FRUIT AND VEGETABLE PROCESSING -Level-II

Based on May 2019, Version 2 Occupational standards

Module Title: - Applying Hydro-cooling Processes to Fresh Produce

LG Code: IND FVP2 M07 LO (1-3) LG (22-24)

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Table of Contents

LG #22	LO #1- Determine requirements for hydro-cooling

Instruction sheet

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

- Identifying key steps of hydro-cooling
- Identifying Impact of timing and temperature
- Identifying produce for hydro-cooling and confirming requirements
- Identifying consequences of incorrect hydro-cooling
- Checking and adjusting equipment performance
- Carrying out pre-start checks
- Locating goods in correct storage areas
- Recording stores information

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:

- Identify key steps in the hydro-cooling process including impact of timing and temperature
- Identifying produce for hydro-cooling and confirm specific cooling and transfer requirements
- Check and adjust equipment performance to meet work requirements
- Carry out pre-start checks as required by workplace requirements
- Place goods in storage areas to meet storage temperature, stores handling and stock rotation requirements
- Record stores information in required format

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- Identify key steps of hydro-cooling process

1.1. Introduction

This module covers the knowledge, skills and attitude required to use hydro-cooling equipment and processes to cool fresh fruit and vegetables in preparation for storage or transportation. The series of steps needed to keep produce at low temperature from the time it is harvested until purchased by the final consumer is referred to as a cold chain system. Pre-cooling is the start of the cold chain that brings produce temperature to its optimum level. Once this condition is reached, it should be continuously maintained until the produce is sold. Refrigerated transport vehicles and cold storage rooms are generally designed only to keep commodity at low temperature. Warm produce should, therefore, be pre-cooled to an appropriate temperature prior to being placed in refrigerated storage or transport. However, economic constraints, the volume of production, as well as other considerations will also determine whether produce is actually pre-cooled. Hydro cooling is one of several postharvest cooling methods available to growers, packers, and shippers. To select the best cooling method, it is necessary to understand the basic principles of cooling. The choice of cooling method depends on the following factors.

- ✓ The nature of the product.
- ✓ Product packaging requirements.
- ✓ Product flow capacity.
- ✓ Economic constraints.

- **Key steps of hydro cooling processes are:**
  - ✓ Harvest in the morning when it is cool.
  - ✓ Keep the product out of direct sunlight.
  - ✓ Move the product to the processing facility as soon as possible.
  - ✓ Use water rinses in postharvest handling.
  - ✓ Water used for cooling must be safe and sanitary (pathogen free).
  - ✓ Do not use untreated or not sanitized water (e.g. water from rivers or ponds) for post-harvest treatment.

- ✓ Routinely inspect and maintain all equipment for sanitizing process water (e.g. filters, chlorine injectors).
- ✓ Water sanitation may involve addition of a sanitizing agent such as liquid chlorine or sodium hypochlorite.
- ✓ Change water in product holding tanks or hydro coolers frequently.
- ✓ Filter or change water used for washing frequently and prevent saturation with organic solids from the soil.
- ✓ Clean and sanitize all water contact surfaces regularly.

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Choose your best answer from the given multiple choices

1. Which of the following is not considered when choosing of cooling method (4 point)
   A. The nature of the product.
   B. Product packaging requirements.
   C. Product flow capacity.
   D. Economic constraints.
   E. none of the above

Test II: Short Answer Questions

1. What are the key steps of hydro cooling process? (5 point)
2. Write down the benefit of cooling fresh produce? (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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____
3. _____

Information Sheet 2- Identify Impact of timing and temperature

2.1. Effects of temperature and time

Perishable crops show a wide range of temperature tolerance but are often particularly vulnerable to injury when exposed to extremes of temperature. When using a hydro-coolers you must pay attention to the rate of cooling. Which will depend on:

- ✓ incoming produce temperature
- ✓ water temperature
- ✓ flow rate of water
- ✓ the type of containers used

Begin by taking temperature measurements by temperature probe. Then you can adjust the rate of produce flow for continuous flow type or the time you leave containers inside hydro-coolers.

- ✓ Small diameter produce such as **asparagus and radishes** will typically be cooled in less than 10 minutes
- ✓ medium sized produce such as **peaches and apples** will take about 20-25 minutes
- ✓ while large diameter produce such as melons can take one hour.
- ✓ While cooling is very important, care must be taken to avoid chilling injury in sensitive crops.
- ✓ **Chilling injury:** occurs when crops are stored or transported at temperatures lower than those recommended for proper postharvest handling.
- ✓ Tropical and subtropical produce is especially sensitive, and chilling injury can be seen regularly in tomatoes, papers and cucumbers.

- **Common visual symptoms**

- ✓ Surface lesions (pitting, large sunken areas and discoloration)

- ✓ Water soaking (disruption of cell structure and accompanying release of substrate favors the growth of microorganisms)
- ✓ Internal discoloration of the pulp
- ✓ Failure to ripen in the expected pattern
- ✓ Accelerated rate of senescence
- ✓ Increased susceptibility to decay
- ✓ Compositional changes
- ✓ Many fruit and vegetable crops are susceptible to chilling injury when cooled below 13 to 16 °C (55 to 60 ^{O}F).
- ✓ Chilling injury reduces the quality of the product and shorten shelf life.
- ✓ Make sure you don't over cool sensitive produce.

