FRUIT AND VEGETABLE PROCESSING -Level-II

Based on May 2019, Version 2 Occupational standards

Module Title: Performing Filling Process

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Table of Contents

LG #61	LO #1- Prepare the filling process for operation

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Confirming available materials and service
- Checking conforming equipment
- Setting process
- Starting up filling process
- Monitoring control points
- Filling and closing containers
- Monitoring equipment
- Identifying and reporting out-of-specification product and equipment
- Monitoring and cleaning wastes

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Confirm available materials and service
- Check conforming equipment
- Set process
- Startup filling process
- Monitor control points
- Fill and closing containers
- Monitor equipment
- Identify and reporting out-of-specification product and equipment
- Monitor and cleaning wastes

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

Information Sheet 1- Confirming available materials and service

1.1. Introduction

This module covers the knowledge, skills and attitude required to the filling of product into containers, hermetically sealing containers using a closer or seamier and inspecting can seams. Selecting suitable fruit and vegetables in good conditions; preparing them hygienically and skilfully; packing them in cans which are hermetically sealed and then processed under fixed conditions of time and temperature; cooling these cans carefully and storing them under conditions which will not cause deterioration of either the cans or their contents.

1.2. Selection of raw materials

Raw materials, including ingredients, processing aids, and packaging, are the foundation of finished food products. As such, they must meet not only your specifications, but also regulatory requirements. Services that used in food processing industry like:

- power
- steam
- water
- vacuum and
- Compressed Air

Must be free from contamination and quality in terms of its physico-chemical and microbiological conditions

1.3. Containers, labels and packaging materials

Quality control staff should inspect each consignment of containers, labels and packaging materials to ensure that they are delivered in good conditions and that the items comply with the purchasing specification. In addition, samples of primary containers (cans, drums, glass jars, flexible pouches and bags and semi-rigid aluminum tray packs) should be examined to determine that the properties of these items that are critical to the safety and storage stability of the product are satisfactory.

1.4. Packaging materials used for filling food

According to the materials the fruit juice packages adopt, there are 4 common packages: glass bottle (account for 30%), PET bottle (30%), aluminium can (20%), and paper-plastic composite materials (10%)

1.4.1. Glass bottle package

Glass bottle is a package with long history. With more kinds of packages entering the market, it is less frequently used, but it remain as one of the most popular packages. Glass bottles have the following advantages:

- non-toxic
- odourless
- transparent
- beautiful
- good barrier
- airtight
- rich in raw materials
- low price
- and easy to recycle

Glass bottle is resistant to heat, low temperature, pressure, and cleaning. It is usually used for fruit tea, jujube juice, and those with high requirement on the containers. Glass bottle has good barrier property, heat resistance, low cost, and convenience for recycle. It can meet the requirements of beer to prevent microbial pollution, carbon dioxide and water loss. Therefore, most beers and wines are packaged in glass bottles. On the other hand, glass containers also have some defects: it has heavy weight, easy to break, high transportation cost, uneasy to print. Therefore, most commercial drinks don't use glass bottle any more.

Figure 1.1. Glass bottle

1.4.2. Metal can packages

Metal is the most versatile of all packaging forms. It offers a combination of excellent physical protection and barrier properties, formability and decorative potential, recyclability, and consumer acceptance.It can block air and light so as to prolong the shelf life of drinks. Metal can has good mechanical property. It is resistant to high-temperature, high-moisture, high-pressure, insect-pest, and harmful substance. Metal hand is hard to break. It is easy to take, and meet today's life style. Metal can be well decorated to promote sales. Metal can be melt and recycled. Metal packages also has some drawbacks: poor chemical stability and alkali resistance. If the interior paint has low quality, it would contaminate the drinks. It is necessary to upgrade the technology, improve the product quality, and solve the problem of break and leakage.

Figure 1.2. Metal can package

1.4.3. Paper carton packages

Paper containers are usually used for the package of fruit and vegetable juice, milk, and soft drink. It can be classified into papers, brick composite paper box, paper cup, and composite can. Paper packages have the advantages of low cost, light weight, convenience for transportation, no metal dissolving or can smell.

Paper packages can be recycled easily, so it is environmentally friendly. But their pressure resistance and air tightness is lower than glass bottle, metal can, and plastic container. Besides, paper packaged drinks cannot be sterilized under high temperature. The paper cartons are made of high-strength paper boards. They are paper composite materials. They are widely used in fruit juice, teas, coffee, especially milks.

Paper packages have taken over large market space of glass bottles, but it is impacted by pet bottles. Paper packages still play an important role in the drink market, especially in small-capacity packing. It is reported the sterile carton packing consumption is more than 100 billion every year, which is mainly contributed by people in developed countries.

Figure 1.3. Paper package

1.4.4. Plastic packages

Multiple types of plastics are being used as materials for packaging food, including polyolefin, polyester, polyvinyl chloride, polyvinylidene chloride, polystyrene, polyamide, and ethylene vinyl alcohol. Although more than 30 types of plastics have been used as packaging materials. Polyolefin and polyesters are the most common. The most commonly used polyester in food packaging is Polyethylene terephthalate (PET).

Figure 1.4. Plastic package

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Choice the best Answer

1. Which one of the following is not the advantage of glass bottles package (5pts)
   A. Non-toxic
   B. Odourless
   C. Transparent
   D. Beautiful
   E. Good barrier

Test I: Short Answer Questions

1. What are the services that used in food processing industry (4 pts)
2. What are the packaging materials used for filling food (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 2- Checking conforming equipment

2.1. Inspecting and Checking Condition of Equipment and Machines (USE)

Before any equipment or machine is used, it must first be checked to make sure that it is very functional and in good condition. Checking and inspecting equipment and machines will guarantee that all their parts are intact and that no part is missing or defective. This will also assure that electrical plugs and wirings are not defective and will not in any way cause problems on short circuits, electrocution or any form of accident. Religiously checking and inspecting equipment and machines will facilitate Preventive Maintenance which include checking the following:

- Machine temperature
- Hydraulic fluid
- Wear and surface condition
- Crack
- Leak detection
- Vibration
- Corrosion
- Electric insulation

Performing pre- operation activities ensures that all the tools, equipment and utensils assembled, checked, inspected, sanitized, readied and stowed after use are the appropriate devices required in processing the food based on the method of processing that will be undertaken like pickling, canning, bottling, processing using sugar. Doing this will prevent the use of inappropriate devices as well as well as the occurrence of accidents due to the use of faulty or defective tools, equipment and utensils.

Sanitizing and disinfecting the tools, equipment and utensils will destroy all germs and microorganisms which were not removed after washing with soap and water. Proper cleaning and disinfecting leads to:

- Minimizing product rejection, return and complaints due to defects resulting from the use of defective or inappropriate tools, equipment and utensils
- Lengthening product shelf life due to the reduction of contamination resulting from the use of properly sanitized and disinfected tools, utensils and equipment
- Reduction of the risk on food poisoning due to the use of unsanitized tools, equipment and utensils.
- Facilitating preventive maintenance which include checking the machine temperature, hydraulic fluid, wear and surface condition, crack, leak detection, vibration, corrosion, and electric insulation.

2.2. Cleaning and Sanitizing Equipment and Instruments

The use of sanitizing agents leads to effective sanitation of tools, equipment and utensils. Sanitation with the use of physical and chemical sanitizing agents will kill residual microorganisms that remain after cleaning. Cleaning by washing with soap and water is very important as it ensures the removal of dirt or debris by physical and/or mechanical means.

Clean water is to be used to finally wash and rinse all utensils, tools and equipment. Sanitizing or disinfecting, on the other hand, rids or reduces the number of micro-organisms on surfaces where food comes in contact with. It cannot be accomplished until surfaces where foods are processed are clean. Moreover, it cannot be effective without a good pest control program.

Cleaning alone by washing will not be capable of totally eradicating microbes, germs and viruses, hence the need to use sanitizing agents. Some sanitizing agents are detergent solution for scrubbing surfaces of processing tables, 150 – 200 ppm chlorinated water for sanitizing. All tools and utensils are also cleaned and sanitized

with the use of detergent solution rinsed with tap water before sanitizing with 150 – 200 ppm chlorinated water by soaking.

Chlorine is one of the cheapest and most easily available sanitizers in the market. It is popularly used in the treatment of water for both household and plant. Likewise, chlorine is also used to sanitize processing equipment.

1. Procedure in Cleaning Equipment and Instruments

- Wash all the equipment / instruments with soap.
- Rinse with clean water.
- Sanitize by dipping into approved sanitizer solution.
- Remove from the solution.
- Allow to air dry.

2. Procedure in Sanitizing

- Prepare all the materials needed.
- Measure a certain amount of chlorine and water.
- Mix and dip the equipment / instruments in the mixture
- Remove from the sanitizing solution.
- Dry thoroughly.

Self-check 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Write true if the statement is right and false if wrong

1. Before any equipment or machine is used it must first be checked to make sure that it is very functional and in good condition (4pts)

Test I: Short Answer Questions

1. Write the procedure in cleaning equipment and Instruments (5 pts)
2. Write the procedure in sanitizing (5pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 3- Setting process

3.1. Setting the filling process

Preparation of the fruit and vegetables involves a number of processes such as:

- washing
- grading
- peeling
- Blanching.

Washing: Washing usually involves:

- agitating or tumbling the vegetables on moving belts in water
- revolving drum screens while they are immersed in water or
- subjected to water sprays on moving belts

Washing by means of high-pressure water sprays is the most satisfactory method. Sprays are effective only if the water reaches all parts of the product.

