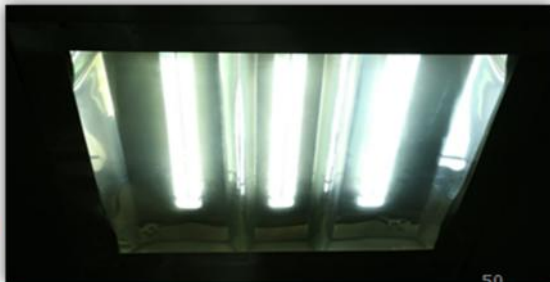
Ventilation is especially important at workstations devoted to raw-material handling, milling, handling of bleaching earth, and use of solvents.



- e. **Lighting** : Adequate lighting facility shall be provided to enable the food handlers to operate in a hygienic manner. Lighting shall be protected / covered to prevent contamination due to accidental breakages.



Proper lighting facility in the work area



Lights shall be covered

COVERED LIGHTING

All lights in the process and packaging halls should be covered with shatter proof material to prevent any accidental contamination of product from shattered glass of lights



PART III

CLEANING AND MAINTENANCE OF EQUIPMENT

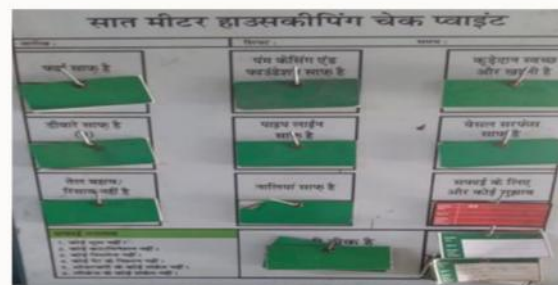
CLEANING & SANITATION
EQUIPMENT MAINTENANCE

CLEANING AND SANITATION OF EQUIPMENT AND PREMISES

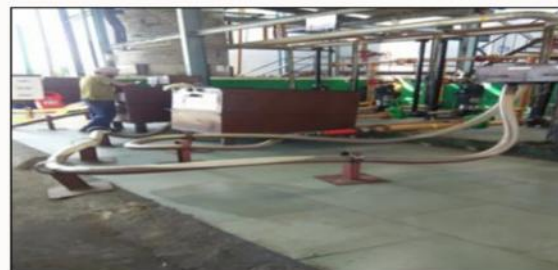
Detailed cleaning program shall be developed indicating specific areas to be cleaned, cleaning frequency, procedure, equipment, cleaning material and method



Visualizing for HK material



Kamishibai Board for maintaining HK



Hanging of Flexible pipes for ease of cleaning

- Equipment and containers that come in contact with oil and used for edible oil handling, storage, processing & packaging shall be made of corrosion free materials which do not impart any toxicity to the food material and should be easy to clean and /or disinfect (other than disposable single use types). MS Tanks and pipelines should be preferably avoided and replaced with SS.
- Equipment and utensils used in the edible oil manufacture shall be kept at all times in good order and repair and in a clean and sanitary condition. Such utensil or container shall not be used for any other purpose.
- Equipment shall be so located, designed and fabricated that it permits necessary maintenance and cleaning functions as per its intended use and facilitates good hygiene practices inside the premise including monitoring and audit.
- Appropriate facilities for the cleaning and disinfecting of equipment's and instruments and wherever possible cleaning in place (CIP) system shall be adopted.

- CIP (cleaning in place) facilities can be adopted for cleaning and disinfecting of equipment and instruments. For cleaning of disassembled equipment, utensils and containers, a separated and identified cleaning area shall be provided with adequate potable water supply, drainage system and cleaning agents.
- Build-up of oils in drains and polymerization around motors and valves should be regularly cleaned.
- Equipment and containers for waste, by-products and inedible or dangerous substances, shall be specifically identifiable and suitably constructed.
- Containers used to hold cleaning chemicals and other dangerous substances shall be identified and stored separately to prevent malicious or accidental contamination of food.
- If required, a waste water disposal system / effluent treatment plant shall be put in place.
- All items, fittings and equipment's that touch or come in contact with food must be kept in good condition in a way that enables them to be kept clean and wherever necessary, to be disinfected.
- Lubricants and heat transfer fluids shall be food grade where there is a risk of direct or indirect contact with the product.



Sanitation and Maintenance of Establishment Premises

Template for Cleaning/Sanitation Program

Item	Frequency	Equipment and Chemicals	Methods	Responsible Person
Structure				
Floors	End of each day or as frequently as required	Brooms, damp mop, brush detergent and sanitizer	<ol style="list-style-type: none"> 1. Sweep the area 2. Apply detergent and mop the area 3. Use scrub for extra soil 4. Rinse thoroughly with water 5. Remove water with mop 	
Walls, window and ceiling	Monthly or as required	Wiping cloth, brush and detergent	<ol style="list-style-type: none"> 1. Remove dry soil 2. Rinse with water 3. Apply detergent and wash 4. Rinse with water 5. Air dry 	
Food Contact Surfaces				
Work Tables and sinks	After use	Wiping cloth, detergent and sanitizer	<ol style="list-style-type: none"> 1. Remove food debris and soil 2. Rinse with water 3. Apply detergent and wash 4. Rinse with water 5. Apply sanitizer 6. Air dry 	

Dos and Don'ts

1. Never store chemicals near food, food storage areas or any tools or equipment that will touch food. Keep them under lock in a designated area only for cleaning tools and chemicals.
2. Never leave chemicals on or near a food preparation area. That includes on top of counters, stoves, etc.
3. Do not store chemicals above food prep areas, kitchen sinks or drain boards.
4. Store chemicals in their originally labelled containers and make sure they are closed properly.
5. Never use food storage containers to store, transport or mix chemicals.
6. Always read the instructions on the label before use, even if it's a product you use regularly. You don't want to accidentally use the product in the wrong area or use it incorrectly.
7. Use safety posters or graphics to warn employees about chemical safety precautions. In businesses where language barriers could be a problem, create materials that are either bilingual or use pictures that don't require further descriptions.
8. Always spray chemicals holding the spray nozzle away from you.
9. Never mix two different chemicals together.
10. Always wear protective gloves and goggles when recommended.



Preventive & Corrective maintenance

A preventive maintenance programmes shall be in place.

1. The preventive maintenance programmes shall include all devices used to monitor and/or control food safety hazards
2. Corrective maintenance shall be carried out in such a way that production on adjoining lines or equipment is not at risk of contamination
3. Maintenance requests which impact product safety shall be given priority.
4. Temporary fixes shall not put product safety at risk. A request for replacement by a permanent repair shall be included in the maintenance schedule.
5. Lubricants and heat transfer fluids shall be food compatible where there is a risk of direct or indirect contact with the product.
6. The procedure for releasing maintained equipment back to production shall include clean up, sanitizing, where specified in process sanitation procedures, and pre-use inspection.
7. Local area PRP requirements shall apply to maintenance areas and maintenance activities in process areas.
8. Maintenance personnel shall be trained in the product hazards associated with their activities



PART IV

PEST CONTROL

PEST CONTROL

A pest is any living organism that causes damages or discomfort, or transmits or produces diseases.

1. The establishment shall have a nominated person to manage pest control activities and/or deal with appointed expert contractor.
2. Pest management programmes shall be documented and shall identify target pests, and address plans, methods, schedules, control procedures and, where necessary, training requirements.
3. Programmes shall include a list of chemicals which are approved for use in specified areas of the establishment to be get listed in agreement.
4. Food establishment, including equipment and building shall be kept in good repair to prevent pest access and to eliminate potential breeding sites. Holes, drains and other places where pests are likely to gain access shall be kept in sealed condition or fitted with mesh / grills / claddings or any other suitable means as required and animals, birds and pets shall not be allowed to enter into the food establishment areas/ premises.
5. Food materials shall be stored in pest-proof containers stacked above the ground and away from walls.
6. Pest infestations shall be dealt with immediately and without adversely affecting the food safety or suitability. Treatment with permissible chemical, physical or biological agents, within the appropriate limits, shall be carried out without posing a threat to the safety or suitability of food. Records of pesticides / insecticides used along with dates and frequency shall be maintained.
7. Animals, birds and pets shall not be allowed to enter into the food establishment areas/ premises.
8. In order to control the settlement of pests in the surroundings (i.e. not to provide them place of refuge and feed resources) it is necessary to maintain a non attractive environment which includes:
 - Isolated storage of unutilised materials, pallets and machines, without contact with the walls and buildings.
 - Design and maintenance of external spaces, including:
 - Elimination of holes and spaces in waste land with high vegetation.
 - Regular cutting of grass lawns
 - The elimination of stagnant water.
 - The absence of rags, papers, plastic films and other detritus abandoned on the ground.
9. Tidying and cleaning of technical buildings (machine shop, boiler room, refrigeration rooms, electrical cabinets) to avoid rodent settlement.
10. Mosquito nets at window and suitable screens on access doors.
11. Rigorous management of waste containers, which include:

- Frequent cleaning so as not to attract insects.
- Storage in a clean and easily available washing area equipped with a source of water and floor drainage system for waste water.
- Keeping them closed (to prevent use as a feed source by all types of pests).
- Not filling them in to excess to avoid overflowing and dropping of food waste on the ground.
- A waterproof design and easy to clean and disinfect.
- Frequent removal of waste from production area.

Monitoring and detection

Pest-monitoring programmes shall include the placing of detectors and traps in key locations to identify pest activity. A map of detectors and traps shall be maintained. Detectors and traps shall be designed and located so as to prevent potential contamination of materials, products or facilities.

The Major Pest includes – *(Informative purpose)*

1. Cockroaches
2. Rodents (mice, rats, squirrels etc.)
3. Flies
4. Stored product pests (Flour beetle, sawtooth grain beetle, cigarette beetle, indianmeal moth etc.)

1. Cockroaches

Cockroaches are active mostly at night. They prefer places that are warm (26°C or higher) and moist (55% humidity or higher, which is another reason to keep relative humidity at or below 50%). Cockroaches like to hide in cracks and crevices and they frequently take advantage of “free rides” in delivery boxes, bags and personal items. Cockroaches leave coarse pepper-like fecal droppings, as well as fecal smears that dry on surfaces. Other signs of cockroach activity are the presence of egg cases under and inside drawers, cabinets, equipment and other hiding areas.

Critical areas for Cockroaches

Cockroaches are attracted to spilled food and water or beverages. Equipment, such as packaging machines need to be checked carefully. Inspect and clean all food preparation equipment and surfaces. Remove scraps from drains.

Chemical Control of Cockroaches

Crack and crevice treatment and spot treatment

- Target use of insecticides to reduce amount used
- Avoid contaminating food, preparation surfaces and equipment
- Apply insecticides after business hours

2. Rodents

Rodents mainly include rats and mice (usually mice are the more common problem). They damage/contaminate food and property. The rodents can spread diseases through their feces and urine or by contact with surfaces. Rodents nest outdoors in areas hidden by tall grass, landscaping, “clutter” or down in sewers.

