



QUALITY MANAGEMENT GUIDE FOR THE OLIVE OIL INDUSTRY: REFINERIES

1. Scope

This guide is for businesses that refine lampante virgin olive oils and crude olive-pomace oils, irrespective of their size or legal status. It provides pertinent advice on quality management from the time the raw material enters the refining plant until the refined product is stored, ready for distribution as such.

2. Purpose

This guide specifies the rules that have to be followed at the refining plant as regards hygiene, hazard analysis, evaluation of critical control points and quality assurance aimed at overall quality in order to assure the businesses for which the finished product is intended that the refined olive oil and refined olive-pomace oil produced are safe (suitable) and to provide quality assurance.

3. Definitions

Food hygiene – All the conditions and measures necessary to ensure the safety and suitability of food at all stages of processing.

Good hygiene practice – All the rules recommended to businesses concerning the conditions and measures necessary to ensure the safety and suitability of food at all stages of processing.

Good manufacturing practice – All the rules recommended to businesses concerning the measures necessary to ensure the safety and suitability of food at all stages of processing.

Cleaning – The removal of soil, food residues, dirt, grease or other objectionable matter.

Contaminant – Any biological or chemical agent, foreign matter or other substances not intentionally added to food which may compromise food safety or suitability.

Contamination – The introduction or occurrence of a contaminant in food or a food environment.

Disinfection – The reduction, by means of chemical agents and/or physical methods, of the number of microorganisms in the environment, to a level that does not compromise food safety or suitability.

Hazard – A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.

Risk – A function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard(s) in food.

Control measure – Any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

HACCP – A system which identifies, evaluates and controls hazards which are significant for food safety.

Hazard analysis – The process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and therefore should be addressed in the HACCP plan.

HACCP plan – A document prepared in accordance with the principles of HACCP to ensure control of hazards which are significant for food safety in the segment of the food chain under consideration.

Critical control point (CCP) – A step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Critical limit – A criterion which separates acceptability from unacceptability.

Control (verb) – To take all necessary actions to ensure and maintain compliance with criteria established in the HACCP plan.

Control (noun) – The state wherein correct procedures are being followed and criteria are being met.

Corrective action – Any action to be taken when the results of monitoring at the CCP indicate a loss of control.

Quality – The totality of characteristics of an entity (which can be individually described and considered – product, process, business) that bear on its ability to satisfy stated and implied needs.

Quality system – The organisational structure, procedures, processes and resources needed to implement quality management.

Quality assurance – All the planned and systematic activities implemented within the quality system, and demonstrated as needed, to provide adequate confidence that an entity will fulfil requirements for quality.

Quality control – The operational techniques and activities that are used to fulfil requirements for quality.

Quality management – All the activities that determine the quality policy, objectives and responsibilities, and that implement them by every means to ensure quality planning, control, assurance and improvement within the quality system.

Quality plan – A document setting out the specific quality practices, resources and sequence of activities relevant to a particular product, project or contract.

Traceability – The ability to trace the history, application or location of an entity by means of recorded identifications.

Audit – A systematic and functionally independent examination to determine whether activities and related results comply with planned objectives.

Certification – The procedure whereby official certification bodies and officially recognised bodies provide written or equivalent assurance that foods or food control systems conform to requirements. Certification of food may be, as appropriate, based on a range of inspection activities which may include continuous on-line inspection, auditing of quality assurance systems, and examination of finished products.

4. Definition of the products obtained by the refining industry

Oil refining entails correcting undesirable defects in the free acidity, colour, odour and taste of oils with a view to improving and/or homogenising their properties. Where olive-pomace oil is concerned, the objective is to make the oil suitable for consumption in accordance with the IOC trade standard.

Refined olive oil is the product obtained by refining lampante virgin olive oil; it may also be obtained by refining other virgin olive oils. Lampante virgin olive oil is the oil obtained from the fruit of the olive tree (*Olea europaea* L.) solely by mechanical or other physical means under conditions, particularly thermal conditions, that do not lead to deterioration of the oil, and which has not undergone any treatment other than washing, decantation, centrifugation and filtration. Its physico-chemical and/or organoleptic characteristics are such that it is not fit for consumption as it is.