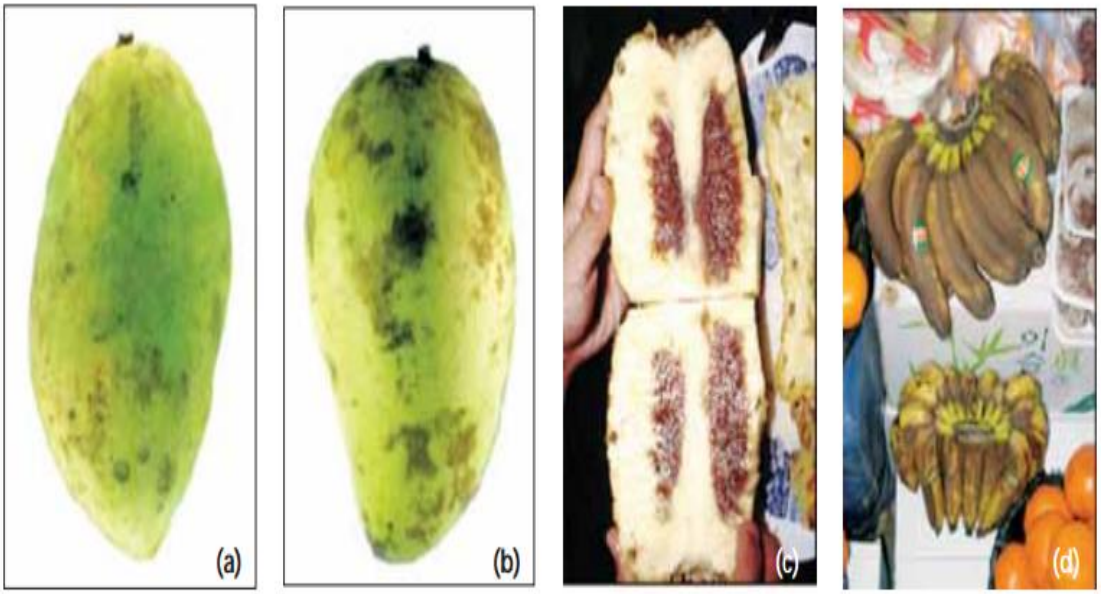

Figure 2.1. Chilling injury in (a and b) mango (peel pitting and browning), (c) pineapple (pulp browning), and (d) banana (peel browning)

Self-check 2	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Choose your best answer from the given multiple choices

1. Which one of the following is the symptom of chilling injury (3 point)
   A. Surface lesions
   B. Internal discoloration of the pulp
   C. Failure to ripen
   D. Accelerated rate of senescence
   E. Increased susceptibility to decay
   F. all

Test I: Short Answer Questions

1. What is chilling injury? (5 point)
2. What are the impact of time and temperature on produce?(3)
3. Methods of protecting product from temperature caused damage (5 point)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

Information Sheet 3- Identify produce for hydro-cooling and confirming requirements

3.1. Best Produce for Hydro cooling

There are many types of fruits and vegetables that respond particularly well to hydro cooling. Produce items that have a large volume in relationship to their surface area. These include:

- ✓ Apricots
- ✓ Peaches
- ✓ Plums
- ✓ Nectarines
- ✓ Cantaloupe
- ✓ Apples
- ✓ Pears
- ✓ Cherries
- ✓ Spinach
- ✓ Lettuce
- ✓ Endive and other greens
- ✓ Leeks and Green Onions
- ✓ Asparagus

Foods that should not be hydro cooled include those that are highly susceptible to wetting such as:

- ✓ berries
- ✓ potatoes
- ✓ garlic.
- ✓ citrus fruits
- ✓ mushrooms
- ✓ grapes

- **Requirements**
  - ✓ The commodity must be resistant to water damage and tolerant to wetting.
  - ✓ For sensitive commodities such as leafy vegetables, the drop height of water should not exceed 20 cm.
  - ✓ Water-resistant containers with sufficient drain holes, e.g. plastic crates, waxed fibreboard cartons.

- ✓ Chlorinated water (150-200 ppm active chlorine) must be used for cooling to minimize the spread of disease.
- ✓ Strict maintenance of the cool chain (wet produce deteriorates faster at high temperatures).

Self-check 3	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below

Test I: Choose your best answer from the given multiple choices

1. **Which one of the following could not hydro cooling product**
   A. berries
   B. potatoes
   C. citrus fruits
   D. mushrooms
   E. grapes
   F. all

Test II: Short Answer Questions

1. What is requirements for hydro cooling?(5 point)
2. What types of produce cooled by hydro cooling? (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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

Information Sheet 4- Identifying consequences of incorrect hydro-cooling

4.1. Inappropriate hydro-cooling

- ✓ causes accumulation of decay causing micro-organisms
- ✓ Produce dehydration of the product (i.e.. high speed of cooling air)
- ✓ Tissue damage –i.e. as result of inappropriate packing
- ✓ Produce quality decay caused by sensitivity of the product to water exposition.
- ✓ Accelerate quality decay by accumulation of water in some areas of the product (between leaves and calyx)

- Therefore, proper cooling is essential for almost any type of produce in order to:
  - ✓ Suppress enzymatic degradation and respiratory activity (softening)
  - ✓ Slow or inhibit water loss (wilting)
  - ✓ Slow or inhibit the growth of decay-producing microorganisms (molds and bacteria)
  - ✓ Reduce production of ethylene (a ripening agent) or minimize the product's reaction to ethylene
  - ✓ Keeps fruits and vegetables fresher for longer, decreasing the urgency to sell and improving overall quality once it is purchased

Self-check 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Choose your best answer from the given multiple choices

1. Which one of the following not the essential of proper hydro cooling (4 point)

   B. Suppress enzymatic degradation
   C. Slow or inhibit water loss (wilting)
   D. Slow or inhibit the growth of microorganism
   E. Reduce production of ethylene
   F. Keeps fruits and vegetables fresher for longer

Test II: Short Answer Questions

1. What is the advantage of hydro cooling (5 point)
2. What is the impact of incorrect hydro cooling (5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