Control of Rodents

i. Rodents Traps

Mechanical traps are the best choice for indoor rodent control. Lethal traps include sticky traps and regular snap traps. Mechanical rodent traps include “live traps”. Traps must be checked daily and rodents or their carcasses removed as soon as possible.

ii. Rodent Baiting

Poison baits can be used only outdoors. Keep track of rodent feeding activity on these baits. Placement is critical. Rodents prefer to travel along walls, so place the stations where rodents are likely to find them. One important point to remember: if you bait in public areas (i.e., accessible to people or animals), then you must place the baits in a secure bait station

3. Flies

“Filth flies” are the most common fly problems associated with food-handling facilities. They include house flies and the green, blue or coppery colored blow flies commonly seen around garbage cans.

Fruit flies are found near damaged or discarded fruits and vegetables. Drain flies breed in floor/sink drain, as well as the drip lines for air conditioners, freezers and ice-makers. Fungus gnats can also be found where indoor plants are overwatered.

Sanitation is very important to fly control and prevention. Keep food prep areas clean and dry.

Control of Flies

Lights traps are helpful indoors and outdoors to trap flies. They should be mounted preferably 4-6 feet off the ground, but out of the way of employee activities. Indoors, place these traps where they will *not* be visible from outside. Otherwise, they might attract flies to the building. Bulbs should be replaced yearly and the replacement date noted on the trap.

4. Stored product pest

Important pests in food service are those that attack store foods. The Indian meal moth (a small moth with coppery-colored wings) is probably the most common stored products pest.

Flour and grain beetles are other important stored product pests. All of these insects attack a wide variety of oil seeds.

Some of the potential sources of pest entrance



Broken glass of the window



Open exhaust



Gap in between shutter & floor



Space in blinds on exhaust

Some of the pest control methods (4 D's Approach)



Deny entry



Deny food



Deny shelter

**PEST
CONTROL**



Destruction

Some of the pest control methods



•Rat cage protected by steel frame



•Glueboard for insect trapping in production
•maintain 1.5m radius gap



•End seal for pipelines not in use



•Insectocutor used outside production area
•maintain 3m radius gap



•Tamper resistant bait station secured onto ground
•hook up baits



•Mesh and grit for drainage

PART V

PERSONAL HYGIENE

Health status

Behavioural & personal cleanliness

Visitors

HEALTH STATUS

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

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

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

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



Health check up by medical practitioners

An illustrative performa is shown below and it can be downloaded from www.fssai.gov.in

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.

BEHAVIOURAL & PERSONAL CLEANLINESS

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

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

Basic requirements for personal hygiene -

Do (क्या करें)

Hair should be properly tucked inside the cap
बाल अच्छी तरह टोपी से ढकें

No earrings or necklace/chains
कान की बालियाँ, गले का हार वर्जित है

No outer pockets
बाहरी जेब न रखें।

wear neat and clean clothes
साफ सुथरे कपड़े पहनें

No wrist watch / rings
घड़ी और अंगूठी मना है

Cover all wounds
जखम पर पट्टी लगाएँ

Nails should be short and clean
नाखून छोटे और स्वच्छ रखें

Torn clothes should be repaired or replaced
फटे हुए कपड़े न पहने

Wear clogs and safety shoes
सेफ्टी वाले जूते पहनें

Don't (क्या न करें)

Hair Coming outside the cap
टोपी से बाहर निकलते हुए बाल

Earring and necklace / Chains
कान की बालियाँ और गले का हार

Outer pockets and contents
बाहरी जेब और सामान

Dirty clothes
गंदे कपड़े

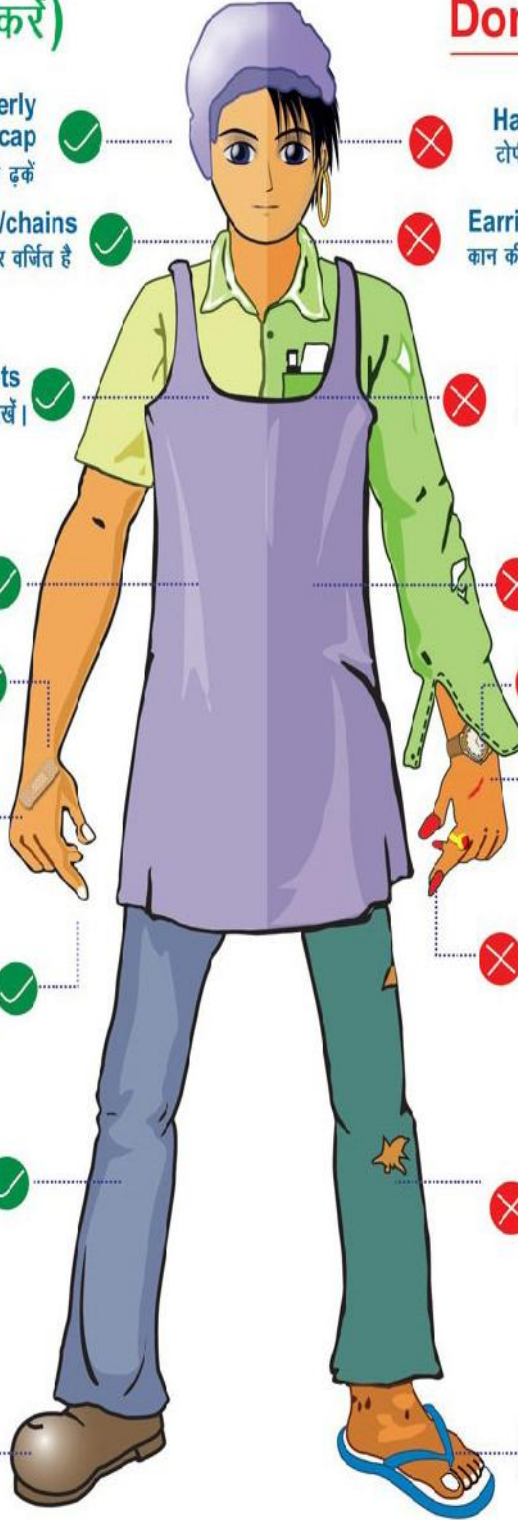
Wrist watch/Rings
घड़ी/गहने

Open and bleeding wounds
खुले जखम

Long and painted nails
बड़े और रंगे हुए नाखून

Torn clothes
फटे हुए कपड़े

Bare feet/slippers
खुले पैर/चप्पल



Here's procedure for how to properly wash hands and when to wash hands.

How to wash hands



How to wash hands



When to wash your hands

After Using the Toilet, Urinal or anytime you visit the restroom for any reason

Before and After Handling or Preparing any Food Item

Before and After handling raw meats, raw poultry or other raw foods

After Sneezing, Coughing or Scratching Any Part of Your Body

Before Serving Food, Beverages, Setting or Waiting Tables

After Handling a Tissue or Handkerchief

After Cleaning, Washing Dishes or Bussing Tables

After Touching Your Face, Hair, Clothes or Any Part of Your Body

Employees are required to wash your hands **BEFORE beginning work, **BEFORE** working with foods and **AFTER** any activity that could contaminate the food and equipment you are working with.**

After Eating, Drinking and After Breaks

After Smoking, Chewing Gum or Chewing

Before Putting Gloves on, or Anytime You Take Gloves Off

General Hygiene & Health of Food Handlers

Food handlers should NOT EAT OR TASTE FOOD in food handling area

Food handlers should NOT EAT CHEWING GUM OR PAN MASALA in food handling area

Staff with cough and sneezes must NOT HANDLE FOOD, alternatively must wear a face mask

SPITTING is prohibited in food handling area

DO NOT SMOKE

General Hygiene & Health of Food Handlers



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



No jewellery allowed



Nails should be trim with no nail paint



Hair should be trim with hair net



No perfume allowed



Open Cut



Open Cut being dressed

Cuts should be dressed



No mobile phone allowed

VISITORS

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



Visitor policy shall be documented



Visitor shall be given visitor card with restricted entry



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

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PART VI

FOOD OPERATION AND CONTROL

Procurement of raw materials

Storage of raw material

Production: Pre-processing, Production

- Expelling
- Solvent extraction
- Refining
- Blending
- Value adding Processing – Oils and Fats product.

Product Packaging

Approved additives

Procurement of raw materials

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

1. Raw materials shall be purchased from reliable and known suppliers. As per Condition of license, Every manufacturer, distributor or supplierselling an article of food to manufacturing shall give either separately or in the bill, cash memo or label a warranty in Form E i.e. Form of Guarantee.
2. It shall conform to all the Regulations and standards laid down under the Food Safety & Standard Act, 2006.
3. Records of raw materials & source of procurement shall be maintained in a register for inspection.
4. All raw materials should be checked for visible deterioration & off- odour and for any foreign matter.
5. Oil tanker should be checked for seal integrity and mostly dedicated tankers to be used
6. No raw material or ingredient thereof shall be accepted if it is known to contain parasites, undesirable micro-organisms, pesticides, veterinary drugs or toxic items or decomposed or extraneous substances, which would not be reduced to an acceptable level by normal sorting and/or processing.
7. Raw materials should be purchased in quantities that correspond to storage/preservation capacity of the establishment.
7. Packaged raw material must be checked for 'expiry date'/ 'best before'/ 'use by' date, packaging integrity and storage conditions.

An illustrative copy of Form E is displayed below. The food handler can download the same from Food Safety & Standards (Licensing & Registration of Food Businesses) Regulations, 2011 (Refer Regulations

2.1.14(2)). [http://www.old.fssai.gov.in/Portals/0/Pdf/Food%20safety%20and%20Standards%20\(Licensing%20and%20Registration%20of%20Food%20businesses\)%20regulation,%202011.pdf](http://www.old.fssai.gov.in/Portals/0/Pdf/Food%20safety%20and%20Standards%20(Licensing%20and%20Registration%20of%20Food%20businesses)%20regulation,%202011.pdf)

FORM E
Form of Guarantee
(Refer Regulation 2.1.14(2))

Invoice No. _____
 From: _____
 To: _____

Place: _____
 Date: _____

Date of sale	Nature and quality of article/brand name, if any	Batch No or Code No.	Quantity	Price
1	2	3	4	5

I/We hereby certify that food/foods mentioned in this invoice is/are warranted to be of the nature and quality which it/ these purports/purported to be.

Signature of the manufacturer/Distributor/Dealer

Name and address of
 Manufacturer/Packer
 (in case of packed article)
 License No. (wherever applicable)



Display of Cleaning Status on Tankers and lock & key system provided for Food Defence.



STORAGE OF RAW MATERIALS & FOOD

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

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

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

1. Storage instructions over food packaging should be followed.
2. Temperature and humidity requisite for respective food materials / products shall be maintained, to enhance shelf life.
3. FIFO (First In First Out) & FEFO (First Expire First Out) stock rotation system as applicable, shall be followed in storage areas, work-in-progress and processed/cooked or packaged food products.
4. The food materials shall be stored on racks / pallets, well above the floor level and away from the wall.