Refined olive-pomace oil is the product obtained from crude olive-pomace oil by refining methods which do not lead to alterations in the initial glyceridic structure.

Refined olive oil and refined olive-pomace oil should comply with the purity and quality criteria laid down for each of these designations in the trade standard applying to olive oils and olive-pomace oils adopted by the International Olive Council.

Refined olive oil and refined olive-pomace oil are intended for the food industry and packing plants, which blend them with virgin olive oil fit for consumption as it is (extra virgin olive oil, virgin olive oil, ordinary virgin olive oil) and market the resultant products under the following designations:

- Olive oil: blend of refined olive oil with any of the categories of edible virgin olive oils.
- Olive-pomace oil: blend of refined olive-pomace oil and edible virgin olive oils.

5. Description of industrial refining process

Delivery of raw materials

- Delivery of lampante virgin olive oil, other virgin olive oils, when used, and crude-olive pomace oil in tanks, drums or other containers.
- Delivery of processing aids: water, bleaching earth, active carbon, amorphous silica, filter earth, paper filters, cellulose, soda, phosphoric acid, sulphuric acid, hydrochloric acid, salt, citric acid, nitrogen, hexane (or other solvents) and other authorised aids. All the products used in the refinery should be food-grade quality.

Sampling and testing

- Collection and storage of sealed samples of the oils delivered for testing, taken according to ISO 5555, to check they comply with the contract and to plan refining conditions prior to application.
- Determination of number of samples and storage conditions.

Unloading and storage

- Unloading of the oils from the tanks, drums or other containers to the storage vats through pipes fitted with a filter to retain any extraneous material.
- Temporary storage of the oils in vats or tanks.

Purification and degumming

- Purification of lampante virgin olive oils, edible virgin olive oils, when used, and crude olive-pomace oils. In the case of lampante virgin olive oils or edible virgin olive oils, destoning shall not be necessary when they undergo neutralisation during alkaline refining; however, if the oils are intended for physical refining, it is essential to remove the phospholipids and extraneous matter. This is done by means of phosphoric acid or other authorised acids and subsequent washing with water.
- Degumming of crude olive-pomace oils to remove impurities, if necessary.

Neutralisation in the case of chemical refining

- Removal of the free fatty acids present in the form of soaps by neutralisation with soda and separation of the neutralised oil and soaps by centrifugation or settling.
- Removal of the alkaline substances (soap and excess soda), remaining trace metals, phospholipids and other impurities by washing the oil with water at 90 °C to which processing aids may be added, and separation by centrifugation or settling.
- Drying of the oil by pressure spraying under vacuum.

Bleaching

- Removal of the coloured pigments only partially destroyed by neutralisation, as well as of the peroxides (primary oxidation products), secondary oxidation products, trace soap, metals and phospholipids. This is performed through adsorption by bleaching earth and/or active carbon, which is essential for eliminating polycyclic aromatic hydrocarbons, or by other aids at a temperature of approximately 100 °C, and by stirring under vacuum in a slightly acid medium in the case of olive-pomace oil.
- Separation of the blended oil by filtering.

Winterisation

- This is performed when refining crude olive-pomace oils in order to remove the waxes (fatty acid esters with long-chain alcohols) which have a high melting point and may solidify and precipitate at ambient temperature.
- Winterisation entails cooling the oil, followed by centrifugation and/or filtering.

Neutralising distillation in the case of physical refining

- Distillation by direct high-vacuum steam stripping of the free fatty acids at a pressure of 0.5–2 millibars and a temperature of around 240–250 °C.

Deodorisation

- Removal of odours and flavours by direct vacuum steam distillation at a residual pressure of around 2 millibars and a temperature of not more than 220 °C. It is advised not to use diathermal fluids, particularly in direct reheating (and also neutralising distillation).