- this can be achieved if the sprays are directed from above and below a traveling woven wire-cloth conveyor
- by designing the washer so that the product is induced to roll over during the spraying process.
- Floating of vegetables in a water bath with stirring paddles

Sorting: Sorting ensures the removal of inferior and/or damaged produce which are not fit for the purpose. Manual, automated or combined system could be used depending on the nature of the product and of the defect. For visible defects an inspection belt may be used with trained personnel who identify poor quality produce unsuitable for canning. For non-visible/internal defects several noninvasive technologies have been developed for the quality detection, such as magnetic

resonance imaging, ultrasound, and infrared. The automated systems improve the detecting efficiency and save labor costs

Peeling: Peeling is another important preliminary operation since, in conjunction with washing, it removes surface soiling and associated microbial contamination. Methods of peeling used include:

- steam
- mechanical
- flame
- abrasive
- lye

Blanching: Blanching of vegetables is carried out prior to the canning process for the following reasons:

- ✓ to remove respiratory gases that would reduce the ultimate vacuum in the can if they were released during processing
- ✓ to inhibit enzyme reactions that might occur prior to the heat-processing stage;
- ✓ to promote shrinkage of the product, thus permitting an adequate fill of the container
- Different methods of blanching have been in use.
- ✓ The most common methods include to immerse the vegetables in hot water at 85–95°C.
- ✓ Because hot-water blanching causes loss of some nutrients and gives rise to large volumes of waste water, other methods are also available.
- ✓ Saturated or superheated steam using individual quick blanching (IQB) technique, based on a two-stage heat-hold principle, improves significantly the nutrient retention and reduces effluent.
- ✓ In the first stage the vegetable is heated in single layers to the required temperature;
- ✓ in the second stage they are held in a deep bed for the required time to cause enzyme inactivation

Self-check 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test: Choice the best answer

1. Which of the following method can be used for peeling (5pts)

A. steam

B. mechanical

C. flame

D. abrasive

E. lye

F. All

Test I: Short Answer Questions

1. Write the steps of preparation of the vegetables processes (5 pts)
2. Write the reason of blanching of vegetables (6 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 8 points** **Unsatisfactory - below 8 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 4- Starting up filling process

4.1. Starting up the filling process

4.1.1. Making raw materials and ingredient preparation

The basic raw materials used are fruit pulp, sugar, pectin, colour, citric or ascorbic acid, sodium benzoate and natural and artificial colour. Sugar not only provides sweetness to the juice but also adds body and mouth feel. Natural colour is added to enhance the eye-appeal of the product. Acids are added to enhance flavour and to act as preservative against microbial growth. Natural and artificial flavourings are added in order to increase overall flavour of the juice. These should be stable under processing conditions. Sodium benzoate is added as preservative

4.1.2. Blending

Fruit pulp along with the other ingredients are added or mixed in a blending tank. The various ingredients are added according to a formulation which should meet the product specifications. After being completely mixed the mixture is taken to the next stage in the line

4.1.3. Homogenization

Homogenization causes disruption of particles in a suspension. It is often used in beverages to reduce sedimentation, to increase viscosity or to create a better texture it enhances mouth-feel, colour and flavour. Homogenizer used at FIL industries ltd is built to meet high maintenance, reliability and noise specifications. Homogenization is essentially done only for the mango pulp. This step is very important as it gives the juice a finer and better consistency.

4.1.4. Deaerator

The deaerator is one of the necessary equipment in fruit juice. It is mainly used for deaerating the homogenized juice under vacuum condition and to prevent the juice from being oxidized and then to prolong the storing period the juice.

4.1.5. Sterilization

The next stage in the processing of fruit juices is sterilization. Sterilization involves heating of juice to a temperature of 108 degrees for about 20seconds. It is done to eliminate most of the microbes in the juice, reduce the microbial load and make it sterile. PHE is used for sterilization of juices. It consists of three stages in which one stage is used for regeneration, one for heating, one for cooling. Sterilization is carried out at 108^0C and cooling is done at 15-20^0C. A flow diversion valve is used which diverts the flow of juice back to sterilizer.

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. Write the advantage of sterilize food (5 pts)
2. Write the advantage of Deaerator in juice (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 5- Monitoring control points

5.1. Establish Monitor Procedures

Monitoring is a planned sequence of measurements or observations at critical control points to ensure that the critical limits are continuously achieved. The purpose of monitoring is to confirm that the critical limits are being continuously achieved and to detect any loss of control to enable effective corrective action to be taken. Procedures for monitoring should be established and all relevant staff should be trained in the appropriate methods as well as in the appropriate recording of results. The nature and frequency of monitoring will depend on the critical limits that are subject to the monitoring and the likelihood of any anticipated changes. Issues to consider are:

Nature of monitoring- Monitoring can be made by taking appropriate measurements or by making observations. For example temperature measurement or observation of colour change in a food.

Method of monitoring- Monitoring procedures may involve either in-line or off-line systems.

- In-line systems involve the taking of measurements during the process and may be either continuous, such as using an in-line thermometer or non-continuous for example by inserting a temperature probe into food.
- Off-line systems may involve the taking of samples for rapid testing for example to determine pH or A_w using calibrated meters.
- All monitoring equipment must be calibrated and working correctly.

Frequency of monitoring- The frequency of monitoring will depend on a number of factors:

- Nature of the product- The frequency of monitoring may be reduced if the products are all of a uniform size.
- Nature of the process for example monitoring may be reduced for automated processes compared with manual ones.
- Nature of production- Monitoring may be carried out per batch and hence the size and number of batches produced during a day may influence the frequency of monitoring.
- History of previous checks- Once an initial frequency of monitoring is established it will be possible to either increase or reduce down the frequency depending on the results obtained.

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What is monitoring means (5 pts)
2. Write factors that frequency of monitoring will depend on (5 pts

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 6- Filling and closing containers

6.1. Filling process

Filling into glass or metal containers is accomplished mechanically or by hand. Careful control of the filling weight is important for economic and technical reasons. The volume of the headspace may affect:

- the efficiency of the exhausting procedure
- the rate of heat penetration into the container, (if an agitating process is used)

Figure 6.1. Filling of juice in PET bottles

The cans must be clean and the correct weight of foodstuffs must be added. Under-filled cans will be underweight and the headspace will be too large, resulting in too much air being left in the can. Overfilling may lead to seams being strained during processing and to ends becoming distorted and bulged. If the product forms hydrogen on storage as is the case with coloured fruits, swelling of the can due to hydrogen pressure will occur more quickly in an overfilled can than in one which has

been correctly filled. Overfilling also affects heat penetration in the can and may lead to spoilage outbreaks.

6.2. Exhausting the Container

Refers to the removal of the air in the head space (above the top of the food). The basic objective for the exhausting operation is to create an anaerobic environment (vacuum) in the can. The vacuum would:

- inhibit microbial spoilage and
- Minimize the strain on the can seams or pouch seals during processing.
- Ensures, after cooling, that the ends of the can remain flat or slightly concave throughout moderate changes of storage temperature or barometric pressure,

This provides assurance of the integrity of the container to the consumer. There are three methods used for achieving a vacuum in the container:

- a heat-exhaust,
- mechanical means, and
- Steam injection into the headspace just prior to sealing.

The heat-exhaust method, a conventional technique, involves the passage of the filled containers through a steam chamber or exhaust box prior to sealing. As the can enters the chamber the steam replaces the air in the head space. While in the chamber the can will be closed and sealed. A vacuum is created in the can following condensation of the steam later when the can is cooled after sterilization process

The mechanical method includes sealing cans in a vacuum closing machine, sometimes preceded by vacuum syrup. In this method, cans filled cold with vegetable and syrup/brine are passed into a clincher, which clinches the cans but does not form an airtight seal. The cans are then subjected to a vacuum for only a short period of time. This practice will remove only the free headspace air, but not all dissolved gases within the product. In the headspace injection method, steam is flushed through ports around the seaming head of can closing machines in order to sweep out air from the headspace. Steam flow is generally used during sealing of glass containers. The method is effective if a covering syrup or brine is present. This

method may not be suitable for uncovered solids containing occluded air. Pouches may be sealed in a partial vacuum, although the use of a pressure plate that squeezes the pouch during sealing is often adequate.

6.3. Sealing

Can containers should be closed immediately after filling to prevent excessive cooling of the surface of the product. Modern can seaming machines operate at speeds as high as 300 cans per minute. Liquid products may be sealed in cans at speeds of up to 1600 per minute. The double seaming operation is critical for the assurance of a hermetic seal and good keeping quality of the final product during storage. Faulty seaming can result in deformations in the can during processing and eventual recontamination. Glass jars are closed with a screw cap. The sealing of flexible pouches:

- Relies on the fusion of two thermoplastic materials
- Is a slow operation,
- The high speeds obtainable for cans and glass containers are not yet possible

6.4. Cooling

- Immediately after processing, the bottle are cooled in water to a temperature of 36°C to 42°C to avoid thermophilic spoilage or bottle rust.
- If the cans are cooled much below 36°C, they may not dry thoroughly and rusting well result.
- If the bottle are cased at temperatures much over 42°C, thermophilic spoilage may occur

6.5. Labelling

Labelling of the polyethylene terephthalate (PET) bottles is done manually. Labels notify the product brand name, ingredients used, nutritional status of the product etc. Shrinking of labels is done in the same way as that for the packaged drinking water. Dating: Automatic printing is done on the bottle sleeve to indicate manufacturing and expiry date, price and initials of names of the people in charge of production.

Packaging and Dispatch: The juices bottles are finally packed and loaded into cartons manually. And then stored at low temperature until dispatch to the market.

Figure: juice filled PET bottles

6.6. Storage

- After labelling the bottle, they should be packed in strong wooden cases or corrugated cardboard cartons and stored in a cool and dry place.
- The outer surface of the bottle should be dry as even small traces of moisture sometimes induce rusting.
- Storage of bottle at high temperature should be avoided, as it shortens the shelf-life of the product and often leads to the formation of hydrogen swell.