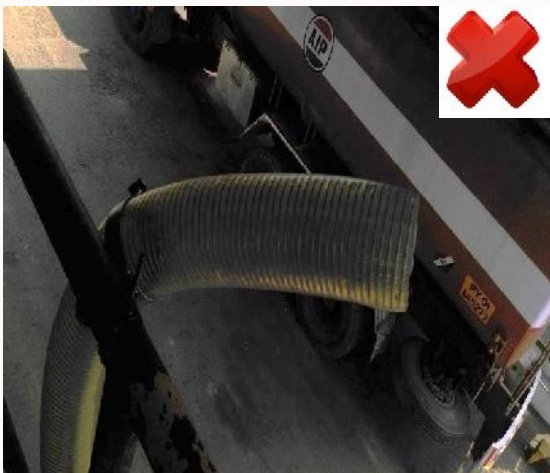
Dedicated Storage Tanks



Covered Flexible Hose Opening to avoid Product Contamination



Display of Tank Number, Cleaning Status, Calibration status & safety Instructions on Oil Tanks



Open hose pipe (chances of cross contamination)



Closure of the Hosepipe when not in use





Material storage on Pallets



FIFO displays on Raw Materials



Color coding for easy identification of Quality Status



Separate storage Area for Expired/damaged material

Storage of raw materials and food



No space between wall and stacks may lead to unhygienic conditions & pest infestation



Proper stacking of raw material on pallets



No space between wall and stacks may lead to unhygienic conditions & pest infestation



Proper stacking of raw material away from wall

Stock Management



- After storing and before raw material being sent for production, some pre – processing is done. Oilseed and nut should be properly dried before storage, and cleaned to remove sand, dust, leaves and other contaminants.
- All raw materials should be sorted to remove stones and mouldy nuts.
- Some moulds, especially in the case of groundnuts, can cause aflatoxin poisoning.
- When storage is necessary, this should be in weather proof, ventilated rooms which are protected against birds, insects and rodents.
- Some raw materials (for example groundnuts, sunflower seeds) need dehusking (or decortication).
- Decortication is important to give high yields of oil and reduce the bulk of material to processed.
- However, expellers normally require a proportion of fibrous material in order to work and, particularly with groundnuts; some husk is normally added to allow oil to escape more freely from the press.
- Coconut is dehusked and split manually by skilled operators. Most oilseeds (copra, palm kernels and groundnuts) need grinding in mills before oil extraction to increase the yields of oil. All oil-bearing materials need to have correct moisture content to maximize the oil yields.

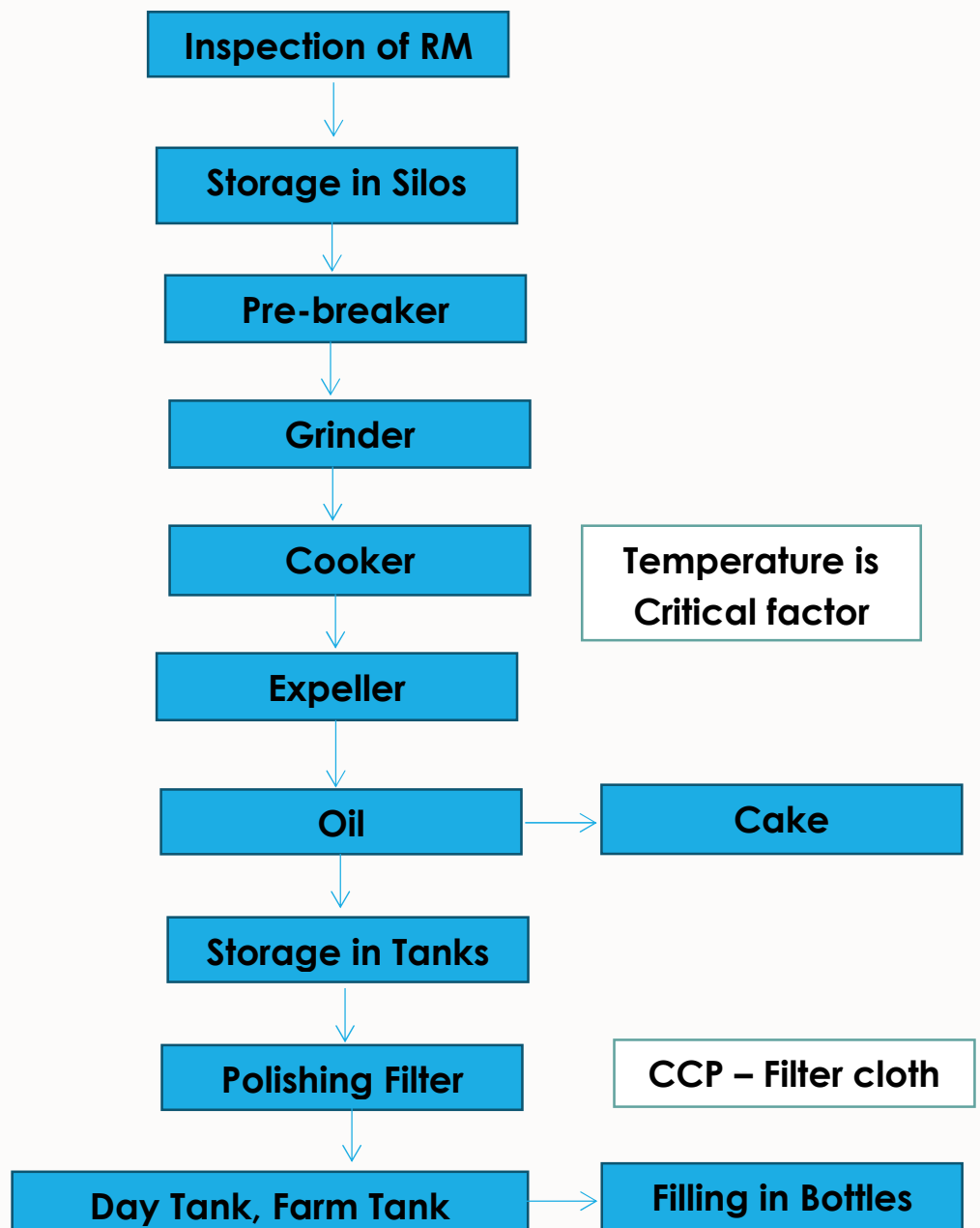


Production: Pre-processing, Production

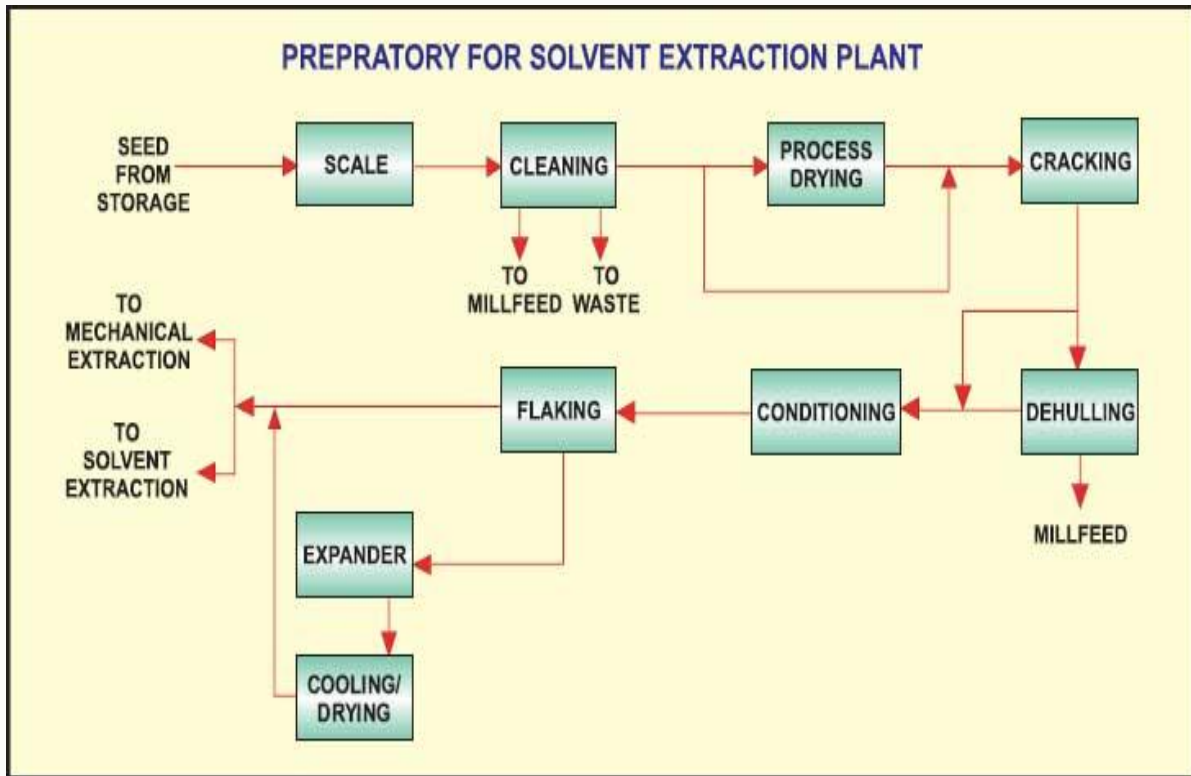
There are various process through which edible oil is manufactured and below given are the few techniques:

- Expelling
- Solvent Extraction
- Refining
- Blending
- Value adding Processing – Oils & Fats Product.