Information Sheet 5- Check and adjusting equipment performance

5.1. Inspecting and checking condition of equipment

- ✓ All equipment to be used in processing or preserving foods must be inspected and checked to determine their condition prior to use and even after using them.
- ✓ Before they are to be stowed or kept after use, they must be inspected and checked to make sure they are in good condition and ready for use in the next processing operation.
- ✓ Inspecting and checking the equipment after use will help determine the presence of damaged or defective parts that need to be repaired or replaced.
- ✓ Inspecting and checking the equipment will also help determine the presence of equipment that breakdown and cannot be used in the next processing operation.
- ✓ Inspecting and checking the equipment before, during and after using them will also help in effectively planning and efficiently carrying out trouble shooting and preventive maintenance activities which include checking the following:
- ✓ **Machine temperature** – this is checked to avoid overheating
- ✓ Hydraulic fluid–this must be checked to guarantee that the equipment which is operated by water or other liquids moving through pipes under pressure will function well
- ✓ **Check surface condition**– this is being checked to make sure no machine parts are deteriorating or defective due to everyday use
- ✓ **Leak detection**–this is checked to prevent accidental release of gas, water, oil, etc. from the machine

- ✓ **Corrosion**–this is checked to minimize wear and tear of parts by washing, drying and lubricating machine parts.
- ✓ Repair or discard damaged containers and handling boxes;
- ✓ Do not use fresh produce boxes and containers for other items, such as tools, lunch or combustibles;
- ✓ Use separate containers (by specific labelling or colouring) for transport of produce before and after washing

Self-check 5	**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. Inspecting and checking the equipment before and after using them will help in effectively planning and efficiently carrying out trouble shooting **(5 point)**

Test II: Choose your best answer from the given multiple choices

1. **Which of the following statement is wrong (5 point)**
   A. All equipment to be used in processing or preserving foods must be inspected and checked to determine their condition prior to use and even after using.
   B. Inspecting and checking the equipment after use will help to determine the presence of damaged or defective parts.
   C. Machine temperature is checked to avoid overheating before using machine
   D. Leak detection is checked to prevent accidental release of gas before using machine
   E. None of the above

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

2. _____

Information Sheet 6- Carry out pre-start checks

6.1. Equipment start up and operation procedures

Undertaking a pre-start check on your equipment before you start a day's work, happens in three steps.

Step 1 - Visual inspections of important features prior to starting the equipment

Step 2 - Visual and function tests while the equipment is turned on

Step 3 - Testing the equipment functions

- ✓ As part of your daily routine you should check the various systems and equipment you will use during the day and make sure it is in correct working order. You may need to perform this checking procedure at the beginning of your working day or at specified intervals during the day.
- ✓ To ensure equipment is not damaged on start-up and also to prevent possible injury to personnel during start up, the operational status of safety systems must be checked.
- ✓ Ensure that equipment is properly ventilated. Most machines can get very hot and need to have a proper airflow around them to avoid damage.
- ✓ Start equipment in accordance with the organizations or manufacture's guidelines.
- ✓ Use safety guards or safety clothing (if applicable). Some equipment can have areas that can cause injury such as cutting blades and overheated areas. They will generally have safety guards or may require safety clothing (such as eye or ear protection) to be worn.

- ✓ Your workplace policies and procedures should include detailed information on how to clean, start and operate machinery.
- ✓ You should receive training in the safe operation of this machinery and equipment.
- ✓ You will be required to wear appropriate PPE including goggles, gloves, hairnets, safety boots or shoe covers. It is your responsibility to ensure you wear the PPE correctly.

Self-check 6	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. Visual inspections is important features prior to starting the equipment (4 point)

Test II: Short Answer Questions

1. What are the three steps undertaking before a pre-start check? (5 point)
2. What are the importance of pre start check?(5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

Information Sheet 7- Locate goods in correct storage areas

7.1. Food storage

Safe food handling requirements in relation to food storage include:

- ✓ Use food grade materials to store food susceptible to contamination–**stainless steel** is preferred
- ✓ Cover food to protect it from contamination
- ✓ Rotate stock to ensure it is used in the correct sequence
- ✓ Keep all storage areas and equipment clean
- ✓ Never store food (including packaged food) directly on the floor.
- ✓ Put cartons on pallets, shelves, trolleys or in 'bins'
- ✓ Ensure pests and rodents are excluded from food storage areas.
- ✓ Conduct a regular (at least weekly) inspection to check this, and take appropriate action when evidence of pests or rodents is discovered.

Storage of food has special importance due to the need to maintain the safety of the food. There are 3 basic food storage methods:

1. Dry goods storage
2. Refrigerated goods storage
3. Frozen goods storage

2. Dry goods store

The dry goods store is a non-refrigerated store where canned and dried food is kept.

- ✓ The area is fly and vermin-proof to minimise contamination by pests
- ✓ It is well ventilated and deter pests and to allow staff to see what they are doing and identify spillages, infestation and problems
- ✓ It is never overstocked – excess stock costs money (that is, increases the chance of stock needing to be paid before it is used or sold)
- ✓ It is fitted with doors making a proper fit when fully closed to help exclude pests
- ✓ The lowest shelf is sufficiently far enough above floor level (250mm) to enable air circulation around produce
- ✓ Bulk food containers used are made from food grade materials and have tight-fitting lids.
- ✓ Plastic garbage bins are not permitted to be used for food storage as they are liable to splitting, do not have a smooth internal surface to facilitate cleaning and do not protect against mice and rats
- ✓ Food storage containers are cleaned and sanitised before being re-used or re-filled.

Figure 7.1. Dry food storage

3. Refrigerated goods store

- ✓ Refrigerated storage is used for fruit and vegetables, dairy products, meat and all other potentially hazardous foods.
- ✓ Refrigerated storage may occur in cool rooms, under counter refrigeration units or domestic refrigerators.
- ✓ The temperature is kept at 5°C or below and this temperature is checked with an independent, calibrated thermometer at least once per day

- ✓ The maximum time high risk foods should be stored at 5°C or below is 7 days. Food should be eaten within this time or discarded. Where the temperature is 3°C or less, this time could extend beyond 7 days
- ✓ The cool room or refrigerator door is closed between uses and an effort made to minimise opening times by planning these openings. An open door raises the temperature and makes the unit more expensive to operate as well as potentially jeopardising food safety
- ✓ The cool room/refrigerator is not overcrowded to enable air to circulate freely around food items
- ✓ Food loads put into the cool room/refrigerator are broken down into smaller units to enable faster cooling. Where large units of food are placed in the refrigerator it takes longer for the core of the food fall out of the Temperature Danger Zone (5˚C - 60˚C)
- ✓ All food is covered and protected from contamination using, for example, plastic film with a label attached to identify the food and the date/time it was placed under refrigeration
- ✓ Potentially hazardous raw food is separated from cooked and/or ready-to-eat foods – this is to prevent cross contamination. Never store potentially hazardous raw food above cooked and/or ready-to-eat foods as there is the potential for raw blood and raw juice to drip down on to the food below.