Self-Check – 6	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Choice the best answer

1. Which one of the following is correct steps in the filling process

   A. filling, exhausting, sealing, cooling, labelling and storage

   B. storage, labelling, cooling, sealing, exhausting and filling

   C. filling, exhausting, cooling, sealing, labelling and storage

   D. None of the above

Test I: Short Answer Questions

1. Write the effect of volume of the headspace (5 pts)
2. Define the Exhausting (5 pts)
3. What is the basic objective exhausting operation? (6 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 8 points** **Unsatisfactory - below 8 points**

Score = _____

Rating: _____

Answer Sheet

Information Sheet 7- Monitoring equipment

7.1. Inspection of Equipment

Fruit processing machinery plays a decisive role in juice production. The performance and service life of the machine is crucial for the tasty and safety of the fruit juice. In order to keep a stable working performance and achieve a longer service life, the correct operation and maintenance of the fruit processing machinery is the top issue that staff should keep in mind. Here are some key points you should pay attention to in machine operation and maintenance.

7.1.1. Hygiene in operation

Production of food always demands the highest possible degree of safety as to hygiene in operation. As we all know, fruit processing machine is used to produce healthy juice, thus, the hygiene of operation should be on the No.1 list.

Before put into real use, all the parts of the machine should be thoroughly cleaned, removing the protective oil on the surface. After cleaning, use dry and clean towel or washcloth to clean the residual moisture. In daily operation, the in time cleaning is also important in guaranteeing the hygiene of fruit juice machine operation.

Besides, in the workshop, large scale of juice production will also produce fruit material waste or other industrial waste. Working staff should do regular garbage collection and waste cleaning to ensure a clean fruit processing machine operation.

7.1.2. Working condition of equipment

In daily operation, the working condition of juice making machinery should be paid close attention. Each machine has its own feature, if overlooking the actual detailed functioning problems, the potential risk will affect the quality of fruit processing and juice making.

7.1.3. Normal check of the machine

When the machine is just bought, operation staff should check the complete machinery, from the whole frame to the spare part. In the later normal maintenance, the spare part should be regularly checked to make sure the all the spare part are tightly installed to the machine. The connecting part should be lubricated regularly. Furthermore, test the machine to see if it stands stable on the ground, to ensure a stable fruit processing performance. If there is anything wrong with the machine, turn off the power as soon as possible. Examine the problem and restart the wok again when all the problems are settled.

7.1.4. Maintenance for storage of season changing

Season change is also a significant factor that will have certain effects on juice processing machinery. So the maintenance of machinery storage during season change should be given special attention. Improper operation will cause harm to the machine. First of all, complete washing is a dispensable part during season change maintenance. The whole set of machine should be kept in a cool and dry condition, protecting the fruit processing machine from rusted. And maintain the machine according to the instructions.

Generally speaking, correcting operation and maintenance will guarantee a long-lasting and better working performance. Therefore, please read the instructions of the machine carefully, aware of the operation methods. Use the fruit processing machine strictly according to the instructions and the above steps. Most packaging operations, especially those in the food industries require some kind of fill level inspection. Each application will vary depending on the product being produced. Purpose of effective inspection equipment can:

- Ensure conformity with local content/label regulations
- Reduce 'give-away' of valuable product by overfilling

- Check vacuity or head space, especially where container contents will be heated
- Reduce product recalls due to inconsistent fill level

Self-Check – 7	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: write true if the statement is right and false it is wrong

1. Performance and service life of the machine is crucial for the tasty and safety of the fruit juice (5 pts)

Test II: Short Answer Questions

1. What is the purpose of inspection of equipment? (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 8- Identifying and reporting out-of-specification product and equipment

8.1. Out-of-specification of product and equipment

The term out of specifications, are defined as those results of in process or finished product testing, which falling out of specified limits. The out of specifications (OOS), may arise due to deviations in product manufacturing process, errors in testing procedure, or due to malfunctioning of analytical equipment. When an out of specifications (OOS) has arrived, a root cause analysis has to be performed to investigate the cause for OOS. The reasons for OOS can be classified as assignable and non-assignable. When the limits are not in specified limits called out of specifications. When OOS has occurred, the analyst should inform to quality control (QC) manager. Each out of specification will be identified with a unique identification number.

E.g. out of specification occurred in filling process when temperature of blanching is high that causes loss of some nutrients and gives rise to large volumes of waste water, other methods are also available not only temperature but also the volume of the headspace may affect:

- The efficiency of the exhausting procedure
- The rate of heat penetration into the container, (if an agitating process is used)

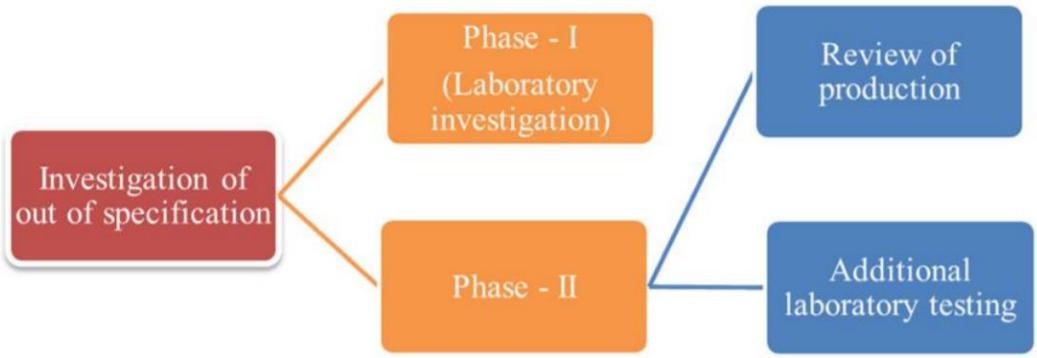
If the there is no the removal of the air in the head space (above the top of the food) so the food create an aerobic environment in the can and deterioration and growth of microorganism in the food

- Monitoring temperatures and headspace is very crucial in filling process for controlling the nonfulfillment of a specified requirement

Out of specification investigation involves 2 phases:

Phase I: (laboratory investigation)

The purpose of the laboratory investigation is to identify the cause for OOS result. The reason for the OOS may be defect in measurement process or in manufacturing process. Irrespective of the rejection of batches, the OOS results must investigate for their trend. The investigation can be done to only those batches that are resulted in OOS, or also to other batches and even other products associated with OOS. The OOS investigation should be thorough, timely, unbiased, well documented and scientifically sound.



Phase II investigation

When there is no possible outcome has obtained from the phase I investigation, the phase II investigation should be commenced in context to investigate the errors occurred in manufacturing processes, sampling procedures along with other additional laboratory testing.

Self-check 8	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. Define out of specifications (5 pts)
2. What are the two steps of out of speciation investigation (5pts)
3. Write the example show out of specification in filling process (4 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 9- Monitoring and cleaning wastes

9.1. Waste management

Defined as handling of all wastes in the plant including food wastes, scratch paper, and fallen dry leaves on the ground, trim wedges and many others into useful products. It is the utilization of wastes by recycling and reusing these wastes into other valuable products good for the health of the people to arrive at zero waste.

Legal Basis of Waste Management

Republic Act no. 9003 known as the National Solid Waste Management Act is issued as part of War on Waste (WOW). To fight against waste provides that all wastes matter will be recycled and reused into useful items.

Different Ways of Waste Disposal

A. For Liquid Wastes Control

1. Screening. It is employed as a preliminary treatment for removal of large particle of solid prior to final treatment to be discharged into a municipal sewage system.

2. Lagooning – Biological Disposal, It consist of holding the wastes effluent in open earthen pits which accomplish treatment under five principles namely:

- Biological Action (aerobic and anaerobic)
- Sedimentation
- Soil absorption
- Evaporation
- Dilution

Two basic types of Lagoons used in disposing industrial wastes:

1. Impounding Lagoon. This meets the requirements of industries discharging small daily volumes of wastes or a seasonal operation, i.e., the canning industry. In this system, the volumetric capacity is equal to the total waste flow, less loss due to evaporation and percolation.

2. Flow-through Lagoon. It requires less land and relies on biological action.

Spray irrigation – land disposal. This serves as an economic and unobjectionable waste disposal method when land is available. It is limited only by the capacity of spray field to absorb the wastewater. The factors required to set up a spray irrigation are as follows:

- Quantity of effluent for disposal (per hour, per day, per week, per season)
- Land available for disposal area such as the texture of soil profile, area and dimensions, topography, depth of ground water, location with respect to plant, and infiltration capacity
- Character effluent
- Climate during operational season.

Chemical Treatment. Chemical precipitation is a form of partial treatment with the use of chemical coagulants of lime followed by ferrous sulphate or alum. It removes 25% to 50% of the biochemical oxygen demand. Analytical measurements such as biochemical oxygen demand (BOD), chemical Oxygen demand (COD) and solid determination are valuable as control measurements.

Self-check 9	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What is the waste management means (5 pts)
2. Write the two basic types of Lagoons used in disposing industrial wastes (5 pts

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

LG #66	LO #2- Monitor and inspect closure and can seams

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Monitoring closing stage
- Inspecting seams
- Identifying and reporting out-of-specification process and equipment
- Identifying and measuring can seam components
- Identifying and reporting non-compliance
- Checking and conforming precision measuring instruments

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Monitor closing stage
- Inspect seams
- Identify and report out-of-specification process and equipment
- Identify and measure can seam components
- Identify and report non-compliance
- Check and conform precision measuring instruments

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

Information Sheet 1- Monitor closing stage

1.1. Monitoring closing stage and seams

The closure is normally the most vulnerable and critical component of a container as far as stability and compatibility with the product is concerned. Suitable closing of the container is necessary because

- It prevents loss of material by spilling or volatilization.
- It prevents the deterioration of product from the effects of environment such as moisture, oxygen, or carbon dioxide.
- It avoids contamination of the product from dirt, microorganism or insects.