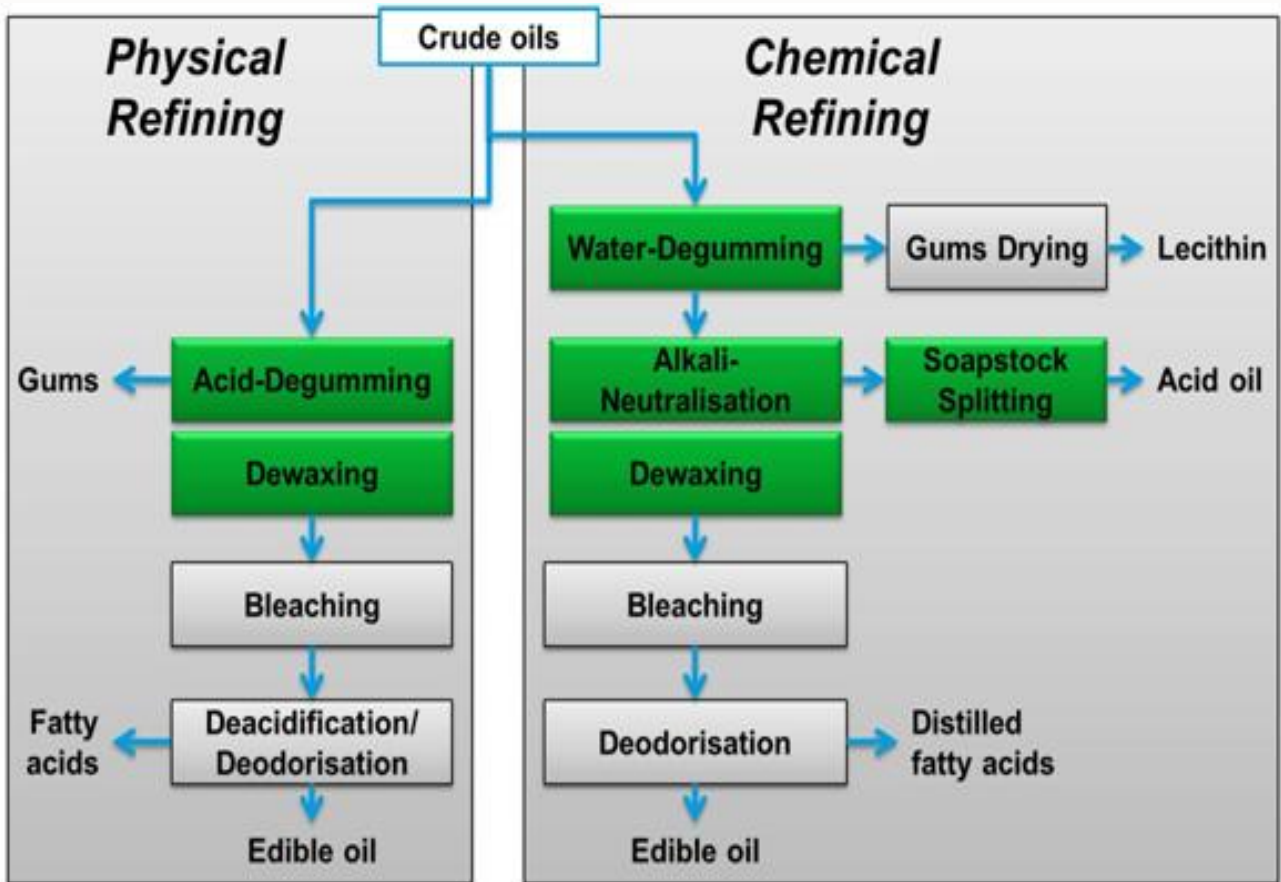
Expelling Process



Solvent Extraction



Refining Process



Blending Process

Once the final oil is produced; same is stored in tanks and then blended as per the requirements and filled in the final packaging format.

PRODUCT PACKAGING

Product packaging prevents contamination, allows food to be transported easily and extends shelf life. Packaging also provides a surface for labelling and identification of products. Packaging materials also need to ensure that food is not contaminated from substances that could migrate from the packaging into food.

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

Packaging- General Requirements

1. A utensil or container made of the following materials or metals, when used in the preparation, packaging and storing of food shall be deemed to render it unfit for human consumption:-

- (a) Containers which are rusty
- (b) Enameled containers which have become chipped and rusty
- (c) Copper or brass containers which are not properly tinned
- (d) Containers made of aluminum not conforming in chemical composition to IS: 20 specifications for Cast Aluminum and Aluminum Alloy for utensils or IS: 21 specifications for Wrought Aluminum and Aluminum Alloy for utensils.

2. Containers made of plastic materials used as appliances or receptacles for packing or storing food articles, whether partly or wholly, should conform to the following Indian Standards Specification viz. :—

- (i) IS: 10146 (Specification for Polyethylene in contact with foodstuffs)
- (ii) IS: 10142 (Specification for Styrene Polymers in contact with foodstuffs)
- (iii) IS: 10151 (Specification for Polyvinyl Chloride (PVC), in contact with foodstuffs)
- (iv) IS: 10910 (Specification for Polypropylene in contact with foodstuffs)
- (v) IS: 11434 (Specification for Ionomer Resins in contact with foodstuffs)
- (vi) IS: 11704 Specification for Ethylene Acrylic Acid (EAA) copolymer
- (vii) IS: 12252 - Specification for Poly alkylene terephthalates (PET)
- (viii) IS: 12247 - Specification for Nylon 6 Polymer
- (ix) IS: 13601 - Ethylene Vinyl Acetate (EVA)
- (x) IS: 13576 - Ethylene Methacrylic Acid (EMAA)
- (xi) Tin and plastic containers once used, shall not be re-used for packaging of edible oils and fats

Provided that utensils or containers made of copper though not properly tinned, may be used for the preparation of sugar confectionery or essential oils and mere use of such utensils or containers shall not be deemed to render sugar confectionery or essential oils unfit for human consumption.

2.1.2: Product specific requirements

2. Packaging requirements for Edible oils / fats:

Material of packaging	Conformance requirement
Tin Plate used for the manufacture of tin containers for packaging edible oils and fats	Standards of prime grade quality as per IS 1993 or 13955 or 9025 or 13954
Tin containers for packaging edible oils and fats	IS No. 10325 or 10339

Approved Additives

LIST OF ADDITIVES:

Fats and oils, and fat emulsions					
Food Category System	Food Category Name	Name Of The Food Additive	INS No	Recommended Maximum Level	Note
2.0	Fats and oils, and fat emulsions				
2.1	Fats and oils essentially free from water				
2.1.1	Butter oil, anhydrous milk fat and ghee (no additives in case of ghee)	ASCORBYL ESTERS		500 mg/kg	As ascorbyl stearate, Excluding anhydrous milkfat.
		Butylated hydroxyanisole (BHA)	320	175mg/kg	On the fat or oil basis, Any combination of butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), and propyl gallate (INS 310) at 200 mg/kg, provided that single use limits are not exceeded, Excluding anhydrous milkfat.
		Butylated hydroxytoluene (BHT)	321	75mg/kg	On the fat or oil basis, Any combination of butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), and propyl gallate (INS 310) at 200 mg/kg, provided that single use limits are not exceeded,

					Excluding anhydrous milkfat.
		Propyl gallate	310	100 mg/kg	On the fat or oil basis, Any combination of butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), and propyl gallate (INS 310) at 200 mg/kg, provided that single use limits are not exceeded, Excluding anhydrous milkfat.
		Gallate(octyl/ ethyl/dodecyl)	311, 313, 312	100 mg/kg	
		Citric acid	330	GMP	Excluding anhydrous milkfat.
2.1.2	Vegetable oils and fats	Lecithins	322(i)	GMP	
		Ascorbic acid	300	GMP	
		Propyl gallate	310	200 mg/kg	On the fat or oil basis, Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310)
		Natural and synthetic tocopherols	307	GMP	
		Ascorbyl esters	304, 305	500 mg/kg	As ascorbyl stearate
		Butylated hydroxyanisole (BHA)	320	200mg/kg	Singly or in combination: butylated hydroxyanisole (INS 320), butylated

				hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310), On the fat or oil basis.	
		Butylated hydroxytoluene (BHT)	321	200mg/kg	Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310), On the fat or oil basis.
		Citric acid, tartaric acid, gallic acid	330, 334	GMP	On the fat or oil basis, Excluding virgin and cold pressed oils and products conforming to the standard for Olive Oils and Olive Pomace Oils
		Guaiaic resin	314	1,000 mg/kg	
		TBHQ	319	200 mg/kg	On the fat or oil basis, Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310)
		Sodium citrate	331(iii)	GMP	
		Isopropyl citrate mixture	384	200 mg/kg	
		Monoglyceride citrate		100 mg/kg,	Singly or in combination
		Phosphoric acid	338	100 mg/kg	Singly or in combination

		Polydimethylsiloxane	900a	10 mg/kg	
		beta-Carotenes, vegetable	160a(ii)	1,000 mg/kg	
		CAROTENOIDS		25 mg/kg	For use in vegetable fats conforming to the standard for edible fats and oils not covered by individual standards only.
		Diacetyltartaric acid and fatty acid esters of glycerol	472e	10,000 mg/kg	
		POLYSORBATES		5,000 mg/kg	For use in fat emulsions for baking purposes only.
		Propylene glycol esters of fatty acids	477	10,000 mg/kg	
		Stearyl citrate	484	GMP	
		THIODIPROPIONATES		200 mg/kg	As thiodipropionic acid.
2.1.3	Lard, tallow, fish oil, and other animal fats (edible fats)	Lecithins	322(i), (ii)	GMP	
		Ascorbic acid	300	GMP	
		Propyl gallate	310	200 mg/kg	On the fat or oil basis, Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310)
		TOCOPHEROLS		GMP	
		Ascorbyl esters	304, 305	500 mg/kg	As ascorbyl stearate
		Butylated hydroxyanisole (BHA)	320	200mg/kg	Singly or in combination: butylated

				hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310), On the fat or oil basis.
	Butylated hydroxytoluene (BHT)	321	200mg/kg	Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310), On the fat or oil basis.
	Citric acid	330	GMP	
	tartaric acid	334	GMP	
	Guaiac resin	314	1,000 mg/kg	
	TBHQ	319	200 mg/kg	On the fat or oil basis, Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310)
	Sodium citrate	331(iii)	GMP	
	Phosphoric acid	338	100 mg/kg	
	Dimethyl polysiloxane	900a		Singly or in combination with silicon dioxide
	Silicon dioxide	551		

				10 mg/kg	
		beta-Carotenes, vegetable	161a(ii)	1,000 mg/kg	
		CAROTENOIDS		25 mg/kg	
		Diacetyl tartaric acid and fatty acid esters of glycerol	472e	10,000 mg/kg	
		Fast green FCF	143	100 mg/kg	
		Indigotine	132	100 mg/kg	
		Isopropyl citrate mixture	384	200 mg/kg	
		POLYSORBATES		5,000 mg/kg	For use in fat emulsions for baking purposes only.
		Propylene glycol esters of fatty acids	477	10,000 mg/kg	
		Stearyl citrate	484	GMP	
		Sunset yellow FCF	110	100 mg/kg	
		THIODIPROPIONATES		200 mg/kg	As thiodipropionic acid.
2.2	Fat emulsions mainly of type water-in-oil				
2.2.1	Butter (Butter and Milk Fat)	Curcumin	100(i)	100 mg/kg	
		beta-Carotenes, vegetable	160a(ii)	600 mg/kg	
		Annatto	160b(i),(ii)	20 mg/kg	As bixin.
		CAROTENOIDS		35 mg/kg	Beta-carotene (synthetic) (INS 160a(i)) only.,

					Except for use of beta-apo-8'-carotenal (INS 160e) and beta-apo-8'-carotenoic acid, methyl or ethyl ester (INS 160f) at 35 mg/kg.
		Sodium hydroxide	524	GMP	
		Calcium hydroxide	526	GMP	
		PHOPHATES		880 mg/kg	As phosphorus. On the anhydrous basis.
		Sodium carbonate	500(i)	GMP	
		Sodium hydrogen carbonate	500(ii)	GMP	
2.2.2	Fat spreads, dairy fat spreads and blended spreads (margarine, bakery shortenings and fat spreads)	Lecithins	322(i), (ii)	GMP	
		Propyl gallate	310	200 mg/kg	On the fat or oil basis, Any combination of butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), and propyl gallate (INS 310) at 200 mg/kg, provided that single use limits are not exceeded, Excluding anhydrous milkfat.
		Tocopherols	307a,b,c	GMP	
		Ascorbyl esters	304, 305	500 mg/kg	As ascorbyl stearate
		Butylated hydroxyanisole (BHA)	320	200mg/kg	Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310),