Figure 7.2. Refrigerated food storage

4. Frozen storage

Every time the freezer is used, it should be standard practice to visually check the temperature and notify management where there is a problem.

- ✓ Food is kept hard frozen. The recommended temperature range is -15˚C to -18˚C
- ✓ Hot food is never frozen – cool it first
- ✓ Freezers are defrosted regularly to maintain operating effectiveness and encourage use or disposal of items in the freezer for some time
- ✓ Freezer doors are kept closed when the freezer is not in use
- ✓ Freezer temperature is be checked at least daily to ensure correct temperature
- ✓ Large amounts of food are not frozen as this encourages others to defrost the item and then re-freeze it

Self-check 7	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Choose your best answer from the given multiple choices

2. which on the following is true regarding of refrigerated food storage (4 point)
   A. Food stored in the temperature range -15˚C to -18˚C
   B. Food stored in the temperature range at 5°C or below
   C. Food stored in the temperature range at 5° to 60 ^{o}C
   D. None of the above

Test II: Short Answer Questions

1. What are the 3 basic food storage methods? (5 point)

2. What are the Safe food handling requirements in relation to food storage?(5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

Information Sheet 8- Record stores information

8.1. General record requirements

Information is recorded in a manner that represents an accurate history of the product or process.

- ✓ The records are legible, permanent and accurately reflect the actual events, conditions or activities.
- ✓ Errors or changes are identified so that the original record remains clear (e.g., strike out with a single stroke and initial the correction/change).
- ✓ Each entry on a record is made by the person in the position of responsibility at the time that the specific event occurred.
- ✓ The completed records are signed and dated by the person in the position of responsibility.
- ✓ The records are retained for at least one year after the best before date on the label or container.
- ✓ The records are maintained and are available upon request.
- ✓ Records are necessary to verify that factors significant to food safety
- ✓ The records are available upon request to verify that reliable procedures have been followed in designing the process.

- **Incoming material control records**

- Appropriate records are kept to demonstrate that incoming lots of raw vegetables and other ingredients were inspected for signs of contamination and adherence to written specifications.
- The manufacturer has records to:

  - ✓ identify the material;
  - ✓ identify the deficiency; and,
  - ✓ specify the preventive and corrective action taken.

- **Process control records**

✓ Records the control of biological, chemical and physical hazards
✓ Records the control of the initial wash to ensure the effective removal of soil and the reduction of initial microbial load.
✓ Records the steps to minimize contamination with biological and physical hazards such as pathogens and metal

- **Product Temperature during Storage**

✓ Records the control of product temperature during storage.
✓ Daily records of temperatures in all refrigeration facilities are maintained.

- **Deviation and Corrective Action Records:** Deviation records include information such as:

✓ the product and code
✓ the date when the product was manufactured, held, released or destroyed;
✓ the amount of product held, e.g., back to the point where the process was last in control

- ✓ the results of the evaluation/sort, e.g., amount analysed, analysis report of the number and nature of defects
- ✓ the disposition of the held product, e.g., amount sorted, destroyed or returned to the supplier, employee sales, distress or salvage, reconditioning and retail sales
- ✓ the signature of personnel responsible for the hold and evaluation;
- ✓ the signed authorization for disposition.

- **Corrective action records:** include information such as:

- ✓ the cause of the deviation identified
- ✓ the corrective action taken to correct the deficiency
- ✓ the follow-up/assessment related to the effectiveness of the corrective action
- ✓ the preventive measures taken to prevent a recurrence
- ✓ the date corrective action was taken and verified
- ✓ the signature of the person in the position of responsibility.

- **Maintenance Records**

- ✓ Includes an identification of the equipment/instrumentation, the maintenance activity, the date of maintenance, the name of the person in the position of responsibility and the reason for the activity.

- **Calibration Records**

- ✓ Includes an identification of the equipment/instrumentation, the date of calibration, the name of the person in the position of responsibility, the calibration results and corrective actions.

- **Distribution Records**

- ✓ Product distribution records are available to enable the manufacturer to recall any lot of food in a timely fashion.

  - ✓ the product identification and size;
  - ✓ the lot number or code;
  - ✓ the quantity; and,

- ✓ the name and type

Self-check 8	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What are the purpose of store information record? (5 point)
2. what types of information recorded during distribution ?(5 point)
3. what types of information recorded during corrective action(4 point)

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

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

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

LG #23	LO #2- Conduct hydro-cooling

Instruction sheet

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

- Checking and confirming storage facility
- Using handling equipment to transfer produce
- Setting operating parameters for hydro-cooling equipment
- Applying hydro-cooling
- Transferring produce to storage
- Recording process information
- Maintaining work area
- Conducting work

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:

- Check storage facility for readiness and allocation of space for produce
- Transfer produce in a manner that is safe and maintains produce quality
- Set operating parameters for hydro-cooling equipment to meet safety and cooling requirements
- Apply hydro-cooling to produce according to cooling requirements
- Transfer produce to storage according to workplace procedures
- Record process information in required format
- Maintain work area according to workplace standards, food safety and work health and safety requirements

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4. Accomplish the “Self-checks” which are placed following all information sheets.
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Information Sheet 1- Check and confirming storage facility

1.1. Inspection of stock and storage areas

The process of inspecting stock and storage areas must include the following practices:

- **Visual inspections**: require you to look at:
  - ✓ Floors, walls and ceilings,
  - ✓ Shelves, bins and storage containers
  - ✓ Individual stock items
- **Identifying stock approaching ‘’use by’’** or **‘’best before date’’** so it can be used, promoted or returned before it is ‘’too late"
  - ✓ Adhering to internal inspection protocols. Some venues have:
  - ✓ Inspection schedules detailing when to inspect and what items or areas to inspect
  - ✓ Checking stock quality. This is a constant requirement for every inspection and must become part of what you do every time you handle any item in storage
  - ✓ Checking for signs of pest infestation.
  - ✓ Signs of physical damage to the storage area itself
  - ✓ Damage or degradation of stock items

- ✓ Evidence of the presence of vermin such as droppings
- ✓ Ensuring stock is aligned with designated storage areas
- ✓ Making sure stock is placed where it should be.