Materials used for making closures:-

- Cork
- Glass
- Plastic
- Metal
- rubber

1.2. Control of closures and seam food product

1. Regular observations shall be maintained during production runs for gross closure defects. Any such defects shall be recorded and corrective action taken and recorded. The operator, closure supervisor, or other container closure inspection person shall visually examine either the top seam of a can randomly selected from each seaming head or the closure of any other type of container being used. These examinations and a record of the observations shall be made at intervals of sufficient frequency to ensure proper closure. All pertinent observations shall be recorded. When irregularities are found, the corrective action shall be recorded.

2. Additional visual closure inspections shall be made immediately following:

- A jam in a closing machine;
- A closing machine adjustment; and
- A start-up of a closing machine following a prolonged shutdown.

3. Teardown examinations for double-seam cans shall be performed and the results shall be recorded at intervals of sufficient frequency on enough containers from each seaming station to ensure maintenance of seam integrity. The results of the teardown examinations shall be recorded and the corrective action taken, if any, shall be noted.

- **Required can seam measurements:**
  - ✓ Micrometre measurements are required for covered hook, body hook, width, tightness for wrinkle and thickness.
  - ✓ Seam scope or projector measurements are required for body hook, overlap tightness for wrinkles, and thickness by micrometre.
- Double seam can terminology:
  - ✓ Crossover means the portion of a double seam at the lap.
  - ✓ Cutover means a fracture, sharp bend, or break in the metal at the top of the inside portion of the double seam.
  - ✓ Deadhead means a seam which is incomplete due to chuck spinning in the countersink.
  - ✓ Droop means smooth projection of double seam below bottom of normal seam.

- ✓ False seam means a small seam breakdown where the cover hook and the body hook are not overlapped.
- ✓ Lap means two thicknesses of material bonded together.

4. For glass containers with vacuum closures, capper efficiency shall be checked by a measurement of the cold water vacuum. This shall be done before actual filling operations, and the results shall be recorded.
5. For closures other than double seams and glass containers, appropriate detailed inspections and tests shall be conducted at intervals of sufficient frequency to ensure proper closing machine performance and consistently reliable hermetic seal production. Records of such tests shall be maintained.

Self-check 1	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Write true if the statement is right and false if wrong (5pts each)

1. Seam is the join where two or more layers of the materials are held together with stitches
2. False seam is a small seam breakdown where the cover hook and the body hook are not overlapped

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating – 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 2- Inspecting seams

2.1. Can Seam Inspection

A leaking double seam must be avoided to ensure canned product quality. There are several methods and measurements used to inspect the soundness of a can seam.

- **Seam thickness**

The thickness of the finished seam. There are specified ranges of seam thickness for all can types. The seam thickness measurement is an indicator of the overall pressure that is applied during the seaming operation. Seam thickness is often tested with a seam micrometer.

- **Seam height**

Seam Height is another measurement that indicates overall pressure applied during the seaming operation. Like seam thickness, a seam micrometer is used to measure.

- **Seam impression**

The seam impression is left inside of the can body as seamer rollers push the cover and body hook materials together and against the seaming chuck. The can liner can become damaged if too much pressure is applied.

- **Cover hook wrinkles**

Inspecting the cover hook wrinkling is a more reliable indication of proper seaming pressure. As the various parts of the seam are pressed together due to the differences in radius, wrinkles naturally occur in the inside radius of the cover hook. You can ensure your seamer is operating properly and determine that the correct pressure is being applied by measuring the depth, type and quantity of cover hook wrinkles.

The cover hook must be removed in order to inspect for wrinkling. Removal can be accomplished through manual removal with a pair of nippers or through utilization of a Seam Stripper.

- **Reverse wrinkle**

A Reverse Wrinkle is a non-tightness type of wrinkle that projects towards the can body wall or the center of the can. A reverse wrinkle is formed in the first operation seam and cannot be ironed out regardless of the tightness of the second operation seam. Reverse wrinkles typically appear when seaming harder alloy and/or lighter gauge end stock.

Reverse wrinkles, in themselves, are an appearance issue. They do not attribute to leaker spoilage unless the material folds over on itself (Pucker or Pleat) and/or cracks vertically. One should not try to impose a grading system for this condition. Individual situations must be assessed, and decisions made on each separate case.

Visual inspection

Visually inspecting the external double seam is a valuable tool in maintaining double seam quality. In food canning processes, visual inspection of each container is performed from each seaming station at least every 30 minutes. The inspector is looking for deviations in the double seam as she traverses around the seam. Typical problems found visually include seam vees and droops. Seam bumps are difficult to see because the deviation is small.

Self-check 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Write true if the statement is right and false if it is wrong

1. A leaking double seam must be avoided to ensure canned product quality (5 pts)

Test II: Short Answer Questions

1. What are methods and measurements used to inspect the soundness of a can seam (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating – 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____
Rating: _____

Information Sheet 3- Identifying and reporting out-of-specification process and equipment

3.1. Out of specification

The term out of specifications, are defined as those results of in process or finished product testing, which falling out of specified limits. The out of specifications (OOS), may arise due to deviations in product manufacturing process, errors in testing procedure, or due to malfunctioning of analytical equipment. When an out of specifications (OOS) has arrived, a root cause analysis has to be performed to investigate the cause for OOS. The reasons for OOS can be classified as assignable and non-assignable. When the limits are not in specified limits called out of specifications. When OOS has occurred, the analyst should inform to quality control (QC) manager. Each out of specification will be identified with a unique identification number.

The reason for the OOS may be defect in measurement process or in manufacturing process. Irrespective of the rejection of batches, the OOS results must investigate for their trend. The investigation can be done to only those batches that are resulted in OOS, or also to other batches and even other products associated with OOS. The OOS investigation should be thorough, timely, unbiased, well documented and scientifically sound.

Self-check 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test II: Short Answer Questions

4. Define out of specification(5 pts)
5. What is the cause of out of specification (5pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating – 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 4- Identify and measure can seam components

4.1. Seam Components

The following are the component of can seam

a) Countersink Depth

The countersink depth is the distance measured from the top of the double seam to the end panel adjacent to the inside wall of the double seam

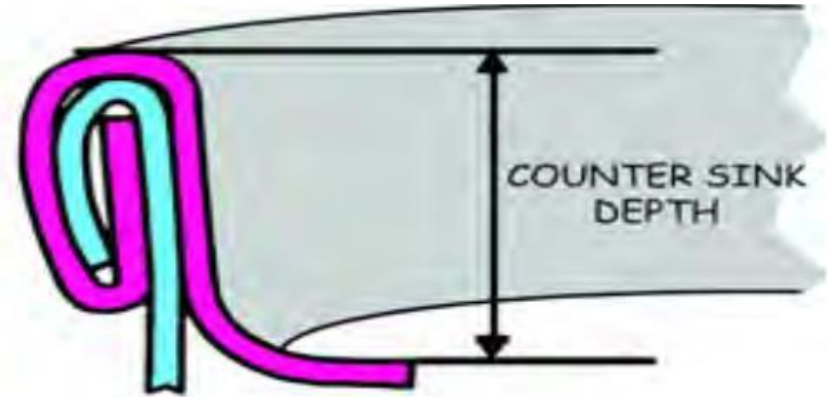


Figure 4.1. Counter sink depth

b) Seam Thickness

Seam thickness is the maximum distance measured across or perpendicular to the layers of material in the seam. As previously mentioned, there are three layers of the

end metal and two of the body metal (or plastic) in the double seam. Thickness is an indication of double seam tightness; however, it should be emphasized that it is only one indication of seam tightness.

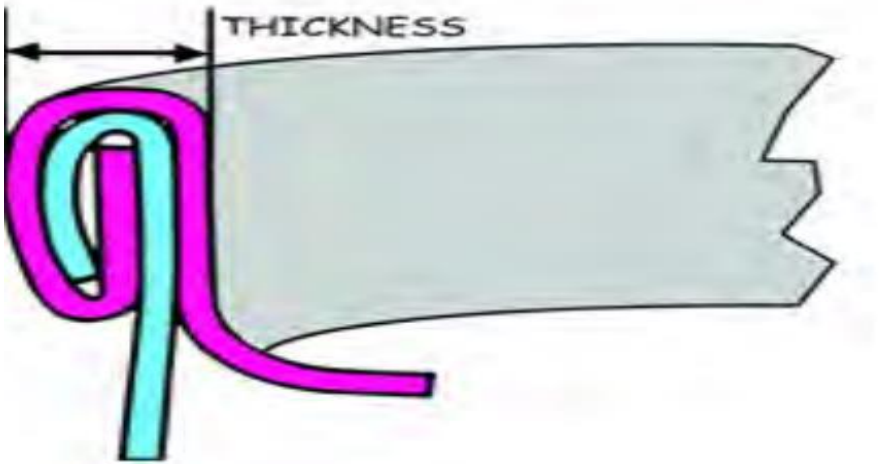


Figure 4.2. Seam thickness

c) Seam Width (Length or Height)

Seam width, also referred to as seam length or height, is the dimension measured parallel to the hooks of the seam. This dimension is somewhat dependent upon the groove contour of the second operation seaming roll

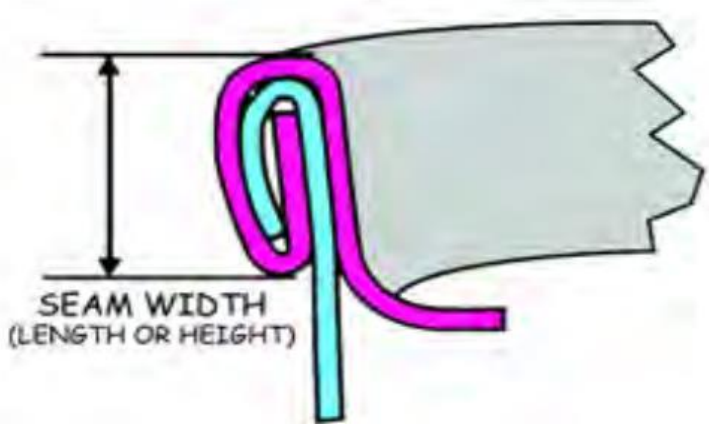


Figure 4.3. Seam width

d) Body Hook and Cover Hook

The body hook, whose origin was the body flange, and the cover hook, which was formed during the double seaming operation from the, end curl, reflect the internal aspects of the double seam. These two structures observed in a cross-section appear in an interlocking relationship to each other.