Final oil filtering

- Filtering of the oil through safety paper filters or filters made of other suitable material to remove any possible trace of bleaching earth or other impurities.

Storage

- Storage in stainless steel tanks or tanks made of any other material suitable for food products; plastic (PVC) should be avoided. Nitrogen atmosphere storage is recommended for prolonged storage.

6. General principles of food hygiene: practical application and control

6.1. Refinery location

- Refineries should be located away from environmentally polluted areas or areas where industrial activities are carried out that pose a serious threat of contaminating olive oils.
- Refineries should be located away from areas subject to flooding unless sufficient safeguards are provided.
- Refineries should be located away from areas prone to infestations of pests.

6.2. Buildings and facilities

- Buildings should be made of durable material and should be of sound construction such as to prevent any deterioration caused by weather, soil or other conditions.
- Buildings should be designed to ensure adequate natural light for daytime work inside the refinery and to ensure adequate ventilation in each handling area.
- The internal distribution of the premises should be such as to differentiate clearly between each handling area.
- The equipment should be tailored to each operation; it should work properly and be in good condition.
- The moving parts of machinery should be protected by safety devices.
- Buildings should be fitted with a fire system.
- Refineries should have an adequate supply of potable water and suitable facilities for its storage, distribution and temperature control. Potable water should comply with the guidelines issued by the WHO for the quality of drinking water, or should be of a higher standard. Non-potable water (used for fire control) should have a separate system. Non-potable water systems should be identified and should not connect with, or allow reflux into, potable water systems.
- Sanitary facilities should be located separate from handling areas and should ensure adequate personal hygiene: facilities for hygienic washing and drying of hands (washbasins with a supply of hot and cold water), lavatories of appropriate hygienic design and adequate changing facilities for personnel.

6.3. Premises

- Walls and partitions should have a smooth surface made of impervious materials that are easy to clean and disinfect.
- Floors should be made of heavy-duty, impervious, non-slip material. They should be easy to clean and disinfect and should ensure good drainage.
- Windows should be fitted with screens to prevent the entry of insects and rodents, and they should be easy to clean.
- Doors should have smooth, non-absorbent surfaces and should be easy to clean and to disinfect. Outer doors should open outwards and be easy to open from the inside. They should be adequately close-fitting to prevent the entry of pests or any other small animals.
- Floor openings for lines or pipes should be adequately protected to prevent any contamination.
- Adequate space should be left between equipment to enable staff to move without risk.
- Ceilings should be at least three metres high.
- Each worker should have a minimum space of two square metres.
- Artificial lighting should be adapted to handling areas. Light bulbs should be protected to prevent contamination in the event of breakage.

6.4. Staff hygiene

- Any person known or suspected to be suffering from, or to be a carrier of, a disease likely to be transmitted through food should not be permitted to enter the refinery if there is any likelihood of such a person contaminating the oil.
- No person known or suspected to be suffering from, or to be a carrier of, a disease likely to be transmitted through food may be authorised to work in any of the production areas if there is any direct or indirect likelihood of product contamination.
- Persons working in the refinery should maintain a high standard of personal cleanliness. They should always wash their hands before handling the oil and immediately after using the toilet.
- Persons working in the refinery should avoid any behaviour that could result in contamination of the oil, such as smoking, spitting, chewing or eating, sneezing or coughing nearby.

- Persons working in the refinery should wear clothes that are suited to their tasks and that do not represent a hazard.
- Persons working in areas where there is a high, continuous level of noise should wear suitable ear protection.
- Staff should be equipped with individual protective devices.

6.5. Cleaning products

- Cleaning and maintenance products should be kept in separate premises.
- All the products used in the refinery should be food-grade quality.

6.6. Responsibilities – recording of inspections

The management of the business is responsible for implementing and monitoring the application of the hygiene rules.

7. Risk identification, analysis and control

7.1. Delivery and storage of raw materials:

- Delivery of oils: This stage comprises the operations carried out from the time the tanker enters the refinery.

