

Model Curriculum

Cold Storage Technician

SECTOR: FOOD PROCESSING
**SUB-SECTOR: FRUIT & VEGETABLE, DAIRY PRODUCTS,
MEAT & POULTRY, FISH & SEAFOOD**
OCCUPATION: REFRIGERATION
REF ID: FIC/Q7004, V1.0
NSQF LEVEL: 4



Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

FOOD INDUSTRY CAPACITY AND SKILL INITIATIVE (FICSI)

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: **'Cold Storage Technician'** QP No. **'FIC/Q7004, NSQF Level 4'**

Date of Issuance: 04 September, 2018

Valid up to: 30 June, 2019

* Valid up to the next review date of the Qualification Pack



Authorized Signatory
(Food Industry Capacity and Skill Initiative)

TABLE OF CONTENTS

1. <u>Curriculum</u>	01
2. <u>Trainer Prerequisites</u>	06
3. <u>Annexure: Assessment Criteria</u>	07

Cold Storage Technician

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Cold Storage Technician”, in the “Food Processing” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Cold Storage Technician		
Qualification Pack Name & Reference ID. ID	FIC/Q7004, v1.0		
Version No.	1.0	Version Update Date	04/09/2018
Pre-requisites to Training	Class 12/ Diploma /ITI with certification in refrigeration and 1-3 years in a cold storage unit		
Training Outcomes	After completing this programme, participants will be able to: <ul style="list-style-type: none"> • Prepare work area for cold storage of food product • Handle cold storage facility • Perform documentation and record keeping related to cold storage • Demonstrate the maintenance of hygiene and sanitation related to cold storage of food product 		

This course encompasses 4 out of 4 National Occupational Standards (NOS) of “Cold Storage Technician” Qualification Pack issued by “Food Industry Capacity and Skill Initiative”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	Introduction to Training Program and Overview of Food Processing Industry Theory Duration (hh:mm) 02:00 Practical Duration (hh:mm) 00:00 Corresponding NOS Code Bridge Module	<ul style="list-style-type: none"> Define Food Processing List the various sub sectors of food processing industry List the need for storage of food products List the various methods of food preservation List the advantages of cold storage of food products List the various units within a cold storage plant 	
2	Organizational Standards and Norms Theory Duration (hh:mm) 12:00 Practical Duration (hh:mm) 10:00 Corresponding NOS Code FIC/N7011	<ul style="list-style-type: none"> State the roles and responsibilities of a cold storage technician State how to conduct yourself at the workplace State the personal hygiene and sanitation guidelines State the food safety hygiene standards to follow in a work environment 	Protective Gloves, Head Caps, Lab Coat, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual
3	Prepare and maintain work area and refrigeration equipments Theory Duration (hh:mm) 16:00 Practical Duration (hh:mm) 30:00 Corresponding NOS Code FIC/N7010	<ul style="list-style-type: none"> State the materials and equipment used in the cleaning and maintenance of the work area State the common detergents and sanitizers used in cleaning work area and machineries State the methods of cleaning and sanitization State the different types of maintenance procedures Conduct minor repairs and faults in process machineries Prepare the machines and tools required for production 	Compressor, Condenser, Evaporator, Fans, Sensors, Thermostat, Humidity Meter, Protective Gloves, Head Caps, Lab Coat, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual

Sr. No.	Module	Key Learning Outcomes	Equipment Required
4.	Handle cold storage facility for storing food Theory Duration (hh:mm) 27:00 Practical Duration (hh:mm) 40:00 Corresponding NOS Code FIC/N7011	<ul style="list-style-type: none"> Perform a check if all the machineries are clean and in good working conditions List the various parts of the refrigeration system correctly Demonstrate the installation of refrigeration system Perform a pre startup check Demonstrate the starting up of the refrigeration system Analyze the refrigerant used in the system List the control parameters required like the temperature range, atmosphere, storage time at a given temperature Demonstrate the setting of machines according to control parameters Demonstrate the storing of food products Demonstrate the monitoring of machineries during storage Demonstrate the recording of parameters in storage chart until storage period Inspect, repair/replace refrigeration system and components Maintain the entire system and its components 	Compressor, Condenser, Evaporator, Fans, Sensors, Thermostat, Humidity Meter, Protective Gloves, Head Caps, Lab Coat, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual
5.	Complete documentation and record keeping related to the cold storage facility Theory Duration (hh:mm) 08:00 Practical Duration (hh:mm) 06:00 Corresponding NOS Code FIC/N7012	<ul style="list-style-type: none"> State the need for documenting and maintaining records of raw materials, processes and finished products State the method of documenting and recording the details of raw material to final finished product Demonstrate the process of documenting records of production plan, process parameters, and finished products 	Food Safety Manual, Log Books.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
6.	Food Safety, Hygiene and Sanitation for Storage Theory Duration (hh:mm) 20:00 Practical Duration (hh:mm) 35:00 Corresponding NOS Code FIC/N9003	<ul style="list-style-type: none"> State the importance of safety, hygiene and sanitation in the storage industry Apply personal hygiene practices by using of gloves, hairnet, mask, ear plug, goggles, shoes etc. Inspect raw material, ingredients and finished products to ensure safe food Apply GMP, GHP, HACCP and product recall practices List the various types of hazards Role play of hazard management techniques Analyze the quality of produce by smell, appearance, taste and take measures to prevent spoilage Demonstrate stock rotation based on FEFO/FIFO 	Protective Gloves, Head Caps, Aprons, Safety Goggles, Safety Boots, Mouth Covers, Sanitizer, Food Safety Manual ,Log Books etc.
7.	Professional and Core Skills Theory Duration (hh:mm) 05:30 Practical Duration (hh:mm) 10:30 Corresponding NOS Code Bridge Module	<ul style="list-style-type: none"> Undertake a self-assessment test to identify personal strengths and weaknesses Plan and schedule the work order and manage time effectively to complete the tasks assigned State the importance of decision making Identify potential problems and make sound and timely decision State the importance of listening 	
8.	IT Orientation Theory Duration (hh:mm) 08:00 Practical Duration (hh:mm) 20:00 Corresponding NOS Code FIC/N7012	<ul style="list-style-type: none"> Use the computer keyboard effectively to type Use ERP effectively to record day-to-day activities Use the word processor effectively Use the spreadsheet application effectively Use the computer to document day-to-day activities 	Computer/Laptop
	Total Duration 250:00 Theory Duration 98:30	Unique Equipment Required: Compressor, Condenser, Evaporator, Fans, Sensors, Thermostat, Humidity Meter, Protective Gloves, Head Caps, Lab Coat, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual, Log Books, Computer/Laptop	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Practical Duration 151:30		

Grand Total Course Duration: **250Hours, 0 Minutes**

Recommend OJT Hours: **60Hours, 0 Minutes**

(This syllabus/ curriculum has been approved by SSC: Food Industry Capacity and Skill Initiative)

Trainer Prerequisites for Job role: “Cold Storage Technician” mapped to Qualification Pack: “FIC/Q7004, v1.0”