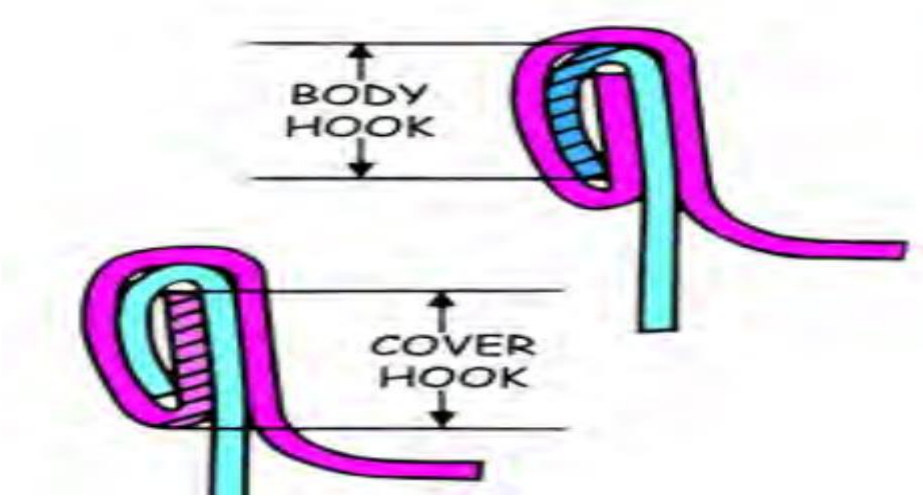


Figure 4.4. Body Hook and Cover Hook

e) Juncture Area

On a three-piece can, the juncture is where the double seam meets and crosses over the side seam area of the can body. On welded side seam cans, the thickness of the weld is only slightly greater (about 1.4 times as great) than the thickness of the body metal. While a slight impression of the weld is apparent on the face of the cover hook, there is minimal change to the double seam at this point. Some welded cans that are made using a thicker coating over the inside surface of the weld may exhibit slight droops at the juncture. Two-piece containers have no side seam; therefore, they have no side seam juncture. The juncture area was a particularly troublesome spot when the side seams were soldered rather than welded. For soldered side seam cans, there were two additional thicknesses of metal at this point.

Self-check 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Write true if the statement is right and false if it is wrong (5pts each)

1. Seam thickness is the maximum distance measured across or perpendicular to the layers of material in the seam
2. The countersink depth is the distance measured from the top of the double seam to the end panel adjacent to the inside wall of the double seam

Test II: Short Answer Questions

1. Write the components of seam (4 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating – 7 points** **Unsatisfactory - below 7 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 5- Identifying and reporting non-compliance

5.1. Guidance for Identifying and Reporting Noncompliance

Noncompliance is the failure or defect with something. Noncompliance can result from a number of factors during the process. This guidance provides directions for identifying and reporting potential non-compliance occurring during the conduct of process. During the examination of double seams, measurements that are outside the recommended guidelines or visual defects may be found. Assessing the seriousness of these out-of-normal conditions requires experienced judgment. Whether or not immediate corrective action is taken depends upon the effect of the seam condition and on the soundness of the container seal. Seam defects and their possible causes are as follows:

Excessive Countersink Depth

Excessive countersink depth occurs when the dimension exceeds operating limits and results in shortened cover hooks and overlap. Possible causes are:

- Excessive baseplate pressure;
- Insufficient (short) pin gauge height;
- Chuck not fully seated in the end unit;
- Improper seaming chuck lip height; and/or
- Improper relation of first operation roll to lip of chuck.

Loose First Operation Seam

When the first operation is too loose, the cover hook will not be in contact with the can body, and there may not be sufficient "tuck up" of the end curl to form a good cover hook and overlap. Possible cause of a loose first operation seam may be:

- First operation seaming roll setting too loose;
- Worn first operation seaming roll;
- Worn seaming roll cam, roll pins, bearings or plunger; and/or
- First operation seaming roll groove profile too wide.
- Worn seaming roll cam, roll pins, bearings or plunger; and/or
- First operation seaming roll groove profile too wide.

Excessively Tight First Operation Seam

An excessively tight first operation seam will have the bottom of the seam slightly flattened throughout its length, sharp seams and poorly formed cover hooks. Possible causes are:

- First operation seaming roll setting is too tight; and/or
- First operation seaming roll groove is too narrow.

Short Body Hooks

When the body hook length is less than the recommended guidelines, the double seam is said to have a short body hook. Possible causes of this condition are:

- Insufficient lifter pressure;
- Incorrect pin height setting (seaming chuck set too high in relation to lifter baseplate);
- First operation seaming roll set too tightly;
- Second operation seaming roll set too loosely; and/or
- Improperly formed can flange length or flange radius.

Long Body Hooks

Long body hooks occur when the body hook length is in excess of recommended guidelines. Possible causes are:

- Excessive lifter pressure;
- Incorrect pin height (pin gauge) setting (chuck too low in relation to lifter baseplate); and/or
- Improperly formed can flange length, flange radius or mushroomed can flange.

Self-check 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What are the cause of a loose first operation seam (5 pts)
2. What are the cause of an excessive countersink depth (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating – 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 6- Checking and conforming precision measuring instruments

6.1. Measuring instrument for food

The term precision means two or more values of the measurements are closed to each other. The value of precision differs because of the observational error. The precision is used for finding the consistency or reproducibility of the measurement.

- **Instruments used for measuring food are:**

PH meter: is *used* to measure the acidity or basicity of liquids and food

Figure 6.1. Ph. meter

Digital scale: is a digital scale used to get the weight of food like meat, fish, vegetables, fruits, etc.

Figure 6.2. Digital scale

Digital Micrometers: instrument for making precise linear measurements of dimensions such as diameters, thicknesses, and lengths of solid bodies.

Figure 6.3. Digital micrometre

Thermometers: Thermometers indicate the degree of hotness or coldness of a thing or body. It measures how high or how low the temperature

Figure 6.4. Thermometer

Refractometer: used to measure the sugar concentration of sap and syrup for food

Figure 6.5. Refractometer

Self-check 6	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. Define precision (4 pts)
2. write the instrument used to measuring food (5pts)
3. What is the use of thermometers (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating – 7 points** **Unsatisfactory - below 7 points**

Answer Sheet

Score = _____
Rating: _____

LG #67	LO #3- Perform filling

Instruction sheet
This learning guide is developed to provide you the necessary information regarding the following content coverage and topics: • Performing septic filling process • Performing canning process • Performing jar filling system • Performing pouncing filling This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to: • Perform septic filling process • Perform canning process • Perform jar filling system • Perform pouncing filling
Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1- Performing aseptic filling process

1.1. Aseptic Processing

Aseptic processing is a high-temperature–short-time thermal process to commercially sterilize a product and fill the cooled sterile product into a pre sterilized package in a sterile environment. Aseptic processing is the preservation method where:

- The food and the package are sterilized separately and are assembled under sterile conditions. It is applied for liquid or liquid-containing small particulate foods.
- The product is first subjected to heat by passing the liquid product through a heat exchanger and held for a sufficient time in holding tubes to complete the required heat treatment.

- Following the heat treatment, the product is passed through another heat exchanger where it is cooled.
- The filling and sealing operations are then performed under aseptic conditions.
- The two main reasons for using aseptic processing are:

✓ To permit the use of containers that are unsuitable for in-package sterilization

✓ To take advantage of high-temperature short-time (HTST) processes, which are thermally efficient and generally give rise to food that is superior in quality to that produced by processing at lower temperatures for longer times (LTLT).

Self-check 1	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. Define Aseptic process(5 pts)
2. What are the two main reasons for using aseptic processing (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____
Rating: _____

Information Sheet 2- Performing canning process

2.1. Canning of Fruits and Vegetables

Canning is defined as preservation of foods in hermetically sealed containers and usually implies heat treatment as the principal factor in prevention of spoilage.

- Foods that are canned:
  - ✓ **Low acid foods:** Meat, fish, poultry, dairy fall into a pH range of 5.0 to 6.8. This large group is commonly referred to as the low acid group.
  - ✓ **Acid foods:** With pH values between 4.5 and 3.7. Fruits such as pear, oranges, apricots and tomatoes fall in this class.
  - ✓ **High acid foods:** Such as pickled products and fermented foods. The pH values range from 3.7 down to 2.3, also Jams and Jellies are in this classification.

2.2. Canning process

1. Selection of fruits and vegetables

- Fruits and vegetables should be absolutely fresh.
- Fruits should be ripe, but firm, and uniformly mature. Over-ripe fruits should be rejected because they are infected with microorganisms and give a poor quality product. Unripe fruits should be rejected because they generally shrivel and toughen on canning.
- All vegetables except tomatoes should be tender
- Tomatoes should be firm, fully ripe and of deep red colour
- Fruits and vegetables should be free from dirt.
- They should be free from blemishes, insect damage or mechanical injury

2. Grading

- The selected fruits and vegetables are graded according to size and colour to obtain uniform quality.
- This is done by hand or by machines such as screw grader and roller grader.
- Fruits like berries, plums and cherries are graded whole.
- while peaches, pears, apricots, mangoes, pineapples, etc., are generally graded after cutting into pieces or slices

3. Washing

- It is important to remove pesticide spray residue and dust from fruits and vegetables.
- One gram of soil contains 1012 spores of microorganisms. Therefore, removal of microorganisms by washing with water is essential.
- Fruits and vegetables can be washed in different ways. Root crops that loosen in soil are washed by soaking in water containing 25 to 50 ppm chlorine (as detergent).
- Other methods of washing are spray washing, steam washing, etc.