Risks: Deficiencies in production or handling by the supplier, or deficiencies in transportation. The risks may be:

- Physical: presence of foreign matter in the oil: small animals, insects;
- Chemical: contamination from previous delivery loads.

The effects can be eliminated through the refining process; however, because it is a stage in which the refinery takes charge of a product which until then was not under its control, it is considered a critical control point.

Preventative measures:

- Check the certificates issued by carriers and suppliers.
- When haulage is at the expense of the refinery, issue approval to carriers on the chief basis of compliance with hygiene criteria.
- Define the purchase specifications.
- Ask carriers for load or cleaning certificate, if any doubts.
- Check load documents.
- Ensure strict compliance with pertinent regulations.
- Ensure tankers are clearly marked and used exclusively for food purposes.

Critical control point (CCP): Yes

Monitoring and parameters:

- Test and check the documents for each consignment or lot of oil to ensure it complies with regulatory quality specifications.
- Check the tanker is sealed.

Corrective action:

- Reject the consignment of oil if it fails to meet quality specifications, or use it for another purpose.
- Withdraw approval from carriers.

Control records:

- Certificate of carrier load or cleaning
 - Oil testing report.
 - Record of consignments rejected on health and hygiene grounds.
 - Record of suppliers and carriers.
- **Unloading and storage of oils:** This encompasses the stage from the time the oil is classified until it is deposited in tanks, stores or suitable containers which do not alter its properties. The oil is transferred by mechanical means, hoses and pumps.

Risks: Occurrence of impurities or dirt in the oil.

The effects can be eliminated owing to the design of the oil refining process.

The causes may be inadequate handling, dirtiness or deterioration of pipes or tanks.

Preventative measures:

- Ensure the tank and storage area surfaces are made of resistant materials preventing the transfer of substances to the contents (stainless steel, epoxy resins, vitrified materials, etc).
- Require storehouse staff to have food handling or equivalent qualifications.
- Provide workplace training in good handling practices.
- Implement the maintenance programme and condition tanks at set intervals depending on usage and the types of oils stored.
- Implement the cleaning programme.
- Implement the pest control programme.

Critical control point (CCP): No – it is a control point.

Monitoring and parameters:

- Check for compliance with the maintenance, cleaning and pest control programmes at set intervals.

Corrective action:

- Repair facilities.
- Review the maintenance, cleaning and pest control programmes if faults are detected in their application.
- Review the staff training plan, if necessary.

Control records:

- Records of the implementation of the maintenance, cleaning and pest control programmes.
- **Delivery of auxiliary materials:** This encompasses the stage from the time the auxiliary materials enter the factory and are checked until they are authorised for unloading.

Risks: Delivery of auxiliary materials failing to comply with specifications for food use.

The effects are not considered serious. The causes may be supply deficiencies or non-compliance by suppliers.

Preventative measures:

- Define the purchase specifications for auxiliary materials.
- Approve suppliers and require them to hold the corresponding sanitary approvals.

Critical control point (CCP): No – it is a control point.

Monitoring and parameters:

- Check documents on the delivery of all consignments.

Corrective action:

- Reject auxiliary materials failing to meet food conformity specifications.
- Withdraw approval from suppliers in the event of non-compliance.

Control records:

- Record of approved suppliers as regards food conformity compliance.
- Record of auxiliary materials rejected on health and hygiene grounds.

- **Unloading and storage of auxiliary materials:** This encompasses the stage from the time unloading is authorised until the auxiliary materials are properly stored.

Risks:

- Physical deterioration of auxiliary materials during storage owing to inadequate handling or storage.

Preventative measures:

- Implement cleaning programme in stores.
- Implement pest control programme.
- Implement maintenance programme.
- Provide workplace training in good handling practices.

Critical control point (CCP): No. It is a control point for the sector generally although it may be a CCP for specific businesses.

Monitoring and parameters:

- Regularly inspect stores.

Corrective action:

- Reject deteriorated auxiliary materials.
- Review the maintenance, cleaning and pest control programmes if faults are detected in their application.