- **When should I inspect?**

- ✓ Inspection needs to be an on-going activity.
- ✓ Several opportunities for inspecting or checking stock exist.
- ✓ Stock can be checked for quality at the same time you perform the following:
- ✓ Checking stock levels when ordering stock
- ✓ Placing new items into stock
- ✓ Checking use-by/best before dates
- ✓ Taking items out of storage for issuing to departments

- **Follow-up action**

- ✓ If your inspections determine items need to be thrown out, make sure you complete the necessary internal paperwork to notify management what has happened to the items.
- ✓ This allows them to factor in this loss to their calculations of departmental financial performances, and may:
- ✓ Allow them to initiate some claim for the products lost against insurance or suppliers
- ✓ Indicate to them a need for training or a revision to SOPs to prevent a recurrence of the problem.
- ✓ When you need to dispose of stock of unacceptable quality you should also:
- ✓ Notify the person/department using those items so they can decide if more stock needs to be ordered.
- ✓ Never just throw stock out without notifying anyone Consider if the stock can be converted for use somewhere else in the property to prevent the organisation suffering a total loss.
- ✓ For example, note paper intended for guest use may become degraded in storage to the extent it cannot be presented in in-room compendiums but they may still be perfectly acceptable as note pads for staff use.

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What is the process of inspecting stock and storage areas must include? (5 point)
2. List the purpose of inspecting stock and storage areas?(5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____
3. _____

Information Sheet 2- Use handling equipment to transfer produce

2.1. Moving stock properly

When moving stock you must match the option you use to the characteristics of the stock to be moved. You must therefore take the following factors into account when determining how best to move items/stock:

- **The number of items to be moved**
- **The nature of the item to be moved**, taking into account factors such as:
  - ✓ Size/dimensions of the item/load
  - ✓ Whether it is hot or cold
  - ✓ How it is carried
  - ✓ The distance the item has to be moved
  - ✓ The travelling also taking into account such as:
  - ✓ Do you need to go outside?
  - ✓ Will you need to go up or down steps or stairs?
  - ✓ Is the entire floor surface flat or will there be uneven parts or slip, trip and/or fall hazards?

- ✓ Follow house procedures and all internal requirements as specified by the venue
- ✓ Use common sense. Refuse to move anything you believe poses a risk/hazard to your personal health/safety
- ✓ Take a little extra time to make sure you do not get injured and stock does not get damaged

- Relocate food items to food storage areas in a timely as soon as possible/immediately to guard against food safety issues and contamination.

- Using **trolleys** to move stock. There are many different types available, such as:
  - ✓ Two-wheel trolleys
  - ✓ Stair-climbing trolleys
  - ✓ Four-wheel flatbed trolleys
  - ✓ Four-wheel trolleys with multiple shelves
  - ✓ Trolleys with hard wheels or pneumatic tires

Figure 2.1. Two wheel Trolley

- **Carrying items by hand :** Reloading stock into another **vehicle to transport** to another location
- **Using pallet jacks (or forklifts)** to move pallets of stock. Ensure fork lift operators have a current licence

where the law requires them to be licensed.

Figure 2.2. Hand transport

Safety issues when moving stock

Manual handling**:** When handling or moving stock it is vital appropriate OHS skills are applied –these relate to manual handling activities including:

- ✓ Lifting of stock, cartons, boxes
- ✓ Carrying items from storage areas to trolleys,
- ✓ moving stock from place to place
- ✓ Pulling boxes and cartons forward in storage areas
- ✓ Pushing trolleys

- **Safe working practices**
  - ✓ Ensure there is no overloading of trolleys or transportation equipment
  - ✓ If you elect to physically pick up and carry light items you are strongly cautioned:
  - ✓ Not to overload yourself. Make two trips rather than trying to carry or move everything at once
  - ✓ Not to carry any item causes you to overstretch, or which places a strain on any part of your body
  - ✓ Determine the characteristics of the package/item before attempting a carry or lift. Every carry or lift must be judged on its individual attributes
  - ✓ Use designated internal transportation equipment and systems to move stock. For example, your workplace may require:
  - ✓ A keg mover to be used when moving barrels of beer

- ✓ A flatbed trolley to be used when moving linen and drums of chemicals
- ✓ A gas bottle trolley to be used when moving cylinders of gas
- ✓ Use of a conveyor roller when moving cartons from delivery to central store
- Wear protective clothing as appropriate for the item and/or situation. This may mean wearing:
  - ✓ Thermal clothing –cold suits when working in a freezer or cool room
  - ✓ Gloves or gauntlets to protect hands
  - ✓ Protective/steel-capped boots
  - ✓ Protective aprons

- **Safely use trolleys:** When using trolleys to move stock:
  - ✓ Never overload a trolley. Make two trips rather than an overloaded single trip; obtain a bigger trolley
  - ✓ Place heaviest items on the bottom of the trolley. This helps avoid the trolley overturning and reduces the risk of the item falling off the trolley

Figure 2.3. Four wheel trolley

- ✓ **Always push the trolley**. This means you will be walking forward so you can see where you are going: **Never pull the trolley**
- ✓ Never use a damaged trolley such as a trolley with a jammed wheel, or one with shelves with jagged edges

- ✓ Select the right trolley for the job. Different trolleys are suited to different tasks so ensure the best option is used.