Sr. No.	Area	Details
1	Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack “FIC/Q7004”, Version 1.0
2	Personal Attributes	An aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training, and pre/post work to ensure competent, employable candidates at the end of the training. Strong communication skills, ability to work as part of a team; a passion for quality and for developing others; well-organized and focused, eager to learn and keep oneself updated with the latest in the mentioned fields.
3	Minimum Educational Qualifications	<ul style="list-style-type: none"> • Diploma/ITI in Refrigeration & Air-Conditioning with 3-4 years of hands on experience in a Cold Storage/Controlled Atmosphere Unit or • B.Sc./B. Tech/BE in Agricultural Engineering/Refrigeration & Air-Conditioning or Food Process Engineering with 2-3 years of hands on experience in a Cold Storage/Controlled Atmosphere Unit or • M.Sc./M. Tech./ME or PG Diploma in Agricultural Engineering/Refrigeration & Air Conditioning or Food Process Engineering with 1-2 years of hand on experience in a Cold Storage/Controlled Atmosphere Unit.
4a	Domain Certification	Certified for Job Role: “Cold Storage Technician” mapped to QP: “FIC/Q7004 v1.0”. Minimum accepted score is 80%
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q0102”. Minimum accepted score is 80 % as per FICSI guidelines.
5	Experience	<ul style="list-style-type: none"> • Diploma/ITI in Refrigeration & Air-Conditioning with 3-4 years of hands on experience in a Cold Storage/Controlled Atmosphere Unit Or • B.Sc./B. Tech/BE in Agricultural Engineering/Refrigeration & Air-Conditioning or Food Process Engineering with 2-3 years of hands on experience in a Cold Storage/Controlled Atmosphere Unit or • M.Sc./M. Tech/ME or PG Diploma in Agricultural Engineering/Refrigeration & Air Conditioning or Food Process Engineering with 1-2 years of hand on experience in a Cold Storage/Controlled Atmosphere Unit.

Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES	
Job Role	Cold Storage Technician
Qualification Pack	FIC/Q7004
Sector Skill Council	Food Processing

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, as well as the selected elective NOS/set of NOS.
OR
4. Assessment will be conducted for all compulsory NOS, as well as the selected optional NOS/set of NOS.
5. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
6. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria
7. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
8. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

		Total Mark	Out Of	Marks Allocation	
				Theory	Skills Practical
1. FIC/N7010: Prepare and maintain work area and refrigeration requirements	PC.1 Clean and maintain the cleanliness of the work area using approved sanitizers and keep it free from dust, waste, flies and pests	100	25	10	15
	PC2. Ensure that the work area is safe and hygienic for food storage		10	3	7
	PC3. Dispose waste materials as per defined SOPs and industry requirements		15	5	10
	PC4. Check the working and performance of all machineries and tools used for the process such as compressor, condenser, evaporator, fans, sensors, thermostat, humidity meter, etc.		15	5	10
	PC5. Clean the equipments and tools used with approved sanitizers following SOP		15	5	10
	PC6. Attend minor repairs/faults of equipments, if required		15	5	10
			100	35	65
2. FIC/N7011: Handle cold storage facility for storing food	PC1. Interpret technical drawings, inspect the location for setting up refrigeration unit, install condensing unit, mount evaporation coil evaporator	100	3	1	2
	PC2. Install piping following industry refrigeration guidelines and applicable codes to ensure proper operation of the refrigeration system, check all wiring connections		3	1	2
	PC3. Calculate the number of temperature sensors required for the cold storage facility, identify location to place the sensors and place in relevant locations within the cold storage facility to obtain precise reading		3	1	2
	PC4. Charge refrigerant from supply tank to compressor determining charging level through weight and sight glass indication		3	1	2
	PC5. Perform pre-start up checks by verifying sufficient refrigerant is charged, electrical connections are tight, wiring and piping are properly routed and secured, compressor mounting bolts are proper, fan motors and mounting brackets are tight, condensing unit base and evaporator coil are properly secured		3	1	2
	PC6 Start the refrigeration system and check the compressor discharge and		3	1	2

		Total Mark	Out Of	Marks Allocation	
				Theory	Skills Practical
	suction pressures to ensure they are in the normal operating range, check the liquid line sight glass for proper refrigerant charge, monitor the compressor oil level and add oil if necessary to maintain required level.				
	PC7. Check the voltage and amperage at the compressor terminals, check the piping and electrical connections for vibration		3	1	2
	PC8. Check fans on the evaporator coil and condensing unit (for air-cooled condenser) to ensure they are operational and turning in the correct direction, check cooling tower (for water-cooled condenser), ensure there is no refrigerant leakage		3	1	2
	PC9. Set the defrost control/timer clock to required time and verify the defrost initiation settings, set temperature control to desired temperature range		3	1	2
	PC10. Check the functioning and performance of sensors and temperature measuring device		3	1	2
	PC11. Read and understand the work order from the supervisor		3	1	2
	PC12. Check all the features of the cold storage facility, operation of the cooling equipment and ensure readiness		3	1	2
	PC13. Calibrate temperature and humidity measuring instruments of the storage facility		3	1	2
	PC14. Receive food for storage, check the quality of product to be stored in cold storage facility through physical parameters, check the packaging of the product		3	1.5	1.5
	PC15. Adjust controls to set storage parameters such as temperature and humidity required for the food of the cold storage room/chamber following the storage parameter chart, check readings to ensure set storage parameters has reached or make required adjustments or set controls in the plc and monitor system (in case of computerized cold storage units)		5	2	3
	PC16. Weigh and check the temperature of food, transfer it to the cold storage		3	1	2