Control records:

- Record of implementation of maintenance, cleaning and pest control programmes.
- Record of materials rejected.

7.2. **Physical refining**

7.2.1. **Washing**: This entails the addition of water, homogenisation and centrifugation to remove any impurities in the oil. As for all activities involving the use of water in the food industry, the water should be fit for consumption and should comply with the relevant regulations.

Risks:

- Use of unsuitable, non-mains water.

The cause may be a breakdown in the mains obliging the business to look for an alternative emergency solution.

Preventative measures:

- Ensure correct mains supply.

Critical control point (CCP): No – it is a control point.

Monitoring and parameters:

- Monitor the presence of free chlorine.

Corrective action:

- Add chlorine to water.

Control records:

- Record of incidents.
- Record of chlorine checks.

7.2.2. **Bleaching, filtering**: This entails adding a small percentage of bleaching earth to the oil in order to remove the pigments, in an inert atmosphere, and subsequently filtering the mixture.

Risks:

- Poor filtering and entry of bleaching earth in oil.

The effects are production difficulties during deodorisation. The causes can be burst or deteriorated filters or incorrect handling by operators.

Preventative measures:

- Regularly check filters.
- Provide workplace training in good handling practices.
- Fit a safety filter before the deodorisation stage.

Critical control point (CCP): No – it is a control point.

Monitoring and parameters:

- Conduct visual inspection during the operation.

Corrective action:

- Repair the filter.
- Reprocess the filtered oil.

Control records:

- Record of implementation of the maintenance programme.

7.2.3. Neutralising deodorisation: Distillation by direct high-vacuum steam stripping of the free fatty acids and odour and taste components at a pressure of 0.5–2 millibars and a temperature of around 240–250 °C.

Three possible risks are dealt with differently during this stage:

Risk 1:

- Thermal–chemical deterioration of the oil and possible appearance of some degradation products. This is caused by process faults, insufficient vacuum and/or excessively high temperatures.
- Poor neutralisation, as a result of which the oil would not comply with the free acidity requirements stipulated in the existing regulations. This is caused by incorrect stripping owing to the temperature applied, contact time and poor homogenisation.

Preventative measures:

- Specify process parameters (vacuum, temperature and time) according to the plant characteristics and oil type.

Critical control point (CCP): No – it is a control point.

Monitoring and parameters:

- Check vacuum and temperature process parameters.
- Test the oil after refining.

Corrective action:

- Correct process parameters.
- Reprocess the batch of oil.

Control records:

- Record of checks of deodorisation and neutralisation parameters.
- Lot test report.

Risk 2:

- Possibility of physical contamination of the oil by the entry of heat transfer fluid, which could lead to a health risk. This is caused by a leak or breakage in heating systems where the heating coil is in direct contact with the oil.

Preventative measures:

- Monitor the level of heat transfer fluid in the expansion tank.
- Regularly check the airtightness of the system.
- Implement the maintenance programme.

Critical control point (CCP): Yes.

Monitoring and parameters:

- Test the refined oil.
- Monitor the oil level in the expansion tank

Corrective action:

- Withdraw the contaminated product.
- Carry out a specific study of the case of contamination.

Control records:

- Production reports including records of rejected product.
- Test report.

Risk 3:

- Possibility of physical contamination of the oil by the entry of chemicals through the steam. This is caused by a leak or breakage of the steam system, or by the use of inadequate products for protecting the condenser system.

Preventative measures:

- Use solely food-grade products.
- Set maximum doses.
- Implement the maintenance programme.

Critical control point (CCP): Yes.

Monitoring and parameters:

- Test steam quality.
- Check chemicals usage.

Corrective action:

- Withdraw the contaminated product.
- Conduct a specific study of the case of contamination.

Control records:

- Production reports including record of rejected product.
- Test report.

7.2.4. Desorption: This entails removing the air and inerting the oil with nitrogen. It is not a compulsory stage of refining.

Risks: No noteworthy risks have been detected in this stage.

