Model Curriculum

Chilling Plant Technician

SECTOR: AGRICULTURE & ALLIED
SUB-SECTOR: DAIRYING
OCCUPATION: MILK COLLECTION & HANDLING
REF ID: AGR/Q4205, V1.0
NSQF LEVEL: 4

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

AGRICULTURE SKILL COUNCIL OF INDIA

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: 'Chilling Plant Technician' QP No. 'AGR/ Q4205 NSQF Level 4'

Date of Issuance: July 30th, 2017

Valid up to: March 31st, 2021

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

Authorised Signatory
(Agriculture Skill Council of India)

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Chilling Plant Technician

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Chilling Plant Technician", in the "Agriculture & Allied" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	**Chilling Plant Technician**		
Qualification Pack Name & Reference ID.	AGR/Q4205, v1.0		
Version No.	1.0	**Version Update Date**	
Pre-requisites to Training	Class 10/ Diploma /ITI certification, preferably		
Training Outcomes	**After completing this programme, participants will be able to:** • **Prepare and maintain work area for chilling of milk:** Prepare and maintain work area and equipment, Receive milk at chilling plant, minor repair and maintenance of equipment • **Ensure proper installation, handle chilling unit for chilling and storage of milk:** Installation of chilling unit, start up of chilling system, storage of milk, testing of milk, inspect , repair and maintenance of chilling system and component • **Maintain documentation and record keeping related to the chilling plant:** Document and maintain records of milk stored, storage parameters and chilling system in chilling unit • **Maintain Safety Hygiene and Sanitation for storage of milk in chilling plant:** Safety and sanitation related function, safety practices		

This course encompasses 4 out of 4 National Occupational Standards (NOS) of "Chilling Plant Technician" Qualification Pack issued by "Agriculture Skill Council of India".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	**Introduction** **Theory Duration** (hh:mm) 05:00 **Practical Duration** (hh:mm) 00:00 **Corresponding NOS Code** Bridge Module	• Understand General Discipline in the class room (Do's & Don'ts) • Learn and Practice Basic skills of communication • Learn and Practice Basic reading capabilities to enable reading of signs, notices and/or cautions at site • Get acquainted with the Dairy Industry • Understand the process of milk procurement • Understand the Role of a Chilling Plant Technician and the progression pathway	Laptop, white board, marker, projector
2	**Prepare and maintain work area and chilling equipments** **Theory Duration** (hh:mm) 25:00 **Practical Duration** (hh:mm) 35:00 **Corresponding NOS Code** AGR /N4220	• Clean and maintain the cleanliness at work using approved sanitizers • Ensure work area is safe to chill the milk in hygienic condition • Disposal of waste material as per organization standard and industry requirement • Plan the milk route ensuring milk reaches chilling plant fresh and at standard temperature(cold milk below temperature) • Freshly milk procured transported to the chilling plant and receive milk at the chilling plant in the milk can • Ensure freshness of milk during summer • Check the functioning and performances of the equipment • Purge non-condensable gases, including air from the chilling system; ensure that the installation is shut down during the check • Ensure that the oil traps on the refrigerant discharge side are frequently drained • Purge oil out of evaporators and receivers if it has solidified and is obstructing the flow of the refrigerant • Ensure that the evaporator coils are kept free of frost and refrigerant pipes are free of any clog and there is no ice inside the pipes • Ensure that the compressor stuffing boxes are repacked at regular intervals	Laptop, white board, marker, projector, sanitizers for demonstration, compressor, conveyor belt, condenser, evaporator, fans, sensors, thermostat, humidity meter, chiller Field visits (to the chilling plant) are must here