		Total Mark	Out Of	Marks Allocation	
				Theory	Skills Practical
	room and load in the racks either manually or using forklift following sop				
	PC17. Check the temperature in cold storage room between the cartons on a pallet or between packages inside a carton to ensure proper air circulation		3	1	2
	PC18. Observe temperature and humidity and adjusts controls to maintain storage parameters during the entire storage period		3	1	2
	PC19. Check temperature of air and stored food periodically for conformance to specifications and standards		3	1	2
	PC20. Inspect the storage products periodically for decay, mold growth, sprouting, shriveling, etc.		3	1	2
	PC21. Unload stored product immediately after specified storage period and check temperature and weight		3	1	2
	PC22. Check the quality of the food from the storage facility through product temperature, and check for shriveling of agricultural produce, freezer burns, mold growth, deterioration, etc.		3	1.5	1.5
	PC23. Report any malfunction to the supervisor and implement the suggested corrective action immediately		2	1	1
	PC24. Conduct periodic inspection of refrigeration system and components for correct operation, observe operating condition and need for repair or adjustment		3	1	2
	PC25. Detect refrigerant leak through system pressure, temperature, recharge volume liquid level etc, to repair recover refrigerant, inspect, rectify and recharge the refrigerant		3	1	2
	PC26. Identify malfunction of components, dismantle, repair and replace faulty components		3	1	2
	PC27. Reassemble components, test for correct operation, charge system with correct refrigerant, ensure correct operation of the equipment		3	1	2
	PC28. Ensure equipment is running efficiently and the required operating conditions are maintained in the cold store chambers for operational requirements		3	1.5	1.5

		Total Mark	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC29. Ensure periodic maintenance of refrigeration system and components following sop		1	0.5	0.5
	PC30. Check the evaporators for ice accumulation/proper defrosting, wash evaporator coils to remove dust and foreign materials drawn into the fins		2	0.5	1.5
	PC31. Check evaporator and condenser fan blades for fractures, clean the fan blades, replace worn blades and tighten the fan set screws, lubricate fan motors, replace fan motor if required		2	0.5	1.5
	PC32. Check for the operation of defrost controls, ensure defrost heaters are in the correct position for maximum heat transfer to the evaporator coil, check the voltage at each heater terminal and ensure heater terminals are in good condition		2	0.5	1.5
	PC33. Remove foreign materials from the drain pan, check the drain line heater (in case of maintaining freezing temperature)		1	0.5	0.5
	PC34. In compressor unit, replace worn condenser motor, check all electrical components and replace damaged wirings and tighten all electrical connections, check and ensure functioning of pressure controls and safety controls, check oil level, ensure working of solenoid valves, check operation of cold room temperature thermostat and clean condenser periodically		4	1	3
	PC35. Check condition of refrigerant line insulation and replace if necessary, check refrigerant level in the system, ensure no refrigerant leak		3	1	2
			100	35	65
	PC1. Document and maintain records of incoming food to the storage room/facility, types and varieties of food, weight of food, farmer/vendor details, grown area / geographical location, receiving date, label details such as date of manufacture, date of expiry, quality parameters, date of loading in cold storage facility, intended storage period, outgoing date, type of	100	10	6	4