7.2.5. Filtering: The object is to polish the oil and eliminate any particles dragged along in the process. Various filtering methods are used (earth, etc.). It is not a compulsory stage of refining.

Risks: No noteworthy risks have been detected in this stage.

7.3. Chemical refining

7.3.1. Purification: This entails eliminating any undesirable matter in the oil, particularly phospholipids. Phosphoric acid and water are used for this purpose.

Risks: Occurrence of free phosphoric acid in the oil.

The effects can be eliminated at the neutralisation stage. The causes are the addition of too much phosphoric acid.

Preventative measures:

- Specify dose of phosphoric acid.

Critical control point (CCP): No –it is a control point.

Monitoring and parameters: Not necessary.

Corrective action: Not necessary because eliminated in subsequent stages.

Control records: Not necessary.

7.3.2. Neutralisation: The purpose of this process is to remove the oil acidity caused by free fatty acids, which are made to react with an alkali, normally soda, to form soap stock, which is subsequently eliminated by centrifugation.

Risks:

- Occurrence of free alkalis, and hence of problems in later stages.
- Poor neutralisation, as a result of which the oil does not comply with the acidity requirements stipulated in existing regulations although it does not pose a threat for consumption.

The causes of both risks are incorrect measurement of the alkali and/or incorrect mixing owing to the application of the wrong temperature and contact time and poor homogenisation.

Preventative measures:

- Specify the dose of alkali.
- Specify the process parameters (temperature and time) according to the plant characteristics and oil types.

Critical control point (CCP): No – it is a control point.

Monitoring and parameters:

- Analyse the paste acidity.
- Analyse the oil acidity after neutralisation.

Corrective action:

- Not necessary because eliminated in other stages or by reprocessing.

Control records:

- Record of acidity testing of pastes.
- Record of oil acidity in production report.

7.3.3. Winterisation: This entails cooling the oil to precipitate and separate the waxes and so stop it from turning cloudy. It is only applicable to olive-pomace oils.

Risks: No noteworthy risks have been detected at this stage.

7.3.4. Washing: This is similar to the washing process in physical refining and is designed to remove soaps and soda impurities. As for all activities involving the use of water in the food industry, the water should be fit for consumption and should comply with the relevant regulations.

Risks:

- Use of unsuitable, non-mains water.

The cause may be a breakdown in the mains obliging the business to look for an alternative emergency solution. If washing is not done properly, alkali and/or soaps may remain in the oil; however, the effects are eliminated in the subsequent bleaching stage.

Preventative measures:

- Ensure correct mains supply.

Critical control point (CCP): No – it is a control point.

Monitoring and parameters:

- Monitor the presence of free chlorine.

Corrective action:

- Add chlorine to water.

Control records:

- Record of incidents.
- Record of chlorine checks.

7.3.5. Bleaching, filtering: This entails adding bleaching earth, keeping the mixture in an air-free atmosphere for a specific contact time, and subsequently filtering to remove colour pigments.

Risks:

- Poor filtering and entry of bleaching earth in oil.

The effects are production difficulties during deodorisation. The causes can be burst or deteriorated filters or incorrect handling by operators.

Preventative measures:

- Regularly check filters.
- Provide workplace training in good handling practices.
- Fit a safety filter before the deodorisation stage.

Critical control point (CCP): No. It is a control point for the sector generally although it may be a CCP for specific businesses.

Monitoring and parameters:

- Conduct a visual inspection during the operation.

Corrective action:

- Repair the filter.
- Reprocess the batch of oil.

Control records:

- Record of the implementation of the maintenance programme.

7.3.6. Deodorisation: This entails applying process parameters (vacuum, steam and temperature) to remove odours and flavours.

Two possible risks are dealt with differently during this stage:

Risk 1:

- Possibility of physical contamination of the oil by the entry of heat transfer fluid, which could lead to a health risk. This is caused by a leak or breakage in heating systems where the heating coil is in direct contact with the oil.