				On the fat or oil basis.
	Butylated hydroxytoluene (BHT)	321	200mg/kg	Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310), On the fat or oil basis.
	tartaric acid	334	GMP	
	Guaiac resin	314	1,000 mg/kg	
	TBHQ	319	200 mg/kg	On the fat or oil basis, Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310)
	Isopropyl citrate mixture	384	100 mg/kg	
	Diacetyltartaric and fatty acid esters of glycerol	472e	10 g/kg	
	1,2 -propylene glycol esters of fatty acids	477	20g/kg	
	Sorbitanmonopalmitate / sorbitanmonostearate/ tristearate	495, 491	1,000 mg/kg	
	Sucroglycerides	474	10,000mg/kg	For use in fat emulsions for baking purposes only.
	SORBATES		2,000 mg/kg	As sorbic acid.
	beta-Carotenes, vegetable	160a(ii)	1,000mg/kg	
	Annatto	160b	20 mg/kg	

		Curcumin	100(i)	5 mg/kg	
		CAROTENOIDS		35 mg/kg	
		ETHYLENE DIAMINE TETRA ACETATES (EDTA)		100 mg/kg	As anhydrous calcium disodium ethylenediaminetetraacetate.
		BENZOATES		1,000mg/kg	As benzoic acid.
		Canthaxanthin	161g	15 mg/kg	Excluding products conforming to the standard for dairy fat spreads. Excluding products conforming to the standard for fat spreads and blended spreads.
		Caramel III -Ammonia caramel	150c	500 mg/kg	Excluding products conforming to the standard for dairy fat spreads. Excluding products conforming to the standard for fat spreads and blended spreads.
		Caramel IV-Sulfite ammonia caramel	150d	500 mg/kg	Excluding products conforming to the standard for dairy fat spreads.
		HYDROXY BENZOATES, PARA		300 mg/kg	As para-hydroxybenzoic acid.
		Lauric alginate ethyl ester	243	200 mg/kg	Excluding products conforming to the standard for dairy fat spreads. Excluding products conforming to the standard for fat spreads and blended spreads.
		PHOSPHATES		2,200 mg/kg	As phosphorus.
		Polydimethylsiloxane	900a	10 mg/kg	For use in frying only.

		POLYSORBATES		5,000 mg/kg	For use in fat emulsions for baking purposes only.
		RIBOFLAVINS		300 mg/kg	
		Stearyl citrate	484	100 mg/kg	On the fat or oil basis.
		STEAROYL LACTYLATES	481(i), 482(i)	10,000 mg/kg	
		Thermally oxidized soya bean oil interacted with mono- and diglycerides of fatty acids	479	5,000 mg/kg	
		THIODIPROPIONATES		200 mg/kg	As thiodipropionic acid.
2.3	Fat emulsions mainly of type oil-in-water, including mixed and/or flavoured products based on fat emulsions	Acesulfame potassium	950	1,000 mg/kg	If used in combination with aspartame-acesulfame salt (INS 962), the combined maximum use level, expressed as acesulfame potassium, should not exceed this level.
		ASCORBYL ESTERS		500 mg/kg	As ascorbyl stearate.
		Aspartame	951	1,000 mg/kg	If used in combination with aspartame-acesulfame salt (INS 962), the combined maximum use level, expressed as aspartame, should not exceed this level.
		BENZOATES		1,000 mg/kg	As benzoic acid.
		Brilliant blue FCF	133	100 mg/kg	
		Butylated hydroxyanisole (BHA)	320	200mg/kg	Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310),

				On the fat or oil basis
	Butylated hydroxytoluene (BHT)	321	200mg/kg	Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310), On the fat or oil basis
	Canthaxanthin	161g	15 mg/kg	
	Caramel III - ammonia caramel	150c	20,000 mg/kg	
	beta-Carotenes, vegetable	160a(ii)	1,000 mg/kg	
	CAROTENOIDS		200 mg/kg	
	Diacetyltartaric and fatty acid esters of glycerol	472e	10,000 mg/kg	
	HYDROXYBENZOATES, PARA -		300 mg/kg	As para-hydroxybenzoic acid.
	Indigotine (indigo caramine)		100 mg/kg	
	Neotame	961	10 mg/kg	
	PHOSPHATES		2,200 mg/kg	As phosphorus.
	POLYSORBATES		5,000 mg/kg	For use in fat emulsions for baking purposes only.
	Propyl gallate	310	200 mg/kg	On the fat or oil basis. Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310).
	Propylene glycol esters of fatty acids	477	30,000 mg/kg	
	RIBOFLAVINS		300 mg/kg	
	SORBATES		1,000 mg/kg	As sorbic acid.

		Sucroglycerides	474	10,000 mg/kg	For use in fat emulsions for baking purposes only.
		Tertiary butylhydroquinone	319	200 mg/kg	On the fat or oil basis. Singly or in combination: butylated hydroxyanisole (INS 320), butylated hydroxytoluene (INS 321), tertiary butylated hydroquinone (INS 319), and propyl gallate (INS 310).



PART VII

TRANSPORTATION

Transportation

- Tankers, conveyances, and containers shall be maintained in a state of repair, cleanliness, and condition consistent with requirements given in relevant specifications
- Where the same vehicles, conveyances, and containers are used for food and non-food products, cleaning shall be carried out between loads & No petroleum or hazardous chemicals tankers shall be engaged for Food items transportation.
- Bulk containers shall be dedicated to food use only. Where required by the organization, bulk containers shall be dedicated to a specified material
- Bulk tankers deliveries Tankers shall be sealed with plastic / metal seals with numbered seals & thread or lead seals should be restricted.
- The final oil before packing must be filtered through fine cartridge filters to remove any suspended matter / dust and other foreign matter. Post this, the entire oil must be allowed to remain in closed containers and pipelines to avoid subsequent contamination prior to packing.
- Nitrogen gas used for Oil or fats blanketing or as ingredients shall be food grade standards.

Conveyances and / or containers used for transporting / serving foodstuffs shall be **non toxic, kept clean** and **maintained in good condition** in order to protect foodstuffs from any contamination.



Vehicle inspection before loading



Multilayer Tarpaulin to protect from water & duct.

OK	NOT OK
 <p>Properly Wear Cap And Mask പോഷണവും മാസ്ക് ഉപയോഗിക്കുക</p>	 
 <p>Keep Close The Unloading Pipe If Not Using ഉപയോഗിക്കാതിരിക്കുമ്പോൾ അടയ്ക്കുക</p>	 
 <p>Don't Keep Loose Objects In Pockets പുഴുപുഴുപോലെയുള്ള വസ്തുക്കൾ പാക്കറ്റിൽ ഇടരുത്</p>	 
 <p>Close The Tanker Hole If Not Using ഉപയോഗിക്കാതിരിക്കുമ്പോൾ അടയ്ക്കുക</p>	 
 <p>Don't Walk Over The Man Hole Of Tanker മാനഹോളിന്റെ മുകളിലൂടെ നടക്കരുത്</p>	 
 <p>Always Wear Proper Person Hygiene Tools White Handling Foods എപ്പോഴും സുചിന്ത്യം പാലിക്കുക</p>	 
 <p>Always use stair case കോണിപ്പടയിലൂടെ ഇറങ്ങുക കയറുക</p>	 

 <p>No Smoking പുകവലി പാടില്ല</p>	 <p>Don't Use Pan Masala പാനമസാല അനുവദിക്കരുത്</p>	 <p>Don't Spit In Factory പാകട്രിക്ക്കളിൽ തുപ്പരുത്</p>
 <p>Don't Keep Chemicals In Truck രസായനങ്ങൾ വാഹനത്തിൽ വെക്കരുത്</p>	 <p>Don't Stealing മോഷ്ടണം അരുത്</p>	 <p>Dispose Waste Properly പുഴുപുഴുപോലെയുള്ള വസ്തുക്കൾ ശരിയായി മാറ്റി വെക്കുക</p>
 <p>No Alcohol & Drugs മദ്യം അനുവദിക്കരുത്</p>	 <p>Don't Open The Top Cover In The Rain Time മഴക്കാലത്ത് മേൽ കവർ തുറന്നു വെക്കരുത്</p>	 <p>Don't use Chewing Gum ചുട്ടയിടൽ ശീല അനുവദിക്കരുത്</p>
<p>Keep The Factory & Surrounding Clean And Neat പരിസരം വൃത്തിയാക്കി സൂക്ഷിക്കുക</p>		
<p>Give Details In Gate What Are The Materials You Have With കൈവശമുള്ള വസ്തുക്കളുടെ വിവരങ്ങൾ ഗേറ്റിൽ രേഖപ്പെടുത്തുക</p>		

PART VIII
MANAGEMENT
and
SUPERVISION

MANAGEMENT & SUPERVISION

A detailed Standard Operating Procedure (SOP) for the processing of food as well as its packing, despatch and storage will be developed. A standard operating procedure, or SOP, is a living document showing technical instructions of how to perform a routine or repetitive task. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with establishment requirements. The SOP should be based on 5W's & 1H (i.e. why, when, what, where, who & how)

A good standard operating procedure –

- ✓ Should provide all information necessary to perform a task
- ✓ It is usually specific to the equipment used for the procedure
- ✓ Should be detailed
- ✓ Should be standalone
- ✓ Should provide quality information
- ✓ Should provide references

The technical managers and supervisors shall have appropriate qualifications, knowledge and skills on food hygiene principles and practices.

As per the condition of FSSAI license – The Food Business Operator shall employ at least one technical person to supervise the production process. The person supervising the production process shall possess at least a degree in science with Chemistry/ Bio-chemistry/ Food and nutrition/ Microbiology or a degree or diploma in Food Technology/ Dairy Technology/ Dairy Microbiology/ Dairy chemistry/ Dairy engineering/ Oil technology/ Veterinary science / Hotel management & technology or any degree or diploma in any other discipline related to the specific requirement of the business from a recognized university or institute or equivalent.

It should be ensured that SOPs help 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.

PART IX

FOOD TESTING

Sampling

Quality Testing Parameters

Safety Testing Parameters

FOOD TESTING FACILITIES

A well equipped laboratory for physical, microbiological and chemical analysis shall be in place inside the premise of establishment. In case of any suspicion or possible contamination, food materials shall be tested before dispatch by the Food Business Operator.

If there is no in house laboratory facility, then regular testing shall be done through an accredited lab notified by FSSAI. In case of complaints received and if so required, the company shall voluntarily do the testing either in the inhouse laboratory or an accredited lab or lab notified by FSSAI. As per the condition of FSSAI license – Food Business Operator shall ensure testing of relevant chemical and/or microbiological contaminants in food products in accordance with these regulations as frequently as required on the basis of historical data and risk assessment to ensure production and delivery of safe food through own or NABL accredited /FSSA notified labs at least once in six months.



Chemical analysis facilities

Microbial analysis facilities



SAMPLING OF OILS AND FATS

Sampling refers to the statistical process of selecting and studying the characteristics of a relatively small number of items from a relatively large population of such items, to draw statistically valid inferences about the characteristics about the entire population.

Scale of Sampling

Lot: All the containers in a single consignment of one type and grade of material drawn for a single batch of manufactures shall constitute the Lot.

Gross Sample: The general procedure for taking a gross sample is to draw a no. of portions from the bulk quantity or a no. of portions from all or several packages and, mix them thoroughly. Representative portions of the gross sample shall be transferred to air tight containers of suitable size for the test samples.