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 (2 point each)

1. Always push the trolley never pull the trolley
2. Overloading of trolleys or transportation equipment is very important

Test II Short Answer Questions

1. What are the factors considered when item to be moved from one place to other place? (5 point)
2. List equipment used to handle food?(5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____

Information Sheet 3- Set operating parameters for hydro-cooling equipment

3.1. Parameters for hydro-cooling equipment

Efficiency Hydro cooling: efficiency is reduced by heat gain to the water from surrounding air. Other heat sources that reduce effectiveness include solar loads, radiation from hot surfaces, and conduction from the surroundings. Protection from these sources enhances efficiency. Energy can also be lost if a hydro cooler operates at less than full capacity or intermittently, or if more water than necessary issued.

To increase hydro cooler energy efficiency, consider the following factors during design and operation.

- ✓ Insulate all refrigerated surfaces and protect the hydro cooler from wind and direct sunlight.
- ✓ Use plastic strip curtains on both the inlet and outlet of conveyor hydro coolers to reduce infiltration heat gain.
- ✓ Operate the hydro cooler at maximum capacity.

Consider using thermal storage, in which chilled water or ice is produced and stored during periods of low energy demand and is subsequently used along with mechanical refrigeration to chill hydro cooling water during periods of peak energy demand.

Thermal storage reduces the size of the required refrigeration equipment and may decrease energy costs.

Use an appropriately sized water reservoir. Because energy is wasted when hydro cooling water is discarded after operation, this waste can be minimized by not using an oversized water reservoir. On the other hand, it may be difficult to maintain consistent hydro-cooling water temperature and flow rate with an under sized water reservoir.

Self-check 3	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What are considered to increase hydro cooler energy efficiency? (4 point)
2. Important considerations for Hydro cooling?(5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

2. _____

Information Sheet 4- Apply hydro-cooling

4.1. Hydro cooling

The use of cold water is an old and effective cooling method as the water is better heat transfer medium than air, consequently the rate of cooling is faster than forced air ventilation method.

The hydro cooling is normally carried out in two ways i.e., **shower and immersion type,** in **shower cooling** method water is flooded or drenched on the product that is agitated in bath by chilled water where the time of shower depends on the size of the product ranging from 10 minute to 60 minute.

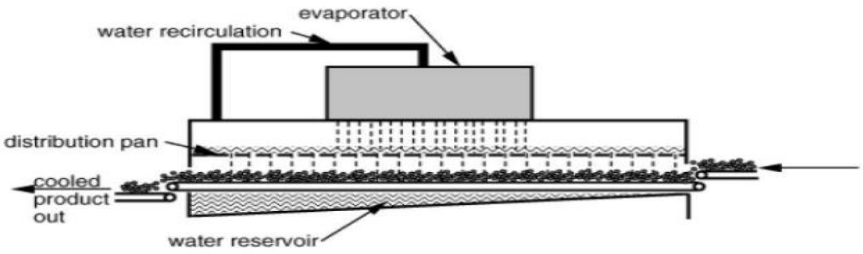

Figure 4.1. Cut-away side view of a continuous-flow shower hydro cooler

In **immersion** cooling time is longer because the water speeds past produce is slower in the immersion bath where the produce is agitated. This method of cooling does not have any moisture loss and can rehydrate slightly wilted produce. In latter case for uniform cooling the produce must be arranged in thin layer. Fairly this method is energy efficient and least expensive cooling method to purchase.

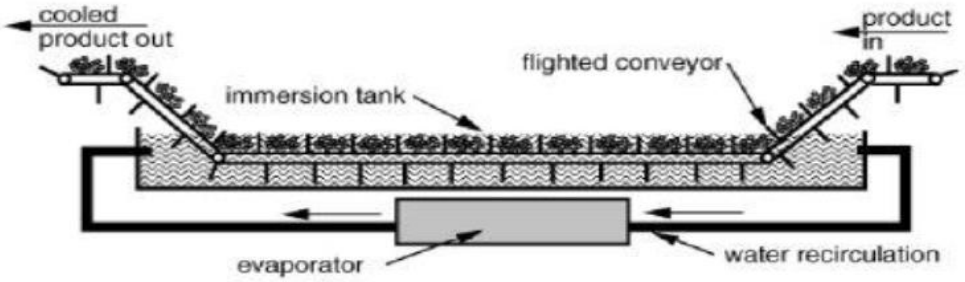

Figure 2. Cut-away side view of a continuous-flow immersion hydro cooler

Self-check 4	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What are the types of hydro cooling? (4 point)
2. Important Considerations for Hydro cooling?(5)
3. What is hydro cooling?(5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____
3. _____

Information Sheet 5- Transfer produce to storage

5.1. Move stock to the required operational area

- Once stock has been received, it must be transported to the appropriate **storage or operational area**, as required.
- All items should be transported safely and without damage.
- **Why does stock need to be moved promptly? Stock should be safely moved from the delivery area in order to:**
  - ✓ Allow space for further incoming items to be unloaded.

- ✓ Remove potential hazards.
- ✓ Minimise the chance of theft.
- ✓ Reduce the damage of products.
- ✓ Eliminate confusion regarding stock checks and counts.
- ✓ Maintain the safety of food.

- **Operational areas**
  - ✓ The operational area to which stock and deliveries may need to be moved
  - ✓ Covers storage areas and departments and working areas
- **Storage areas:** Storage areas to which stock may need to be transported can include:
  - ✓ Dry goods store for food
  - ✓ Refrigerated storage areas such as cool rooms and refrigerators
  - ✓ Frozen food storage areas: walk-in freezers, domestic freezers.
  - ✓ Beverage storage areas: for alcoholic and non-alcoholic products which may include:
    - ✓ Refrigerators
    - ✓ Cool rooms
    - ✓ Dry goods store

- **Working areas:** Working areas to which stock may need to be transported can include:
  - ✓ Kitchen
  - ✓ Bar
  - ✓ Housekeeping
  - ✓ Retail outlets and shops

Load stock into storage units

Stock must be placed in to the designated storage areas and may need to be loaded into appropriate storage units.