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• Get acquainted with FSSAI	
3	**Handle refrigeration unit for chilling and storing milk** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 35:00 **Corresponding NOS Code** AGR/N4221	• Ensure proper installation of chilling unit ▪ Inspect the location ▪ Installation of condense unit and piping for smooth functioning of the unit ▪ Calculate number of temperature sensors ▪ Usage of weight and sight glass indication ▪ Perform pre-start check up • Start the chilling system by checking all the parts of the system like voltage, fans on the evaporator coil, defrost control, sensors and temperature measuring device • Undertake storage of milk in chilling containers following SOP • Test milk at chilling plants; collect and analyse milk and conduct test • Inspect, repair/replace chilling system and components • Undertake maintenance of chilling system and components • Understand refrigeration principles, techniques and practices • Understand refrigeration system and their installation • Understand storage process and calibration • Familiarize with various procedures involved in chilling and storing milk • Understand basic mathematics	Laptop, white board, marker, projector Field visits (to the chilling plant) are must here
4	**Complete Documentation and record keeping related to the chilling plant** **Theory Duration** (hh:mm) 15:00 **Practical Duration** (hh:mm) 25:00 **Corresponding NOS Code** AGR/N4222	• Document and maintain records of stored milk in the chilling plant • Understand ERP system for future reference and can load the details • Register and maintain records of storage parameters • Register and maintain records of current chilling system in the chilling unit • Verify documents and track details in case of discrepancies or any other concern • Understand basic computer functioning	Laptop, white board, marker, projector
5	**Safety, hygiene and**	• Understand contamination and	Laptop, white board,

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	sanitation for storing milk in Chilling plant **Theory Duration** (hh:mm) 15:00 **Practical Duration** (hh:mm) 25:00 **Corresponding NOS Code** AGR/N4223	adulteration • Comply with safety and hygiene procedures followed in the organization • Perform safety and sanitation procedures to store milk in the chilling plant • Follow housekeeping practices • Attend training on hazard management • Report regarding any rodents and pest problem. Record the data • Determine quality of milk • Store and label procured milk, chemicals, allergens etc • Maintain personal hygiene • Familiarize with CIP and COP procedure • Understands storage norms and stock rotation • Get acquainted with milk safety laws and regulation • Understands basic milk microbiology	marker, projector, Sanitizer, Personal protective equipment Like: safety gloves, Safety boots, hairnet First Aid Kit: Bandages, Adhesive bandages, Betadine Solution / ointment, Pain relief spray / ointment, Antiseptic liquid; Antidote, Phone directory, Search lights, fire extinguisher,
	Total Duration: **Theory Duration** (hh:mm) **80:00** **Practical Duration** (hh:mm) **120:00**	**Unique Equipment Required:** Laptop, white board, marker, projector, Audio-visual aids, compressor, conveyor belt, condenser, evaporator, fans, sensors, thermostat, humidity meter, chiller, PPEs	

Grand Total Course Duration: **200 Hours, 0 Minutes**

*(This syllabus/ curriculum has been approved by **Agriculture Skill Council of India)***

Trainer Prerequisites for Job role: "Chilling Plant Technician" mapped to Qualification Pack: "AGR/Q4205, v1.0"

Sr. No.	Area	Details
1	**Description**	Trainer is responsible for educating the trainees – Ensuring practical training of storage of milk in chilling plant along with informative sessions
2	**Personal Attributes**	Trainer should be Subject Matter Expert. He/ she should have good communication, leadership, observation and practical oriented skills.
3	**Minimum Educational Qualifications**	Graduate
4a	**Domain Certification**	Certified for Job Role: "Chilling Plant Technician" mapped to QP: "AGR/Q4205, v1.0". Minimum accepted score is 80%.
4b	**Platform Certification**	Certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q0102". Minimum accepted % as per respective SSC guidelines is 80%.
5	**Experience**	• B. V. Sc. with two years relevant experience • B. Tech (Dairy) • B. Sc Agriculture with 2 years of relevant experience • Any Graduate with 3 years of relevant experience

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Chilling Plant Technician
Qualification Pack	AGR/Q4205, v1.0
Sector Skill Council	Agriculture

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. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria
5. To pass the Qualification Pack , every trainee should score a minimum of 70% in aggregate.
6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack

		Marks Allocation			
Assessable outcomes	**Assessment criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
1. AGR/Q4220 Prepare and maintain work area and chilling equipments	PC1. Clean and maintain the cleanliness of the work area using approved sanitizers and keep it free from dust, waste, flies and pests	**100**	10	3	7
	PC2. Ensure that the work area is safe and hygienic for chilling of milk		10	3	7
	PC3. Dispose waste materials as per defined SOPs and industry requirements		5	1.5	3.5
	PC4. Receive milk at the chilling plant in milk cans		5	1.5	3.5
	PC5. Freshly procured milk is transported to the chilling plant in milk cans		5	1.5	3.5
	PC6. Plan the route of the milk van in such a way that the procured milk reaches the chilling plant while it is still fresh and cold below a specific temperature		5	1.5	3.5
	PC7. During summers, cover the milk cans with wet jute bags to lower the temperature of the milk cans		5	1.5	3.5
	PC8. Check the working and performance of all equipments used in chilling plant facility such as compressor, conveyor belt, condenser, evaporator, fans, sensors, thermostat, humidity meter, etc.		15	5	10
	PC9. Clean the equipments used with approved sanitizers following SOP		5	1.5	3.5
	PC10. Purge non-condensable gases, including air from the chilling system; ensure that the installation is shut down during the check		5	1.5	3.5
	PC11. Ensure that the oil traps on the refrigerant discharge side are frequently drained		5	1.5	3.5
	PC12. Purge oil out of evaporators and receivers if it has solidified and is obstructing the flow of the refrigerant		5	1.5	3.5
	PC13. Ensure that the evaporator coils are kept free of frost		5	1.5	3.5

	PC14. Ensure that the refrigerant pipes are free of any clog and there is no ice inside the pipes		5	1.5	3.5
	PC15. Ensure that the compressor stuffing boxes are repacked at regular intervals		5	1.5	3.5
	PC16. Attend minor repairs/faults of all equipments, if required		5	1	4
			100	**30**	**70**
2. AGR/Q4221 Handle refrigeration unit for chilling and storing milk	PC1. Inspect the location for setting up chilling unit, install condensing unit, mount evaporation coil evaporator	**100**	2	0.5	1.5
	PC2. Install piping following industry guidelines and applicable codes to ensure proper operation of the unit, check all wiring connections		2	0.5	1.5
	PC3. Calculate the number of temperature sensors required for the unit, identify location to place the sensors and place in relevant locations within the unit to obtain precise reading		2	0.5	1.5
	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		2	0.5	1.5
	PC6. Start the system and check the compressor discharge and suction pressures to ensure they are in the normal operating range		2	0.5	1.5
	PC7. Check the voltage and amperage at the compressor terminals, check the piping and electrical connections for vibration		2	0.5	1.5
	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		2	0.5	1.5
	PC9. Set the defrost control/timer clock to required time and verify the defrost initiation settings, set temperature control to desired temperature range		2	0.5	1.5

	PC10. Check the functioning and performance of sensors and temperature measuring device		2	0.5	1.5
	PC11. Read and understand the work order from the supervisor		2	0.5	1.5
	PC12. Check all the features of the unit, operation of the cooling equipment and ensure readiness		2	0.5	1.5
	PC13. Calibrate temperature and humidity measuring instruments of the facility		2	0.5	1.5
	PC14. Receive milk for chilling in cans, check the quality of milk to be refrigerated through physical parameters such as appearance and smell		3	1	2
	PC15. Place the milk cans onto a conveyor belt		2	0.5	1.5
	PC16. Adjust controls to set storage parameters such as temperature and humidity required for the milk to be chilled down to the specified temperature, following the storage parameter chart, check readings to ensure set storage parameters have been reached or make required adjustments or set controls in the monitor system (in case of computerized chilling units)		3	1	2
	PC17. Ensure that the milk from the cans/containers is in emptied into a temporary holding tank where the weight of the milk can be measured through an electronic weighing machine		3	1	2
	PC18. Check the temperature of milk, following SOP		2	0.5	1.5
	PC19. Pump the milk from the holding tank through the condenser		2	0.5	1.5
	PC20. Ensure that the milk is passed through the evaporator for cooling		2	0.5	1.5
	PC21. Observe temperature and humidity and adjusts controls to maintain storage parameters during the entire chilling period		2	0.5	1.5
	PC22. Check temperature of stored milk periodically for conformance to specifications and standards		2	0.5	1.5
	PC23. Unload chilled milk immediately after specified refrigeration period and check temperature		2	1	1
	PC24. Store chilled milk in silos or directly pumped into milk hauler trucks for transportation		2	1	1
	PC25. Test the milk for any impurities before final transportation to the processing unit		2	1	1