Gross sample from bulk quantities: shall be drawn in quantities of not less than 2 kg per 2000kg or less.

Gross sample from small packages: when sampling from drums, barrels, etc. the packages from which the samples are drawn shall be selected at random from the lot. The following schedule is recommended for the no. of packages to be sampled:

Number of Packages in the Lot	Number of packages to be sampled
1 to 4	Each package
5 to100	At least 20% with a minimum of 4 packages
More than 100	At least 10% with a minimum of 20 packages

Sampling Procedure

Oils in bulk tanks and tank wagons:

- a) Stationary Liquid oils: lower the closed sampling bottle or can slowly to the required depth, open and fill it at that depth. Three samples shall be obtained at levels of one-tenth of the depth of liquid from the top surface, one-half of the depth and nine-tenth of the depth of the liquid from the top surface. If foods or water or both are present, a bottom sample shall also be taken at the lowest point of the container. All the samples shall be mixed together in a clean dry container.

- b) During loading or unloading of liquid oils: If the product is completely liquid and free flowing the pet cork method of sampling may be used. A bleeder line with a pet cork is located in a vertical section of a pumping line through which the product is continuously flowing. Adjust the pet-cork so that a continuous stream of sample flows freely without dripping during the entire pumping period. Collect the sample in a clean dry container and mix well.

In case a pet-cork is not available, use a convenient container and withdraw approximately 0.5kg portions from the discharge end of the pipe at regular intervals as the product is entering or leaving the tank wagon.

- c) Solid oils or Fats: It is not possible to sample solid materials in tank wagons correctly. If possible, the material should be liquefied and then sampled. When necessary to sample solid materials, use the sampling scoop and withdraw several portions from the tank wagon taken vertically and obliquely towards the ends of the wagon. The scoop should pass through the stock until it touches the sides of the wagon so that the complete core is taken. Soften and mix all the portions thoroughly.

Oils in Barrels, Casks, Drums, Tierces:

- a) Liquid or semi-liquid oils: Roll the container to mix the contents and insert the sampling tube slowly through the bung hole or any other convenient opening. If possible, the sample should be drawn from end to end. As soon as the tube is fully inserted, close the upper constriction with a thumb or a stopper. Withdraw the tube and transfer the sample into a clean dry container. Take several such portions and mix well.
- b) Solid oils or Fats: Remove the bung and insert the sampling scoop through the opening, push it through the opposite end or side, turn it in a complete circle and withdraw the sample. If possible the sample should be drawn from end to end. Collect several such portions, soften and mix thoroughly.
- c) Very hard Fats: If the sample material is in the form of flakes or loose lumps or pieces; take grab samples of uniform and proportional size. If the sample material is in the form of large pieces, it should be broken up before taking grab samples. Mix thoroughly and Quarter and take a Representative sample.

General Precaution in Sampling

- All sampling instruments should preferably be made of Stainless steel.
- All sampling apparatus should be clean and dry when used.
- Samples should not be taken in an exposed place.

- Samples should be stored in a manner that they are protected from light, temperature fluctuation and other abnormal conditions.
- Sample containers should be filled such that the air space above the liquid level should be 5 to 10% of the capacity of the sample container.

TESTING REQUIREMENTS OILS AND FATS

Oils and Fats are specified under the clause 2.2 of the FSSR 2011.

"Oils" is usually used to refer to fats that are liquids at normal room temperature, while "fats" is usually used to refer to fats that are solids at normal room temperature

FSSAR 2011 Chapter 2 – Food Product Standards specifies:

- 24 types of Oils under 2.2.1.1 to 2.2.1.24
- Defines partially hydrogenated soybean oil under 2.2.3
- 11 different types of edible fats under 2.2.2 and 2.2.4

Oils and fats are primarily tested for their quality and safety requirements. These are based on FSSR guidelines.

Sr. No	Quality Parameter	Sr. No	Quality Parameter
1	Refractive index	6	Polensky value
2	Saponification Value	7	Test for Argemone oil
3	Unsaponifiable matter	8	Bellier test for Turbidity
4	Iodine Value	9	Flash point
5	Acid value		

The basic quality parameters can be done at the site lab of the FBO, whereas parameters requiring sophisticated lab infrastructure and higher analytical expertise can be outsourced to FSSAI recognized / NABL accredited labs.

Adulteration – The Need to Test

Ensuring the authenticity of food has been a problem for eras. Wherever there is a commodity that commands a quality in the market and has either high value or high-volume sales, some people may be tempted to profit from illegal activity. Food fraud usually involves misleading the purchaser as to the true nature, substance or quality of the goods demanded; thus, food standards and labeling are breached. The offence can take the form of adulteration, which generally involves the dilution of a commodity with less expensive materials. A cheaper food may also be represented as if it were a food of greater value.

Injurious Adulterants/Contaminants in Foods and their Health Effects

Adulterant	Foods Commonly Involved	Diseases or Health Effects
Argemone seeds Argemone oil	Mustard seeds Edible oils and fats	Epidemic dropsy, Glaucoma, Cardiac arrest
Mineral oil (white oil, petroleum fractions)	Edible oils and fats, Black pepper	Cancer
TCP	Oils	Paralysis
Rancid oil	Oils	Destroys vitamin A and E
BHA and BHT beyond safe limit	Oils and fats	Allergy, liver damage, increase in serum cholesterol etc.
Excessive solvent residue	Solvent extracted oil, oil cake etc.	Carcinogenic effect

Testing and Analysis

Oils are tested on the basis of two parameters namely being Quality parameters and the other Safety parameters. The limits of Quality parameters like Moisture, Refractive index, Peroxide value, Free fatty acids, Iodine value, Saponification value, Unsaponifiable matter, Fatty acid composition etc. helps understand if the oil is crude, partly refined, fully refined or whether adulterated. The concentrations of Safety parameters like trace metals, Aflatoxins, Naturally occurring toxins etc. are more important and critical as they concern public health.

Quality Parameters

1. Moisture

Water in oil can exist in three stages: Dissolved, emulsified and free. Below saturation level, the molecules of water are dispersed alongside oil molecules, resulting in water in the oil that is not visible. This is known as dissolved water, the least dangerous water state to a lube system. When the amount of dissolved water exceeds the saturation point, the oil is no longer able to absorb more water molecules, resulting in emulsified water. This is characterized by a hazy or cloudy appearance of the oil. Further increments of water content in oil will result in separate levels between oil and water forming. This state is known as free water. Due to its higher density, the water forms the lower layer, settling at the bottom of the sump, with the oil floating on top.

2. Colour

Colour determination is used for determining the quality of oils & in refining process. It also checks the measure of bleaching process also. The method determines the colour of oils by comparison with Lovibond glasses of known colour characteristics. The colour is expressed as the sum of total of the yellow & red slides used to match color in a cell of the specified size.

3. Refractive Index

The refractive index (RI) of oil or fat is a mean for identification of a nature of particular oil due to the difference in saturation, conjugation, presence of hydroxyl substituted & chain length fatty acids. It is measured under different temperature conditions - 20°C for oils, 40°C for solid fats, 60°C for hydrogenated fats & 80°C for waxes. Refractive index is very specific for particular oil. It is defined as ratio between the sine of the angle of incidence to the sine of the angle of refraction when ray of light of a known wavelength (mean of the D lines of sodium) passes from air into oil or fat.

4. Acid Value or Free fatty acids

Acid value indicates the proportion of free fatty acid present in oil or fat and may be defined as the number of milligrams of caustic potash required to neutralize the acid in 1 gm. of the sample. Refined oil acid value for most samples lies within 0.5. If any titrable acid other than a fatty acid is present in the sample, it will be an error. A high acid value indicates a stale oil or fat stored under improper conditions.

5. Saponification value

Saponification is the hydrolysis of fats or oils under basic conditions to afford glycerol and the salt of the corresponding fatty acid. Saponification literally means "soap making". It is important to the industrial user to know the amount of free fatty acid present, since this determines in large measure the refining loss. The amount of free fatty acid is estimated by determining the quantity of alkali that must be added to the fat to render it neutral.

6. Unsaponifiable matter

Unsaponifiable matter is calculated as the difference between the amounts of material which are Unsaponifiable, soluble in diethyl ether and insoluble in water, and the amount of fatty acids expressed in terms of the amount of oleic acid.

The unsaponifiable matter is that portion of oil or fat which is not saponified with caustic alkali but soluble in non-polar solvent. The Unsaponifiable matter consists of oil soluble vitamins, hydrocarbons, higher alcohols & sterols which are not soluble in water after esterification.

The material is completely saponified with alcoholic potassium hydroxide, & extracted with petroleum ether. The petroleum extract is washed with alcohol & ether. The washed extract is evaporated & residue is weighed. The fatty acids in it are determined by titrating with sodium hydroxide solution. The difference in weight of residue & free fatty acids will give the unsaponifiable matter.

7. Iodine value

Unsaturated fatty acids can be converted into saturated by the process of hydrogenation. Depending upon the degree of unsaturation, the fatty acids can combine with oxygen or halogens to form saturated fatty acids. So it is important to know the extent to which a fatty acid is unsaturated. There are different methods for checking the unsaturation level in fatty acids, one among them is by determining the iodine value of fats. Iodine value or number is the number of grams of iodine consumed by 100g of fat. A higher iodine value indicates a higher degree of unsaturation.

8. Peroxide value

Detection of Peroxide gives the initial evidence of rancidity in unsaturated fats and oils. It gives a measure of the extent to which an oil sample has undergone primary oxidation.

Peroxide value, concentration of peroxide in an oil or fat, is useful for assessing the extent to which spoilage has advanced.

The peroxide value is defined as the amount of peroxide oxygen per 1 kg of fat or oil. Traditionally this was expressed in units of mill equivalents, although if we are using SI units then the appropriate option would be in mill moles per kilogram (N.B. 1 millequivalents = 0.5 mill mole; because $1 \text{ mEq of O}_2 = 1 \text{ mmol}/2 = 0.5 \text{ mmol of O}_2$, where 2 is valence). Note also that the unit of millequivalent has been commonly abbreviated as mequiv or even as mEq.

9. FAME

Fatty acid methyl esters (FAME) analysis is an important tool both for characterizing fats and oils for the determination of total fat content in foods. Fat can be extracted from a matrix, using a non-polar solvent, and saponified to produce salts of free fatty acids. After derivitizing the free

acids to form methyl esters, the mixture readily can be analysed by Gas Chromatography (GC), due to the volatility and thermal stability of the FAMES.

Source

- <http://www.fssai.gov.in/Portals/0/Pdf/15Manuals/SAMPLING.pdf>
- <http://agmarknet.nic.in/adulterants.htm>
- <http://www.fssai.gov.in/Portals/0/Pdf/15Manuals/OILS%20AND%20FATS.pdf>

CONTAMINANTS AND TOXINS

Safety Parameters CONTAMINANTS

It is provided under the conditions of license as per FSSR licensing and registration regulations that every FBO shall ensure that his food product is tested for relevant chemical and microbiological contaminants through FSSA notified / NABL accredited or own laboratory at least once in six months.