Storage units may include:

- ✓ Shelves
- ✓ Bins
- ✓ Specially provided storage containers.

When loading stock into storage units:

- ✓ Rotate stock: place new stock at the bottom and move existing stock to the top
- ✓ Check container is clean: clean it where necessary
- ✓ Verify integrity of container: replace or repair if damaged
- ✓ Ensure lid makes a tight fit: storage containers are usually supplied with a lid intended to make a tight fit.

Self-check 5	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. Why does stock need to be moved promptly? (4 point)
2. Factors into account when determining how best to move items/stock?(5)
3. What are the 3 basic food storage methods?(5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____
3. _____

Information Sheet 6- Record process information

6.1. Record Keeping

There are four sets of records that should be kept by the fruit and vegetable processer:

- ✓ Financial records
- ✓ Production records
- ✓ Quality assurance records
- ✓ Sales records.

- The processor must understand why the information is collected and what it can be used for.
- Processors should also put in place a system of checks to ensure that one person does not have responsibility for a whole area of record keeping.

Table 6.1. Types of records for fruit and vegetable processing business

Type of record	Information to be recorded
Production records	Raw materials and ingredients received and suppliers Wastage % at different stages of the process Stock levels for each ingredient Production volumes and measurements Maintenance programs and schedules
Quality assurance records	Target amounts of ingredients and any changes made to recipe Measurements made at process control points Batch numbers and product code numbers Cleaning procedures and schedules
Sales records	Names of customers and amounts sold to each Weekly and monthly sales volumes
Financial records	Income from sales Costs of all process inputs Cash flow, Profit/loss, Tax records and Bank statements

Self-check 6	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What are the four sets of records that should be kept by the fruit and vegetable processer? (4 point)
2. What types information record in quality assurance in ?(5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

Information Sheet 7- Maintain work area

7.1. **Maintaining work area according to housekeeping standards**

- ✓ Good housekeeping is the foundation of a safe, healthy and pleasant workplace.
- ✓ It is essential that all areas be kept clean, orderly, and with all necessary things in the proper places.
- ✓ Employees should be aware of hazards arising from poor housekeeping.
- ✓ Good housekeeping improves safety, efficiency and quality at the same time.

- **Housekeeping Guidelines**

- ✓ Keep work areas neat and clean.

- ✓ Place tools, equipment and supplies in their correct places.
- ✓ Implementing cleaning schedules for the area
- ✓ Removing wrapping and packaging waste
- ✓ Storing all product as soon as possible after delivery to:
- ✓ Remove potential hazards
- ✓ Keep the area clear for future deliveries
- ✓ Keeping stores area well and ventilated to deter pests and allow for easy identification of product items and problem issues
- ✓ Keeping shelves, benches, pallets, bins and other storage containers in good order and inspecting the area and fittings on a regular basis for signs of damage or deterioration or other problems such as stability, security and pest infestation
- ✓ Maintaining all equipment and storage areas in accordance with the relevant occupational health and safety requirements.
- ✓ Checking the temperature of refrigerated food storage areas
- ✓ Initiating preventative maintenance servicing for plant and equipment in the stores area before servicing them
- ✓ Developing and implementing a proper cleaning schedule for the stores areas including ensuring supplies of all necessary chemicals and equipment exist to get the job done

Self-check 7	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What is good housekeeping? (5 point)
2. What are housekeeping guideline?(5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

Information Sheet 8- Conducting work

8.1. Conduct work in accordance with environmental policies and procedures

The maintenance of cleanliness in a working area requires frequent or continuous cleaning as well as a clean-up at the end of each day. The purpose of this is to keep waste from accumulating during the operating day. It involves:

- ✓ careful organization
- ✓ training work scheduling and
- ✓ the best available equipment
- ✓ method and materials.

Hazard Analysis Critical Control Point (HACCP)

- HACCP allows processors/regulator to look at what happens during the process to ensure safety.
- Major Concepts of HACCP
  1. A preventive system of control particularly on biological hazards
  2. A system approach for estimating the risk in producing a food product
  3. Universally recognized system as the most effective way to prevent food borne illness
  4. Science - based systematic, identified specific hazards and measures for their control to ensure food safety
  5. Capable of accommodating change, such as advances in equipment design, processing procedures, or technological developments that can be applied throughout the food chain from the primary producer to the final consumer
  6. Applicable to establishments that produce, process, treat, pack, trade, transport, serve, or involve in food production

Seven (7) HACCP Principles

1. Hazard analysis
2. Identify critical control points
3. Establish Control limits
4. Monitor critical limits
5. Establish corrective actions in case of deviation from established critical limits
6. Establish verification procedure to ensure that the system is consistent
7. Establish record keeping procedures

General Hazards Characteristics

- ✓ The product contains sensitive ingredients, which can be assumed as potential sources of contamination under normal circumstances.
- ✓ The manufacturing process does not contain controlled processing steps that effectively destroy harmful bacteria.
- ✓ There is substantial potential for microbiological abuse in distribution or in consumer handling that could render the product harmful when consumed.
- ✓ Product is subject to contamination after processing and before packaging.

- ✓ No terminal heat process after packaging.

HACCP Pre-Requisite Programs

1. Good Manufacturing Practices (GMP)

This provides the sanitary infrastructure for Food Safety that the:

- ✓ Plant grounds and building facilities emphasize pest control;
- ✓ Equipment design provides ease in cleaning and maintenance;
- ✓ Personal hygiene practices and facilities are set;
- ✓ Storage and warehousing are free from contamination.

2. Sanitation Standard Operating Procedures (SSOP): SSOP are components of GMP that emphasize sanitation procedure. They include:

- ✓ Safety of water that gets in contact with food and food 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 8	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What is HACCP? (4 point)
2. What are the 7 principle of HACCP?(5)
3. What are Sanitation Standard Operating Procedures (SSOP) include?(5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

LG #24	LO #3- Monitor hydro-cooling process

Instruction sheet
This learning guide is developed to provide you the necessary information regarding the following content coverage and topics: • Monitoring process to ensure quality standards • Checking temperature • Identifying problems and acting upon 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 process to ensure quality standards • Check temperature to ensure required levels are maintained

- Identify and act on non-compliance issues or problems

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 process to ensure quality standards

1.1. Standards

Sets of rules that outline specification of dimensions, design of operation, materials and performance, or describe quality of materials, products or systems.