Preventative measures:

- Monitor the level of heat transfer fluid in the expansion tank.
- Regularly check the airtightness of the system.
- Implement the maintenance programme.

Critical control point (CCP): Yes

Monitoring and parameters:

- Test the refined oil.
- Monitor the oil level in the expansion tank

Control records:

- Production reports including records of rejected product.
- Test report.

Risk 2:

- Possibility of physical contamination of the oil by the entry of chemicals through the steam. This is caused by a leak or breakage of the steam system, or by the use of inadequate products for protecting the condenser system.

Preventative measures:

- Use solely food-grade products.
- Set maximum doses.
- Implement the maintenance programme.

Critical control point (CCP): Yes.

Monitoring and parameters:

- Test steam quality.
- Check chemicals usage.

Corrective action:

- Withdraw the contaminated product.
- Conduct a specific study of the case of contamination.

Control records:

- Production reports including record of rejected product.
- Test report.

7.3.5. Desorption: This entails eliminating air and inerting the oil with nitrogen. It is not a compulsory stage of refining.

Risks: No noteworthy risks have been detected in this stage.

7.3.6. Filtering: The object is to polish the oil and eliminate any particles dragged along in the process. Various filtering methods are used (earth, etc.). It is not a compulsory stage of refining.

Risks: No noteworthy risks have been detected in this stage.

7.4. Storage and dispatch

7.4.1. Intermediate storage and lot preparation: The refined oil is run through pipes into the corresponding tanks. Lot preparation entails transferring the oils and grouping them into uniform groups, by grade and category, for preparation for sale.

Two risks are dealt with differently during this stage:

Risk 1: Possibility of chemical degradation of the oil (peroxide formation), as a result of which it may not comply with quality specifications.

The causes are poor tank and pipe maintenance and/or excessively long storage or contact with the air.

Preventative measures:

- Ensure stock rotation.
- Ensure proper preparation of storehouse or inert tanks with nitrogen.
- Implement the maintenance programme.
- Ensure tanks are made of suitable materials.

Critical control point (CCP): No. It is a control point for the sector generally although it may be a CCP for specific businesses.

Monitoring and parameters:

- Test the peroxide value and K_{270} value (highly recommended) of the oil before using it to prepare lots or consignments.
- Ensure the oils fulfil the parameters laid down in the IOC trade standard.

Corrective action:

- Reprocess the batch of oil.

Control records:

- Tank test report prior to lot preparation or dispatch.
- Record of incidents and of reprocessed product.

Risk 2: Possibility of physical contamination of the oil (parasites, extraneous matter), which could make the oil unfit for consumption.

The causes are poor tank, pipe and facility maintenance and cleaning conditions and/or incorrect handling by staff.

Preventative measures:

- Implement the maintenance programme.
- Implement the cleaning programme.
- Implement the pest control programme.
- Require storehouse staff to have food handling or equivalent qualifications.
- Make sure stores and tanks are properly shut.

Critical control point (CCP): Yes.

Monitoring and parameters:

- Check tank and pump maintenance and cleaning status and conditions at set intervals.

Corrective action:

- Reprocess the batch of oil.
- Review the pump maintenance, cleaning and pest control programmes if faults are detected in their application

Control records:

- Records of the implementation of the pump maintenance, cleaning and pest control programmes.
- Record of incidents and of reprocessed product.

7.4.2. **Bulk dispatch:** This entails loading the refined oil into tankers for delivery to the client. The objective is for the oil consignment to comply with requirements.

Risks: Possibility of entry of impurities or dirt in oil, which could make it unfit for consumption.

The causes are poor tanker hygiene conditions and/or incorrect handling.

Preventative measures:

- When haulage is at the expense of the refinery, issue approval to carriers on the chief basis of compliance with hygiene criteria.
- Ask carrier for load or cleaning certificate if any doubts.
- Clean tanker.
- Fit filters in loading piping.

- Seal tanker at all accessible points after filling.
- Ensure strict compliance with pertinent regulations, whether or not transportation is contracted. In particular, ensure tankers are clearly marked and used exclusively for food purposes.