The following contaminants shall not be present in the oil beyond the limits specified below:

Sr.No.	Contaminants	Limits	Sr.No.	Contaminants	Limits
A	<u>Crop Contaminants</u>		16	Fenvalerate	0.10 ppm
1	Aflatoxin	30 ppm	17	Triazophos 1. Cotton seed oil 2. Soyabean oil	0.1 ppm 0.05 ppm
B	<u>Nots:</u>		18	Profenofos	0.05 ppm
1	Agaric acid	100 ppm	19	Fenpropathrin	0.05 ppm
2	Hydrocyanic acid	5 ppm	20	Metolachlor	0.05 ppm
3	Hypericine	1 ppm	21	Oxyfluorfen	0.05 ppm
4	Saffrole	10 ppm	22	Imidacloprid	0.05 ppm
C	<u>Metal Contaminants</u>		23	Metribuzin	0.1 ppm
1	Lead	0.5 ppm	24	Lambdacyhalothrin	0.05 ppm
2	Methyl mercury	0.25 ppm	25	Pendimethalin	0.05 ppm
3	Nickel	1.5 ppm	26	Fluvalinate	0.05 ppm
4	<u>Insecticide</u>		27	Imazethapyr	0.1 ppm
5	Trichlorfon	0.05 ppm	28	Spinosad	0.02 ppm
6	Phenthoate	0.01 ppm	29	Thiodicarb	0.02 ppm
7	Phorate	0.03 ppm	30	Acetamiprid	0.1 ppm
8	Endosulfan	0.2 ppm	31	Indoxacarb	0.1 ppm
9	Chlorpyrifos	0.025 ppm	32	Novaluron	0.01 ppm
D	Ethion	0.5 ppm	33	Clomazone	0.01 ppm
1	Acephate	2.0 ppm	34	Thiochlorprid	0.05 ppm
2	Metiram	0.1 ppm	35	Chlorienvinphos	0.05 ppm
3	Carbendazim	0.10 ppm	36	Phosalone	0.05 ppm
4	Cypermethrin	0.20 ppm	37	Methamido-phos	0.1 ppm
5	Alachlor	0.05 ppm	38	Carbaryl	1.0 ppm
6	Chlormequatchloride	1.00 ppm	39	Benomyl	0.10 ppm
7	Diflubenzuron	0.20 ppm	40	Decamethrin / Deltamethrin	0.10 ppm
8	Fluchloralin	0.05 ppm	41	Bitertanol	0.10 ppm
9	Permethrin	0.50 ppm	42	Chlorothalonil	0.10 ppm
10	Myclobutanil	0.1 ppm	43	Diuron	1.00 ppm
11	b-Cyfluthrin	0.02 ppm	44	Methomyl	0.10 ppm
12	Quizalofop-ethyl	0.05 ppm	45	Iprodione	0.5 ppm
13	Monocrotophos	0.05 ppm	46	Fenoxy-prop-p-ethyl	0.02 ppm
14	Paraquat Dichloride	0.05 ppm	47	Bifenthrin	0.05 ppm
15	Carbofuran	0.10 ppm			



PART X
TRAINING

TRAINING

1. All food handlers shall be aware of their role and responsibility in protecting food from contamination.
2. Food handlers shall have the necessary knowledge and skills which are relevant to food processing / manufacturing, packing, storing and serving.
3. All food handlers shall be trained in food hygiene and food safety aspects along with personal hygiene requirements.
4. Periodic assessments of the effectiveness of training, awareness of safety requirements and competency level shall be made.
5. Training programmes shall be routinely reviewed and updated wherever necessary.





PART XI

AUDIT, DOCUMENTATION & RECORDS

AUDIT, DOCUMENTATION & RECORDS

1. A periodic audit of the whole system according to the SOP shall be done.
2. Appropriate records of Edible oil tanker receipt, raw Materials , production, expelling, refining process, storage, distribution, service, laboratory test results, cleaning and sanitation, pest control and product recall shall be kept.
3. The records shall be retained for a period of one year or the shelf-life of the product, whichever is more.

List of records as mandated under Part 2 of Schedule 4 of Food Safety & Standards (Licensing & Registration of Food Businesses) Regulation, 2011

S. No.	Section	Section Name	Clause	Requirement
1	Part 2 Section 4	Facilities	4.1.3	Water storage tanks shall be cleaned periodically and records of the same shall be maintained in a register.
2	Part 2 Section 5	Food operations and controls	5.1.3	Records of raw materials, food additives and ingredients as well as their source of procurement shall be maintained in a register for inspection.
3	Part 2 Section 8	Audit, documentation and records	8.2	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 and retained for a period of one year or the shelf-life of the product, whichever is more.
4	Part 2 Section 9	Sanitation and maintenance of establishment premises	9.1.1	A cleaning and sanitation programme shall be drawn up and observed and the record thereof shall be properly maintained, which shall indicate specific areas to be cleaned, cleaning frequency and cleaning procedure to be followed, including equipment and materials to be used for cleaning. Equipment used in manufacturing will be cleaned and sterilized at set frequencies.
5	Part 2 Section 9	Sanitation and maintenance of establishment premises	9.2.3	Pest infestations shall be dealt with immediately and without adversely affecting the food safety or suitability. Treatment with permissible chemical, physical or biological agents, within the appropriate limits, shall be carried out

				without posing a threat to the safety or suitability of food. Records of pesticides / insecticides used along with dates and frequency shall be maintained.
6	Part 2 Section 10	Personal hygiene	10.1.2	Arrangements shall be made to get the food handlers / employees of the establishment medically examined once in a year to ensure that they are free from any infectious, contagious and other communicable diseases. A record of these examinations signed by a registered medical practitioner shall be maintained for inspection purpose.
7	Part 2 Section 10	Personal hygiene	10.1.3	The factory staff shall be compulsorily inoculated against the enteric group of diseases as per recommended schedule of the vaccine and a record shall be kept for inspection.
8	FSS Regulation	Condition of license	8	Maintain daily records of production, raw materials utilization and sales separately
9	FSS Regulation	Condition of license	14	The manufacturer/importer/distributor shall buy and sell food products only from, or to, licensed/registered vendors and maintain record thereof.





PART XII

PRODUCT INFORMATION AND CONSUMER AWARENESS

Labelling

PRODUCT INFORMATION & CONSUMER AWARENESS

All packaged food products shall carry a label and requisite information as per provisions of FSS Act, 2006 and Regulations made there under. (Please refer <http://www.fssai.gov.in/home/fss-legislation/fss-regulations.html>)

Manner of Declaration

General Conditions

- Any information / pictorial device / graphic matter on label shall not be in conflict with the regulations
- Declarations shall be legible, conspicuous, clear, bold and in contrast to the background color
- Declarations required to be read through the oil contained in the package shall not be made

Height of Numerical in the Declaration-

Sr. no.	Net Qty.	Minimum Ht. of numeral
1	Up to 50 g/ml	1 mm
2	Above 50 g/ml up to 200 g/ml	2 mm
3	Above 200 g/ml up to 1 kg/L	4 mm
4	Above 1 kg/L	6 mm

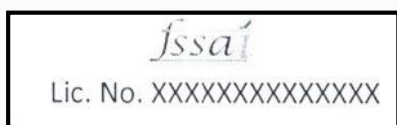
Principal Display Panel (PDP)

- All information required under the regulation shall be given on the PDP of the package / container which shall be
 - Grouped together and given at one place (applicable for pre-printed information also)
 - Online information / those not pre-printed shall be grouped together in another place

Labeling General Requirement –

Every prepackaged food shall carry a label containing information as required hereunder unless otherwise provided, namely -

- a. The particulars of declaration required under these Regulations to be specified on the label shall be in English or Hindi in Devanagari script; Provided that nothing herein contained shall prevent the use of any other language in addition to the language required under this regulation.
- b. Pre-packaged food shall not be described or presented on any label or in any labeling manner that is false, misleading or deceptive or is likely to create an erroneous impression regarding its character in any respect
- c. Labels in pre-packaged foods shall be applied in such a manner that they will not become separated from the container
- d. Contents on the label shall be clear, prominent, indelible and readily legible by the consumer under normal conditions of purchase and use
- e. Where the container is covered by a wrapper, the wrapper shall carry the necessary information or the label on the container shall be readily legible through the outer wrapper and not obscured by it
- f. License number shall be displayed on the principal display panel in the following format



Labeling of Pre-packaged Foods

In addition to the General Labeling requirements specified above every package of food shall carry the following information on the label, namely -

- Name of the food
- List of ingredients in descending order
- Nutritional information
- Declaration regarding veg or non-veg
- Declaration regarding food additives
- Name and complete address of manufacturer or packer

- Net content by weight or volume
- Date of Manufacture / Packing
- Lot / Code / Batch identification
- Best Before Date
- Instructions for use
- Importer details and Country of origin for imported products

All the contents provided on the label must be clear, prominent, indelible and legible.

A label or the primary pack of a food article must carry the following declarations -

1. The name of the food, which includes the trade name or description of the food in the package. It should be provided in bold type, clear and in distinct contrast with the background.
2. The ingredient or list of ingredients - Ingredient listing must carry a proper title namely “Ingredients” and the ingredients must be listed in descending order of prominence in product composition.
3. Nutrition information - must be declared on the label in numerical terms per 100 gm or 100 ml or per serving of the food.

The information must include energy value (kcal), protein (gm), carbohydrate (along with sugar) and fat (gm), saturated fat, trans-fat, minerals and vitamins in metric units, nutrient for which a claim is made.

When claim is made on amount or type of fatty acid or amount of cholesterol, the amount of SFA, MUFA, and PUFA (in gm), trans-fat (in gm) and cholesterol (in mg) needs to be declared. Edible vegetable oil, fats including hydrogenated vegetable oils and processed and packaged foods with declared shelf life will have the following declaration -

1. **Total trans-fat content not more thanpercentage by weight.**
2. **Total Saturated fat content not more thanpercentage by weight.**

A health claim of trans-fat free may be made in cases where the trans-fat is less than 0.2 gm per serving of food and claim of saturated fat free may be made in cases the saturated fat does not exceed 0.1 gm per 100 gm or 100 ml of food.

4. If any food additives are used, the class title of the food additive along with the INS number as given in the rules must be given.
5. The vegetarian logo consisting of green-coloured filled circle within a square with green outline shall be declared on the package. This logo must appear close to the brand name and the dimensions must be as follows -

Sr. no.	Area of Principal display panel	Minimum size of diameter	Minimum size of the side of square
1	Up to 100 sq.cm	3 mm	6 mm
2	Above 100 sq.cm. upto 500 sq.cm.	4 mm	8 mm

3	Above 500 sq.cm. upto 2500 sq.cm.	6 mm	12 mm
4	Above 2500 sq.cm.	8mm	16mm

6. Name and address of the manufacturer and complete address of the manufacturing unit/premises

7. Where the manufacturer is not the packer the name and complete address of the packer must be printed on the label.

8. Every Manufacturer and Packer address must carry the valid License number, with prefix: License No.

9. The Manufacturer License No. should be mentioned in the FSSAI logo

For products manufactured at company plants, License No. would be that of the company manufacturing unit.