4. Peeling

The objective of peeling is to remove the outer layer. Peeling may be done in various ways:

- Hand Peeling
- Steam Peeling
- Mechanical Peeling
- Lye Peeling

5. Cutting

- Pieces of the size required for canning are cut. Seed, stone and core are removed.
- Some fruits like plum from which the seeds cannot be taken out easily are canned whole.

6. Blanching

- Blanching is usually done in case of vegetables by exposing them to boiling water or steam for 2 to 5 minutes, followed by cooling.
- Inactivates most of the plant enzymes which cause toughness, discoloration (polyphenol oxidase), mustiness, off-flavour (peroxidase), softening and loss of nutritive value.
- Reduces the number of microorganisms by as much as 99%.

7. Cooling

After blanching, the vegetables are dipped in cold water for better handling and keeping them in good condition.

8. Filling

- Before filling, cans are washed with hot water and sterilized
- Automatic, large can-filling machines are used in advanced countries but choice grades of fruits are normally filled by hand to prevent bruising in India. Hand filling is the common practice.
- After filling, covering with syrup or brine is done and this process is called syrup or brining. Headspace left inside ranges from o.32 cm to 0.47 cm.

9. Exhausting

The process of removal of air from cans is known as exhausting. After filling and lidding or clinching, exhausting is essential. The major advantages of exhausting areas under:

- Corrosion of the tinplate and pin holing during storage is avoided.
- Minimizes discoloration by preventing oxidation.
- Helps in better retention of vitamins particularly vitamin C.
- Prevents building of cans when stored in hot climate or at high altitude.
- Reduces chemical reaction between the container and the contents
- Prevents development of excessive pressure and strain during sterilization

Exhausting methods:

- Thermal exhausting (Steam Vacuum)
- Mechanical Exhausting (Machine Vacuum)

10. Sealing

- Immediately after exhausting the cans are sealed airtight by means of a can sealer.
- In case of glass jars a rubber ring should be placed between the mouth of the jar and the lid, so that it can be sealed airtight.
- During sealing the temperature should not fall below 74°C

10. Processing

Heating of foods for preserving is known as processing. The cans must be processed (heat treated) immediately after closing (hermetic sealed) at suitable time and temperature

Food to be canned is threatened on the one hand by bacterial spoilage (if under processed) and on the other by danger of lower the nutritive quality by overheating.

- Vegetative bacteria are killed at 80°C/30min.
- Spore formers at a temp.110°C/30min.
- For destroying the spores 121°C/3min.

12. Cooling

- Immediately after processing, the cans are cooled in water to a temperature of 36°C to 42°C to avoid thermophilic spoilage or can rust.
- If the cans are cooled much below 36°C, they may not dry thoroughly and rusting well result.
- If the cans are cased at temperatures much over 42°C, thermophilic spoilage may occur

13. Storage

- After labelling the cans, they should be packed in strong wooden cases or corrugated cardboard cartons and stored in a cool and dry place.
- The outer surface of the cans should be dry as even small traces of moisture sometimes induce rusting.
- Storage of cans at high temperature should be avoided, as it shortens the shelf-life of the product and often leads to the formation of hydrogen swell.

Self-check 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. Define canning (5 pts)
2. Write the canning process/step (5 pts)
3. What are the two method of exhausting (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

Answer Sheet

Score = _____
Rating: _____

Information Sheet 3- Performing jar filling system

3.1. Jar filling system

3.1.1. Jar Preparation for canning

1. Wash the jars, lids, and bands in hot, soapy water. Rinse and drain. Fill the canner with water and place the jars on the rack. Cover and bring to a simmer over medium heat. Reduce heat and keep the jars hot until you're ready to fill them.
2. Put the flat lids in a saucepan and cover with water; bring just to a simmer over medium heat. Do not boil. Reduce heat and keep them hot until you're ready to use them.
3. Put the screw bands near your work area. There's no need to heat the bands

Figure 3.1. Jar preparation in hot water

3.1.2. Filling Jars

1. Prepare your recipe. Have a trivet or rack ready in your work area for the hot pot.
2. Working with one jar at a time, use canning jar tongs to remove jars from the hot water to your work area. Fill the jars using a ladle, leaving the appropriate amount of headspace that your recipe requires. A canning funnel comes in handy for this step.
3. Slide a small non-metallic spatula or plastic knife around in the hot mixture to remove any air bubbles. Using a damp clean cloth or paper towel, clean the jar rims and threads.
4. Centre the lids on the jars, so the sealing compound is in contact with the rims. Screw the bands down just to fingertip tightness. Do not overly tighten. A magnetic lid lifter makes it easier to remove lids, one at a time, from the hot water.

3.1.3. Processing Filled Jars

1. Return the filled jars to the rack in the hot water in the canner. Lower the rack and adjust the water level, so there is at least 1 inch of water above the tops of the jars.
2. Cover the canner and bring to a full boil. Once the water is at a full boil, begin timing the processing time required by your recipe.
3. Turn off the heat, remove the cover, and let the jars stand in the water for 5 minutes. Using the canning jar tongs, remove the jars to a rack or heavy towel to cool. Do not tilt, turn, or dry, and do not disturb the lids or tighten the bands.
4. After 24 hours, check for seals and remove the bands.
5. Refrigerate any unsealed jars and use within a few days or reprocess, heating the liquid again (according to recipe instructions) and canning in sterilized jars with new lids.
6. Label properly sealed jars, wipe the jars and threads clean, and store in a cool, dark place.

Self-check 3	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: short answer

1. Write the procedure of filling jars (5 pts)
2. Write the procedure of processing filled jars (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 4- Perform pouching filling

4.1. Pouching filling and Sealing

Pouch is a small bag used for carrying things. A method for filling an aseptic pouch having the In-lined and preformed pouches are filled vertically. Vertical form fill machine can be used for liquid products. Another method employs of pouch material which is formed on a horizontal bed into several adjacent cavities. The cavities are filled whilst the sealed areas are shielded. This method is especially useful for filling space able products. Thereafter the filled cavities are simultaneously sealed from the top using a second fed from the reel.

Figure 4.1. Aseptic pouch

Pouch closure is normally accomplished by some means of air removal, either by steam flushing or by drawing a vacuum in a sealed chamber or simply, in the case of liquid food products, flattening the pouch by squeezing between two vertical plates. Efficient air removal prevents ballooning and rupturing during retorting. Never hot pack in retort pouches. The bag could burst causing burns or other problems. All products must be cooled completely before vacuum sealing. Then remain in a cold environment until placed directly into the pressure canner for processing.

Self-check 4	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What is pouch means (5 point)
2. Write the method for filling an aseptic pouch (5 point)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____
Rating: _____

Operation sheet – 1	**Perform canning of Fruits**

Operation title: Canning of fruit

Purpose: To demonstrate the process of canning fruits.

Materials required:

- Materials:

✓ Fruits like mangoes, pineapple, and sugar

- Utensils:

✓ Measuring cup

✓ Measuring spoon

✓ Weighing scale

✓ Knife

- ✓ Chopping board
- ✓ Colanders
- ✓ Ladles
- ✓ thermometers
- ✓ Tongs
- ✓ Glass jar

Procedures for canning of fruit

1. Wear protective clothing

2. Select raw materials

- Fruits for canning should be fully-ripened but firm and sound. Unripe fruits are poor in texture and lack flavour and colour. Sort fruits for size and ripeness.

3. Prepare the fruit for canning

- Wash thoroughly. Wash small lots of fruits at a time under running water if possible, or through several changes of water. Do not soak the fruits in water. Handle gently to avoid bruising. Some fruits require blanching – that is heating in water or live steam. It serves to facilitate peeling, drive off gas, wilt the fruit for better control on the fill, and aid in the destruction of enzymes to avoid discoloration.

4. Pack and Process in glass containers

- Depending upon the use or kind of product desired, fruits may be packed in juice, low syrup or in high syrup or with sugar only. Syrup is made by dissolving sugar in water, its sweetness depending upon the amount of sugar added to the water. The Sugar content of the syrup may be determined by the use of a refractometer. Syrups for home use are classified as thin, medium and heavy
- Thin – 3 cups water to 1 cup sugar. 3:1
- Medium – 2 cups water to 1 cup sugar. 2:1
- Heavy or thick – 1 cup water to 1 cup sugar. 1:1

5. Step for hot or cold pack methods of packing
    - Wash jars well and dry
    - Select raw materials

- Prepare according to recipe. Determine whether cold or hot method will be used
- Pack product into clean jars to not more than ½ inch of top of jar - Add syrup.
- Remove air bubbles by running a spatula inside the bottle
- Clean jar rim to remove any particle
- Half seal and process in boiling water at required length of time.
- Remove from cooker and seal completely at once.

6. Cool, label and storage
   - Allow to cool in a place free from draft.
   - Wipe packed jars clean
   - Test leakage by inverting jars.