		Total Mark	Out Of	Marks Allocation	
				Theory	Skills Practical
3. FIC/Q7012: Complete documentation and record keeping related to the cold storage facility	packaging, loading pattern, storage location within the cold storage unit, etc. following SOP				
	PC2. Document and maintain records of all outgoing food from the cold storage facility such as type and varieties of food, weight of food, actual storage period, losses from incoming to outgoing period, quality of food during unloading from cold storage unit, packaging condition, etc. following SOP		5	3	2
	PC3. Maintain record of observations (if any) related to storage		5	3	2
	PC4. Load the details in ERP system for future reference		5	3	2
	PC5. Verify the documents and track details in cases of concerns		10	6	4
	PC6. Document and maintain records of parameters such as temperature, relative humidity of the food before loading in the cold storage facility, during storage period and during unloading from the storage facility for each food stored following SOP		15	9	6
	PC7. Document and maintain records of parameters such as temperature, relative humidity of the cold storage room/facility before loading, during storage and during unloading following SOP		10	6	4
	PC8. Maintain record of observations or deviations (if any) related to storage parameters		5	3	2
	PC9. Load the details in erp system for future reference		5	3	2
	PC10. Maintain record on observations or deviations (if any)		5	3	2
	PC11. Document and maintain records of the technical drawings of cold storage room/chamber, refrigeration system and components, electrical lines, etc.		5	3	2
	PC12. Document and maintain records of refrigeration system such as type of refrigeration unit, type of refrigerant, quantity of refrigerant used, cooling system followed, component details such as type of compressor,		7	4	3

		Total Mark	Out Of	Marks Allocation	
				Theory	Skills Practical
	condenser, evaporator, fans etc following sop				
	PC13. Document and maintain records of operating conditions of cold storage room by recording temperature of food and air in the cold storage room/chamber, compressor pressure, ice formation etc		5	3	2
	PC14. Document and maintain records of preventive maintenance, routine checks, inspections, faults identified, repairs, replacements, refrigerant leak, recharge, quantity and kind (new, reused or recycled etc of refrigeration system and components following sop		4	2.5	1.5
	PC15. Maintain record of observations or deviations (if any)		2.5	1.5	1
	PC16. Load the details in ERP system followed by the organisation for future reference		2.5	1.5	1
	PC17. Verify the documents and track details in cases of concerns		1	0.5	0.5
			100	60	40
5. FIC/N9003: Food Safety, hygiene and sanitation for cold storage	PC1. Comply with food safety and hygiene procedures followed in the organization	100	5	2	3
	PC2. Ensure personal hygiene by using of gloves, hairnets, masks, ear plugs, goggles, shoes, etc.		6	1	5
	PC3. Ensure hygienic production of food by inspecting raw materials, ingredients, finished products etc for compliance to physical, chemical and microbiological procedures		5	2	3
	PC4. Pack products in appropriate packaging material, label and store them in designated area free from pests, flies etc.		10	4	6
	PC5. Clean, maintain and monitor food processing equipments periodically, using it only for the specified purpose		5	2	3
	PC6. Use safety equipment such as fire extinguisher, eye wash unit, first aid kit when required		10	4	6
	PC7. Follow housekeeping practices by having designated area for machines/tools		5	2	3
	PC8. Follow industry standards like GMP, HACCP and product recall		10	4	6

		Total Mark	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC9. Attend training on hazard management to understand type of physical, chemical and microbiological hazards		5	1	4
	PC10. Identify, document and report problems such as rodents and pests to management		5	1	4
	PC11. Conduct workplace checklist audit before and after work to ensure safety and hygiene		5	1	4
	PC12. Document and maintain raw material, process, packaging material to maintain the effectiveness of quality system		4	1	3
	PC13. Determine the quality of food using criteria such as odor, color, taste and best before date and take immediate measures to prevent spoilage		5	2	3
	PC14. Store raw materials, finished products and allergens separately to prevent cross contamination		5	2	3
	PC15. Label raw materials and finished products and store them in different storage areas according to safe food practices		5	2	3
	PC16. Follow stock rotation based on FEFO/FIFO		10	4	6
			100	35	65