For products manufactured at third party location, License No. would be the company marketer's License No. and the manufacturing license of the manufacturing / packing unit.

For products manufactured / packed at third party location, name and address of manufacturing / packing company as well as of the company on whose behalf it is manufactured / packed shall be included on the label.

10. The net quantity of the contents of the package - the net content must be expressed in terms of standard units of weight or measure. Area above and below the declaration must be free of printed information by a space equal to at least the height of the numeral and the area to the right and left by a space of at least twice the height of the numeral.

11. In case of a food enriched with a mineral / vitamin or protein, quantity of such enriched nutrient shall be mentioned.

12. The category of the food.

13. The words "proprietary food" in case the food is proprietary.

14. Best Before date - the shelf life must be indicated with the words "BEST BEFOREMONTHS FROM PACKAGING / MANUFACTURE" (as appropriate).

15. A distinctive batch number with the prefix Lot / Batch / Code No.

16. The date / month of manufacture / packaging of the product along with year to be specified.

17. The retail sale price of the package of food must be declared in the format "MRP Rs. XX inclusive of all taxes".

18. Name, address, telephone number and the e-mail address if available of the person or office to be contacted in case of consumer complaints.

19. Height of the letter for all the declarations has to be minimum 1 mm.

Specific labeling for Edible Oils and Fats -

List of Ingredients -

Except for single ingredient foods, a list of ingredients shall be declared on the label in the following manner:-

- (a) The list of ingredients shall contain an appropriate title, such as the term “Ingredients”
- (b) The name of ingredients used in the product shall be listed in descending order of their composition by weight or volume, as the case may be, at the time of its manufacture
- (c) A specific name shall be used for ingredients in the list of ingredients

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

Classes	Class Titles
Edible vegetable oils / Edible vegetable fat	Edible vegetable oil / Edible vegetable fat or both hydrogenated or Partially hydrogenated oil

Nutritional information -

- (i) 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’
- (ii) Edible vegetable oils, fats including hydrogenated vegetable oils, and processed and packaged foods with declared shelf life will have the following declaration on the label:

- (a) Total trans-fat content not more than ...percent by weight
- (b) Total saturated fat content not more than ...percent by weight

Provided further that, a health claim of ‘trans-fat free’ may be made in cases where the trans-fat is less than 0.2 gm. per serving of food and the claim ‘saturated fat free’ may be made in cases where the saturated fat does not exceed 0.1 gm. per 100 gm. or 100 ml of food.

Nutritional information is not necessary in case of raw agricultural foods / drinking water / single ingredients and bulk food.

When a claim is made on the amount or type of fatty acid or the amount of cholesterol, the amount of saturated fatty acids, monounsaturated fatty acids and polyunsaturated fatty acids in

gm and cholesterol in mg should be declared. Along with this, the amount of trans-fatty acids in gm should also be stated.

Nutrition Information	
Amount per 100g of product	
Energy	# kcal
Protein	# g
Carbohydrates	# g
Sugars	
Fat	# g
Saturated fatty acids	# g
Polyunsaturated fatty acids	# g
Monounsaturated fatty acids	# g
Trans fatty acids	# g
Cholesterol	# mg



PART XIII

Food Safety Management System

Introduction of FSMS:

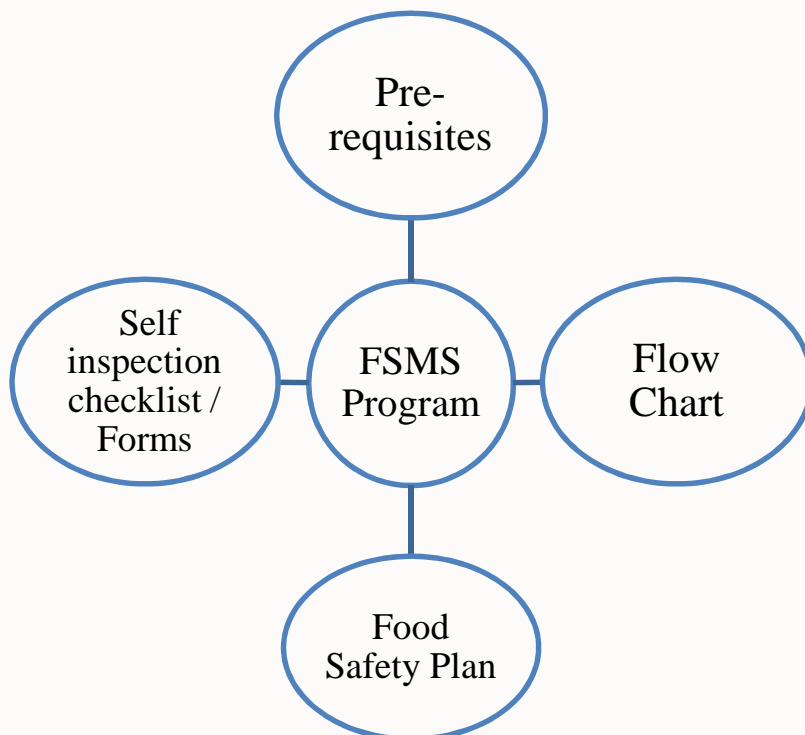
A Food Safety Management System (FSMS) is a network of interrelated elements that combine to ensure that food does not cause adverse human health effects. These elements include programs, plans, policies, procedures, practices, processes, goals, objectives, methods, controls, roles, responsibilities, relationships, documents, records, and resources.

The purpose of FSMS is to ensure the manufacture, storage, distribution and sale of safe food

There are five basic key elements of Food Safety Management System which are as follows:

- Good Practices/ PRPs
- Hazard Analysis /HACCP
- Management Element / System
- Statutory and regulatory requirements
- Communication

Structure of the FSMS Program:

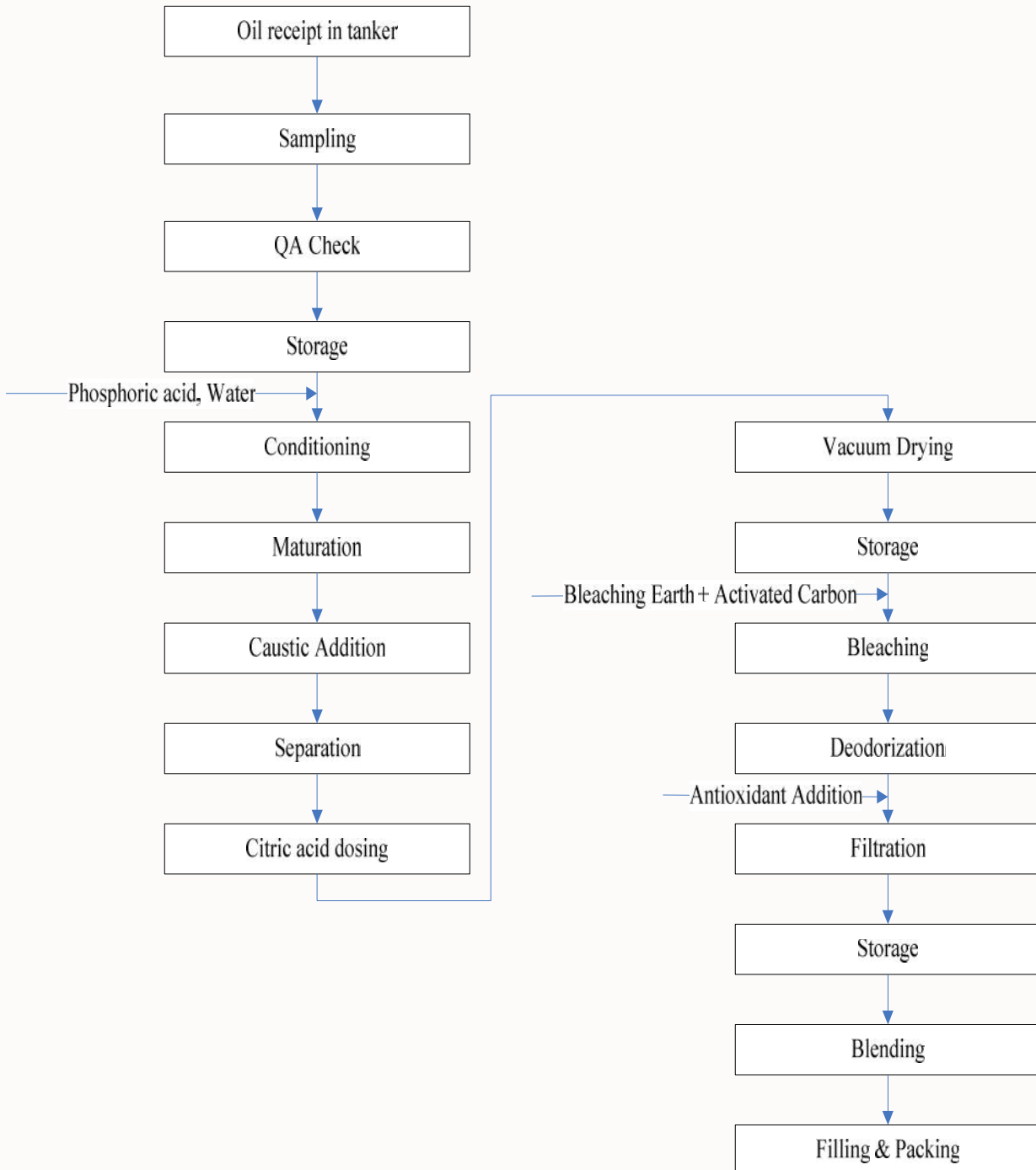


Self-Inspection Checklist:

This is the first part to be taken care of while preparing a FSMS Plan. The Self-inspection checklist shall cover all the requirements given in Schedule 4 – Part 2 of this handbook. The compliance to the Schedule 4 requirements needs to be inspected by individual FBO with the help of this checklist (*Ref. Manual of FSMS, FSS Act 2006 on FSSAI Website*) to check whether the Food Safety Management System is in place & whether all the licensing conditions are complied.

Flow Chart:

- A flow chart is a list of the different steps involved in processing of Edible oil
- Writing a flow chart is the second part of your FSMS
- This is an example of Edible oil Refining Processing:



FSMS Plan:

Every manufacturing / processing unit should submit a Food Safety Management System Plan.

It has to be developed based on Schedule – 4 of Food Safety and Standards Regulation, 2011 as given further in this handbook, in which general hygienic and sanitary practices to be followed by food business operators have been elaborated.

Along with sanitation and maintenance of establishment premises, personal hygiene of workers as well as personal cleanliness is also to be ensured by the FBO's.

The food safety plan shows:

- **Hazard** - What problems could happen
- **Control measures** - What you do to stop problems
- **Critical Limits** - What are the critical limits set for each control measure
- **Monitoring method** - How do you make sure that what you are doing stops the problem
- **Corrective Action** - What you do if something goes wrong
- **Records** - What records you keep

This has to be done for every step identified in your flowchart. FBO will need to complete a food safety plan as the third part of the FSMS.

Sample FSMS Plan for Edible Oil Processing:

Operational Step	Hazard	Control Measure	Critical Limit	Monitoring Method	Corrective Action	Responsibility	Record

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.