Lap Test	**Perform canning**

Name…… ID…… Date……

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

Task 1: Perform canning of fruit

Task 2: Perform jar filling

LG #68	LO #4- Shut down filling and closing equipment

Instruction sheet
This learning guide is developed to provide you the necessary information regarding the following content coverage and topics: • Shutting down process • Preparing equipment for cleaning • Collecting, treating and disposing or recycling waste

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Shut down process
- Prepare equipment for cleaning
- Collect, treat and dispose or recycle waste

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

Information Sheet 1- Shutting down process

1.1. Introduction

The point of a shutdown is to create a plan for a complete cessation of all plant activities in order to perform necessary maintenance, repairs, equipment replacements, and to perform internal maintenance. The shut-down procedure is just as important as the start-up procedure for both an extruder and an injection molding

machine. By properly shutting down the equipment, the start-up will be much quicker and most effective. Shut down the line can have a major impact on your capacity to restart production promptly. In an upcoming article, we will help you restart your machinery, taking the best steps and precautions.

Steps to follow for proper shutdown of manufacturing line:

1. **End of production sequence**

When pausing a manufacturing line, it is crucial to allow the machine to empty itself of all the components. The end of the production sequence clears the manufacturing equipment without loading new products into the cycle. This cycle finishes components in a machine and automatically removes most of the glue, parts, liquid, and powder from the production path. There are, however, certain elements that will not be automatically emptied until a later stage of the manufacturing processes. It may be necessary to remove these elements manually and thus completely empty the machine of any stray material that can complicate startup. This first step is crucial. For instance, we had experience with a temporary equipment shutdown where oil was left inside certain containers. This oil froze and hardened during the production disruption. When we wanted to restart the line, the oil had become like a resin, gumming up the machine and requiring cleaning that was more labor-intensive and time-consuming than if it was completed at the time of the shutdown.

2. Air purge

Once the machine is out of service, the next thing we recommend is to purge any air that may be present in the equipment. Machines often use compressed air to activate the different cylinders, and most machines have an air purge valve that allows for bleeding off any accumulated air. Why is it important? Because the air can crystallize and eventually wear out pneumatic components.

3. Cleaning of the machine

Beyond clearing the line of product and residue, purging air, and cleaning filters, you should take the time to clean the machinery thoroughly during shutdown. Cleaning now will avoid unpleasant surprises at startup. For example, in the previous example where a company left oil in their system, which froze, cleaning it was longer and more complex than just emptying it. During cleaning, they had to dismantle pipes and small components, resulting in broken parts because it was so “jammed”. It added an extra layer of unnecessary work and problems. Invest the time today, and you’ll save time in the long run.

4. Preventive maintenance

Whether the shutdown affects all of your manufacturing lines or just a portion, we recommend you use the disruption as an opportunity to perform preventive maintenance on your equipment. The manufacturer’s operation and maintenance manual is the best source for guidance on how to care for your equipment and how to identify issues that need repair. Dealing with repair needs today will help you to be better able to restart quickly. It is also advisable to ensure that you have critical parts and components that need frequent replacement beforehand. Lead times to supply your parts can be unpredictable, so we suggest that you make a list of parts that need changing and share it with your suppliers to anticipate when the product will be available.

5. Environmental

More generally, we suggest that you keep the equipment in a stable environment, adequate in terms of temperature and ventilation. This will help avoid degrading your production line. For example, in a medical clean room, if the machine is not in production, it may not be necessary to maintain PPM, particles per million, in the air at a level similar to that during production. However, keeping the temperature and humidity level stable is important so that the machine does not start to rust. As for air compressors especially air dryers and filters we highly recommend that you change these components at shutdown so there will be no contamination or blockage of filters. If you have just recently replaced filters, then you may not need to change to new filters at the time of the shutdown process. The main goal here is to avoid letting your machinery be dormant with dirty filters in place, as this could adversely affect the general functioning of your machine.

6. Protection

When your equipment is in an industrial environment, certain activities such as cutting materials, welding, generate dust and debris. This poses the risk of generating contaminants and damaging all that is mechanical, such as seals. Accumulated metal shavings, for example, can cause internal damage and pose a risk to operators when the machine is switched back on after the shutdown period. Normally, when the fans in the factory are running, dust or contaminants are filtered. At Orientate, when a machine is on physical hold at the customer's request, we always cover it with plastic wrap to protect the machine and fragile components from contaminants. This simple step can save you from these problems at restart.

7. Electricity

We highly recommend you to start by making a backup of all of machines. There is a very specific procedure to change the batteries of robotics to ensure that programming does not get lost or altered. When you have backed up everything and replaced the parts and batteries that are needed, you should determine if you should

cut off the power source, or maintain power during shutdown. It may be preferable to cut off the power to avoid any power surge. Electrical components must also be protected during dormancy. If there is dust, contaminants, oil, grease that go under the sensors, you will have issues when it comes time to start the machine again.

8. Get support

In case you are not comfortable with restarting, or if you have any questions, please do not hesitate to contact your partner company. You may even be able to ask them to reboot with you, online, video or phone. This crisis is unprecedented. Many factors are out of your hands, such as the duration of a shutdown period. It is key to focus on what you actually can control. The approach to maintaining your machine, assembly lines, and manufacturing premises, is something you have the ability to actively manage.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What is shut down process? (5 points)
2. Write down Steps to follow for proper shutdown? (5 points)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 2- Preparing equipment for cleaning

2.1. Cleaning and sanitation of equipment

Cleaning is to remove visible dirt and Sanitizing is absence of microorganism through using heat or chemical. Food premises and equipment shall be maintained in an appropriate state of repair and cleanliness in order to function as intended, facilitate all sanitation procedures and prevent contamination of food, such as from metal shards, flaking plaster, food debris and chemicals. Cleaning shall remove food residues and dirt which may be a source of contamination. The necessary cleaning methods and materials will depend on the nature of the food business. Disinfection may be necessary after cleaning.

Cleaning and sanitizing agents and tools

- Cleaning and disinfection chemicals shall be food grade, handled and used carefully and in accordance with manufacturers' instructions, for example, using the correct dilutions, and stored, where necessary, separated from food, in clearly identified containers to avoid the risk of contaminating food. Material Safety Data Sheet for cleaning and sanitizing agent should be maintained.
- Tools and equipment's like scrubbers, brushes, plastic brooms, vacuum cleaners etc. should be of hygienically designed and robust, so that they pose no threat to food safety of product. Further, they should be dedicated to specific areas.

Figure 2.1. a) Cleaning brushes b). Cleaning mops

Figure 2.2. Cleaning Tools with scrubber

Cleaning Methods and programs

A cleaning and disinfection programmes shall be drawn up, observed and records of the same shall be maintained. The programme should ensure that all parts of the establishment are appropriately clean, and shall include the cleaning of cleaning equipment. The cleaning programmes shall specify:

- areas, items of equipment and utensils to be cleaned;
- responsibility for particular tasks;
- cleaning method and frequency of cleaning; and
- Monitoring arrangements for checking effectiveness of cleaning (eg. through audits or microbiological sampling and testing of the environment and food contact surfaces)

Cleaning Procedures and methods

Cleaning procedures should generally involve:

- removing gross visible debris from surfaces;
- applying a detergent solution to loosen soil and bacterial film (cleaning);
- rinsing with water (hot water where possible) to remove loosened soil and residues of detergent;

- dry cleaning or other appropriate methods for removing and collecting residues and debris (may be needed in some operations where water enhances the risk of microbiological contamination); and
- where necessary, cleaning should be followed by disinfection with subsequent rinsing.

The cleaning methods that are mostly done in food establishment are: Wet Cleaning, Controlled Wet Cleaning and Dry Cleaning depending on the type of products. Requirements for cleaning should be detailed in documented procedures and shall be readily available for people involved in cleaning. Instructions shall include:

- Frequency of cleaning
- Equipment disassembly and re-assembly instructions
- Cleaning methodology such as CIP or COP (Cleaning Out of Place system
- Cleaning chemicals concentration
- Contact time and temperature

Potable water shall be used for cleaning of food contact surfaces.

Dry cleaning and disinfection

Dry cleaning should be used as the routine cleaning practice for the area that requires the most stringent hygiene control. The objective of dry cleaning is to remove product residues without the use of water by using tools or cleaning aids that do not involve the application of water or other aqueous solutions. Where appropriate, dry abrasives can be an effective method of removing persistent product residues on equipment or surfaces without introducing water.

Following should be considered when establishing:

Dry Cleaning procedures:

- Compressed air can be used for dry cleaning in special situations (e.g. to dislodge dust from inaccessible points) but when compressed air is used, it should be dried and filtered to exclude microorganisms and moisture prior to use.

- Separate tools should be provided for the dry cleaning of floors. Tools and
- vacuums that are used for cleaning food contact surfaces should not be used to clean non-food contact surfaces. Well-designated portable vacuum cleaners or similar tools are recommended to remove residues.
- Where filters are part of dry cleaning tools, they should be properly maintained on a regular basis and replaced when necessary.
- Alcohol- based disinfectants provide a means to disinfect equipment with a very minimal introduction of water, but water should be avoided as much as possible.
- Cleaning and disinfectants programs should be monitored for their effectiveness and verified by visual observations and, where applicable, environmental monitoring.

Controlled wet cleaning

As much product residue as possible should be removed by dry cleaning. Procedures should be in place to collect water spreading on the floor or to other non-wet cleaned areas. Complete drying of all areas and components involved (e.g. equipment parts, floor) should be done after controlled wet cleaning. Controlled wet cleaning should be monitored and verified by visual inspection that the area is dry. If necessary, production should be stopped while controlled wet cleaning is taking place and only restarted once the area is dry.

Wet cleaning

- Wet Cleaning can be done by using potable water or steam
- The amount of water should be minimised and its use should be limited to specific areas where possible.
- Excessive use of water and high pressure hoses should be avoided.
- Care should be taken to prevent tracking water into areas intended to remain dry.
- Complete drying of all areas should be done after wet cleaning

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below

Test I: Short Answer Questions

1. What are the cleaning procedures (5 pts)
2. What is wet cleaning means (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 3- Collecting, treating and disposing or recycling waste

3.1. Waste Management

Systems shall be in place to ensure that waste materials are identified, collected, disposed/recycle of in a manner which prevents contamination of products or production areas.