Critical control point (CCP): Yes

Monitoring and parameters:

- Conduct a visual inspection of the tanker and of the filling operation.
- Sample and visually inspect the oil loaded into tanker and file samples.

Corrective action:

- Withdraw approval from carriers in the event of non-compliance.
- Reject or reprocess product.

Control records:

- Record of tanker cleaning.
- Record of labelling on oil samples, detailing seals and carrier.
- Record of reprocessed or rejected product

8. Control of quality records, quality audits

All the stages defining the HACCP system should be documented: flow diagrams, raw material and product fact cards, hazard analysis and identification at each stage, etc. This reference documentation proves that the HACCP system has been defined.

In addition, the system has to be put into effect, i.e. all the controls such as the preventative measures, monitoring and corrective action for each critical control point have to be implemented, for which purpose resource planning and task allocation are required.

Once the controls are put in place, it is necessary to keep records proving that planned action has been implemented.

It is also necessary to record any incidents detected, so that information is available on any occurrence and the measures adopted to correct the incident and avoid its recurrence.

Hence, a record management system should be designed to ensure proper control, use and filing of the records for subsequent analysis and system control review.

9. Training

The refinery manager should ensure that all staff are aware and informed of the extent and nature of the risks connected with production. They should understand the operations for which they are responsible and should know how to perform them properly.

Staff training programmes shall be organised at regular intervals and adequate records shall be kept of training activities, including the full name and signature of participants.

10. Guidelines for drawing up the self-check plan

Each refinery should appoint an officer in charge of managing the self-check system who will be assisted by a team of appropriately skilled staff in order to draw up the company plan of good hygiene practice.

The team will check the self-check plan against the description of the refining plans according to the effectiveness and consistency of the procedures laid down in the handbook of good hygiene practice.

If any inconsistencies are observed, the necessary adjustments will be made.

Monitoring procedures should also be drawn up. Such procedures should specify the monitoring methodology and frequency at each risk stage and the check procedures in order to improve the refining system and the product.

11. Management of unsuitable products

The relevant procedures shall be applied for managing unsuitable products at each stage of refining.

Packed product withdrawn from the market on the grounds of unsuitability shall also be withdrawn from the accounts. The oil shall undergo reprocessing at the specific points of the refining cycle and it shall be managed according to the specified procedures.

12. Management of documentation

The documentation relating to the self-check system and staff training shall be filed and shall state:

- . events which are assessed as posing a real risk of contamination
- . measures taken to eliminate such a risk
- . any changes in terms of new staff or in the production process.

13. Developments in the system

The points outlined above should be considered of general value as they refer to the universe of refineries.

In specific operating and logistic situations, businesses may have to assign different risk weightings to those set out in this guide. It is the responsibility of the business to analyse the risk on the basis of the process implemented and of the experience acquired.

This guide is the end result of knowledge and experience to date. Hence, it will need to be updated periodically on the basis of bibliographical works and of the technical/scientific publications printed in the relevant literature.

14. References

CAC/RCP 1-1969, Rev. 3 (1997) Recommended international code of practice – general principles of food hygiene.

Appendix CAC/RCP 1-1969, Rev. 3 (1997) Guidelines for the application of the hazard analysis critical control point (HACCP) system.

Discussion paper on the implementation of HACCP in small and/or less developed businesses.

Preliminary draft guidelines on the use and promotion of quality assurance systems, CX/FICS 00/5, December 1999.

ISO 8402 – Quality management and quality assurance – Vocabulary.

ISO 9001 – Quality systems – Model for quality assurance in design, development, production, installation and servicing.

ISO 9002 – Quality systems – Model for quality assurance in production, installation and servicing.

ISO 9003 – Quality systems – Model for quality assurance in final inspection and tests.

ISO 9000-2000 – Quality management systems (in replacement of ISO 8402, 9001, 9002 and 9003, upon adoption by ISO).

ISO 5555 – Sampling.