The intent of standards is to provide at least minimum quality, safety or performance specifications so as to ensure relatively uniform products and performance, and to

remove ambiguity as to the suitability of certain commercial products for particular applications. Following standards may reduce the risk of error in working.

Specific quality standards for perishable produce are product appearance, quality, nutritional value, product safety, labelling, packaging, methods of analysis and sampling

Production Process: In production process, checking of quality assurance must be highly considered. Quality assurance covers all activities from design, development, production, installation, servicing and documentation. This introduced the rules: "fit for purpose and do it right the first time". It includes the regulation of the *quality* of raw materials, assemblies, products and components; services related to production; and management, production, and inspection processes

Quality Assurance: Quality assurance refers to assurance given to consumers that the product, parts, components and services which he is buying or investing in contain the promised features or characteristics. Quality Assurance implies that the process used to manufacture a product or deliver a service is tried and tested and it is fit for intended use.

Steps taken to ensure quality assurance: Quality specifications: The specific features are established. Then the product is designed to meet these specifications.

Quality inspections: Testing and inspections are regularly done at every stage of manufacture. Raw materials, parts, equipment and qualified personnel are all selected according to quality guidelines.

Quality evaluation: Follow up and evaluation is done to measure the degree of effectiveness and efficiency of a product.

Self-check 1	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What is the standard? (4 point)
2. What quality assurance?(5)
3. What are the steps taken to ensure quality assurance? (5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____
3. _____

Information Sheet 2- Check temperature

2.1. Temperature measurements

Temperature control is an important factor in determining the quality or shelf-life of a commodity.

An accurate thermometer is necessary where temperature control is an important factor in determining the quality or shelf life of a commodity. Temperature monitoring of cold storage rooms is important to ensure that the actual air temperature corresponds to the set point temperature.

Thermometers may also be used to check water temperature in hot water tanks used for heat treating fruit. Temperature readings can be checked against the temperature setting to confirm readout of the thermostat. If the temperature reading differs significantly from the set points on the thermostat, then a check of the system may be needed.

Thermometers are particularly important in determining the temperature of wash water, efficiency of cooling systems (pre-cooling and cold storage), and for monitoring disinfection and disinfestation treatments involving heat, among others. Several types of thermometers are available; each type has its own accuracy, precision, ruggedness and temperature range.

Thermocouple wires are available encased in a wide variety of stainless steel sheaths suitable for measuring internal temperatures of different produce. Exposed sensing junctions can be used for measuring air temperature. Gauge-24 wire (0.51 millimetres) should be suitable for most applications; thinner wires may be too fragile for general use.

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 (5 point each)

1. An accurate thermometer is necessary where temperature control is an important factor in determining the quality or shelf life of a commodity
2. Temperature control is not important factor in determining the quality or shelf-life of a commodity

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
2. _____
3. _____

Information Sheet 3- Identify problems and acting upon

3.1. Identifying faults and taking corrective actions

- During process, problems will occur.
- You will need to decide what to do about them.

- ✦ It might be necessary to keep it separate from acceptable products and services.
- ✦ Rework and control of non-conforming products

3.2. Rework and Control of Non-Conforming Products

- ✓ Handling of Rework/Add-back –to be done in such a way to avoid cross contamination during processing, handling and storage.
- ✓ Rework shall be clearly identified and/or labelled to allow traceability.
- ✓ All traceability records for rework shall be maintained. (e.g. Product name, production date, shift, line of origin, shelf-life).
- ✓ Stored rework materials shall be protected from exposure to microbiological, chemical or extraneous matter contamination.
- ✓ All rework should be certified by QA department before reincorporating.
- ✓ The rework classification or the reason for rework designation shall be recorded
- ✓ Where rework is incorporated into a product as an “in-process” step, the acceptable quantity, the process step and method of addition, including any necessary pre-processing stages, shall be defined.
- ✓ Where rework activities involve removing a product from filled or wrapped packages, controls shall be put in place to ensure the removal and segregation of packaging materials and to avoid contamination of the product with extraneous matter.
- ✓ Segregation requirements for rework shall be documented and met.

- **Control on Non – Conformance products**

The organization shall establish and maintain documented procedures that specify appropriate actions to identify and eliminate the cause of

detected nonconformities, to prevent recurrence, and to bring the process or system back into control after non conformity is encountered. These actions include:

- ✓ Reviewing non conformities (including customer complaints),
- ✓ Reviewing trends in monitoring results that may indicate development towards loss of control,
- ✓ Determining the cause(s)of nonconformities
- ✓ Evaluating the need for action to ensure that nonconformities do not recur,
- ✓ Determining and implementing the actions needed,
- ✓ Recording the results of corrective actions taken,
- ✓ Reviewing corrective actions taken to ensure that they are effective.
- ✓ Corrective actions shall be recorded

Self-check 3	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. How to control nonconformance products (5 point)
2. What is the action you should have taken after non conformity is encountered? (5)

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: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

2. _____

AKNOWLEDGEMENT

We wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development of this curriculum.

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Reference

Abbott, J.A., 1999. Quality measurement of fruits and vegetables. Postharvest Biol. Technol., 15:207-225.

Are gloves, goggles or safety glasses clean and in good repair? 29CFR 1910.132 requires that safety equipment be maintained in clean and sanitary condition and that it be used only if in good repair. Broken or dirty equipment raises questions in an inspector's mind and leads to a more intensive inspection

Code of Hygienic Practice for Fresh Fruits and Vegetables, Annex 1 for Ready-to-Eat Fresh Pre-Cut Fruits and Vegetables. WHO/FAO. 2007.

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