1. Waste Collection

Facilities shall be designed to prevent access to waste or inedible material by pests and avoid contamination of food, potable water, equipment, buildings or roadways in the premises. The waste shall be collected in identifiable containers with lid and shall be removed from the processing areas either at the end of the operations or when the container is full. Waste storage facilities shall be:

- away from the processing area;
- designed to prevent access to waste by pests;

Waste containers shall be kept in designated area and constructed of impervious material which can be readily cleaned and sanitized (Foot operated bins are recommended).

2. Waste Disposal

Accumulation of waste, non-edible by products and other refuse shall not be allowed in food-handling or storage areas. Removal frequencies shall be managed to avoid accumulations and over flow in food handling, food storage, and other working areas and the adjoining environment except so far as is

unavoidable for the proper functioning of the business, with a minimum daily removal.

No waste shall be kept open inside the premise and shall be disposed as per local rules and regulations including those for plastics and other non-environment friendly materials. Records for the disposal shall be available.

Waste stores must be kept appropriately clean and free of pests. If the waste disposal is outsourced, it has to be done through approved contractors only and the records shall be maintained.

The disposal of sewage and effluents (solid, liquid & gas) shall be in conformity with standards laid down under Environment Protection Act, 1986 & the local rules, wherever prevalent.

Figure 3.1. : Colour coded bins/containers for Wet and dry disposable.

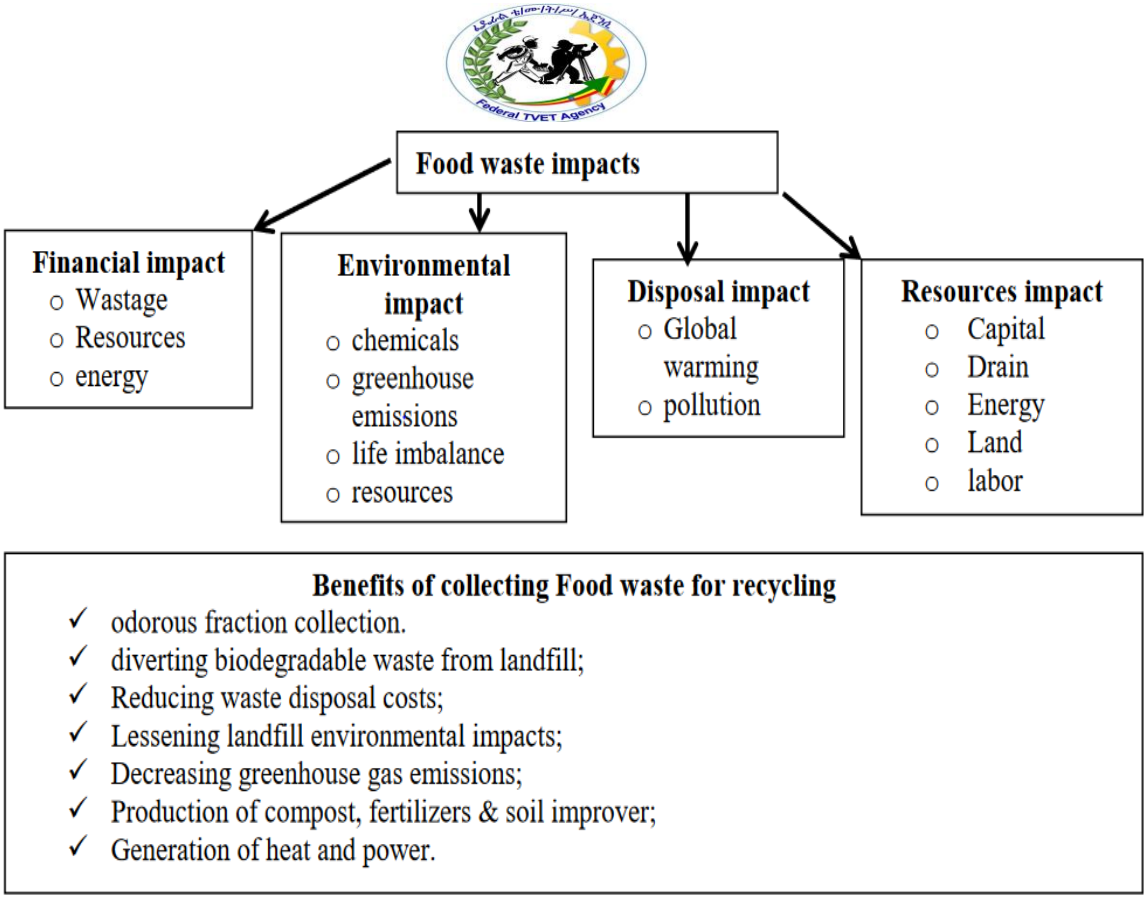


Figure 3.1. Impacts of Food waste.

Self-check 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Instruction: I Short answer questions

1. Waste storage facilities shall be (5 pts)
2. What are the impact of food waste (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

LG #69	LO #5- Use Workplace information

Instruction sheet
This learning guide is developed to provide you the necessary information regarding the following content coverage and topics: • Doing Standard Operating Procedures (SOPs) • Setting specification • Recording and reporting Standard forms This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to: • Done Standard Operating Procedures (SOPs) • Set specification • Record and report Standard forms
Learning Instructions:
1. Read the specific objectives of this Learning Guide. 2. Follow the instructions described below. 3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them. 4. Accomplish the “Self-checks” which are placed following all information sheets. 5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

Information Sheet 1- Doing Standard Operating Procedures (SOPs)

1.1. Standard Operating Procedure (SOP)

A Standard Operating Procedure (SOP) is a set of written instructions that document a routine or repetitive activity followed by an organization. The development and use of SOPs are an integral part of a successful quality system as it provides individuals with the information to perform a job properly, and facilitates consistency in the quality and integrity of a product or end-result.

Standard Operating Procedures (SSOP): SSOP are components of good manufacturing practice that emphasize sanitation procedure. They include:

- Safety of water that gets in contact with food and food surfaces;
- Condition and cleanliness of food contact surfaces;
- Measures to prevent contamination;
- Employee hygiene practices;
- Control of employee health conditions that could result in contamination of food and food surfaces;
- Protection of food and food contact surfaces from adulteration with toxic and other harmful components;
- Proper labelling and storage and use of toxic; and
- Control of pests.

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Write true if the statement is right and false if it is wrong

1. A Standard Operating Procedure (SOP) is a set of written instructions that document a routine or repetitive activity followed by an organization (5 pts)

Test II: Short Answer Questions

1. Standard Operating Procedures are components of good manufacturing practice that emphasize sanitation procedure that include (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 2- Setting specification

2.1. Specification

Any description of the physical or functional characteristics, or of the nature of a supply, service, or construction. It may include a description of any requirement for inspecting, testing, or preparing a supply, service or construction item for delivery. A specification is the basis for procuring a good, service or construction item service or construction item. Purchasing agencies may seek to procure standard commercial products and obtain the most advantageous prices. All specifications shall seek to promote overall competition, shall not be restrictive, and provide fair and equal opportunity for every supplier that is able to meet the State's needs.

2.2. Types of Specifications

There are three (3) key types of specifications. All three types of Specifications may be combined to form the one Specification.

Functional specifications

These are Specifications that define the function, duty or role of the goods or services. It nominates what the goods or services are broadly required to do. Functional specifications define the task or desired result by focusing on what is to be achieved rather than how it is to be done. They do not describe the method of achieving the intended result. This enables suppliers to provide innovative solutions to defined problems.

Performance specifications

These are Specifications that define the purpose of the goods or services in terms of how effectively it will perform. Performance is a logical extension of function. Performance specifications define the task or desired result by focussing on what is to be achieved. They do not describe the method of achieving the desired result.

Technical specifications

These are Specifications that define the technical and physical characteristics and/or measurements of a product, such as physical aspects (e.g. dimensions, colour, and surface finish), design details, material properties, energy requirements, processes, maintenance requirements and operational requirements. They are used when functional and performance characteristics are insufficient to define the requirement and are often used for engineering and information technology requirements

- **Importance of specification**

  - ✓ Critical to procurement planning process.
  - ✓ Provides clarity to the supplier/vendor community
  - ✓ Provides clarity to the supplier/vendor community.
  - ✓ Conveys the level of quality and function.
  - ✓ Avoids the acquisition of inferior products and materials.
  - ✓ Provides fair opportunity to all qualified offerors.
  - ✓ Promotes a competitive bidding environment.
  - ✓ Key component to strategic sourcing

Self-check 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. Define specification (5 pts)
2. What are the three types of specifications (5 pts)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Information Sheet 3- Recording and reporting Standard forms

3.1. Work place information

Workplace information may include:

- Standard Operating Procedures (SOPs),
- Specifications for raw material and ingredient
- production schedules
- sampling and tests requirements
- reporting arrangements
- certificate of analysis
- Recording filling process of food.

3.2. Record activities

- Record of food safety includes a description of each of the hazards identified in the hazard analysis process, as well as the control measures that will be implemented to address each hazard, shall be prepared by food business operators.
- Records of processing, production and distributions shall be maintained in a legible manner, retained in good condition for a period of one year or the shelf-life of the product, whichever is more.
- Records include incoming material checks, inspection and testing, calibration of food safety equipment's, water testing, operational controls (such as temperature, pressure, time etc.), product recall and traceability, storage, cleaning and sanitation, pest control, medical examination and health status of food handlers, training etc.

Self-check 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What is the term of HACCP? (4 point)
2. What are the 7 principle of HACCP? (5 point)
3. Sanitation Standard Operating Procedures (SSOP) are components of GMP that emphasize sanitation procedure. They include (5 point)

You can ask you teacher for the copy of the correct answers

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

Answer Sheet

Score = _____

Rating: _____

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