	PC26. Report any malfunction to the supervisor and implement the suggested corrective action immediately		2	1	1
	PC27. Inspect the storage containers periodically for rust, mould growth, sprouting, shriveling, etc.		2	1	1
	PC28. Test the milk received at the chilling plant once it has been stored in a temporary storage area/holding tank		2	1	1
	PC29. Collect and send samples from all batches of milk received at the plant to the chilling plant laboratory		2	0.5	1.5
	PC30. Mark/number the samples collected		2	0.5	1.5
	PC31. Analyze milk samples for fat and SNF content		2	0.5	1.5
	PC32. Conduct various milk tests such as urea detection/ ammonia fertilizer detection/ nitrate fertilizer detection/salt detection/etc are on batches of milk received at the laboratory to assess the quality of the procured milk		3	1	2
	PC33. Conduct periodic inspection of system and components for correct operation, observe operating condition and need for repair or adjustment		3	1	2
	PC34. Identify malfunction of components, dismantle, repair and replace faulty components		2	0.5	1.5
	PC35. Reassemble components, test for correct operation, charge system with correct refrigerant, ensure correct operation of the equipment		3	1	2
	PC36. Ensure equipment is running efficiently and the required operating conditions are maintained in the chilling containers for operational requirements		2	0.5	1.5
	PC37. Ensure periodic maintenance of the system and components following SOP		2	0.5	1.5
	PC38. 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
	PC39. 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
	PC40. Check for the operation of defrost controls, ensure defrost heaters are in the correct position for maximum		3	1	2

	heat transfer to the evaporator coil, check the voltage at each heater terminal and ensure heater terminals are in good condition				
	PC41. In compressor unit, replace worn condenser motor		2	0.5	1.5
	PC42. Check all electrical components and replace damaged wirings and tighten all electrical connections		2	0.5	1.5
	PC43. Check and ensure functioning of pressure controls and safety controls		2	0.5	1.5
	PC44. Check oil level, ensure working of solenoid valves		2	0.5	1.5
	PC45. Clean condenser periodically		2	0.5	1.5
	PC46. Check condition of refrigerant line insulation and replace if necessary, check refrigerant level in the system, ensure no refrigerant leak		2	0.5	1.5
			100	**30**	**70**
3. AGR/Q4222 Complete documentation and record keeping related to the chilling plant	PC1. Document and maintain records of all incoming milk to the storage room/facility, weight of milk, farmer/vendor details, catchment area / geographical location, receiving date, label details such as date of procurement, date of expiry, quality parameters, date of loading in chilling unit, outgoing date, storage location within the chilling unit, etc. following SOP	**100**	10	6	4
	PC2. Document and maintain records of all outgoing milk from the chilling unit such as weight of milk, actual chilling period, losses from incoming to outgoing period, quality of milk when it is sent out of the chilling unit etc. following SOP		5	3	2
	PC3. Maintain record of observations (if any) related to chilling or 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 of the milk, relative humidity of chilling container, before loading in the unit, during storage period and during unloading from the storage facility for each batch of milk stored following SOP		15	9	6
	PC7. Maintain record of observations or deviations (if any) related to storage parameters		10	6	4
	PC8. Load the details in ERP system for		5	3	2

	future reference				
	PC9. V erify the documents and track details in cases of concerns		5	3	2
	PC10. Document and maintain records of the technical drawings of chilling container/chamber, chilling system and components, electrical lines, etc.		5	3	2
	PC11. Document and maintain records of chilling system such as type of chilling unit, type of refrigerant, quantity of refrigerant used, cooling system followed, component details such as type of compressor, condenser, evaporator, fans etc following SOP		3	2	1
	PC12. Document and maintain records of operating conditions of chilling container/chamber by recording temperature of milk and air in the chilling room/chamber, compressor pressure, ice formation etc		7	4	3
	PC13. 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 chilling system and components following sop		5	3	2
	PC14. Maintain record of observations or deviations (if any)		5	3	2
	PC15. Verify the documents and track details in cases of concerns		5	3	2
			100	**60**	**40**
4. AGR/Q4223 Safety, hygiene and sanitation for storage of milk in a chilling plant	PC1. Comply with safety and hygiene procedures followed in the organisation	**100**	5	1.5	3.5
	PC2. Ensure personal hygiene by using of gloves, hairnets, masks, ear plugs, goggles, shoes, etc.		5	1.5	3.5
	PC3. Ensure hygienic storage of milk by inspecting raw materials, ingredients, finished products, etc. for compliance to physical, chemical and microbiological parameters		10	3	7
	PC4. Keep the milk and milk products in appropriate containers or packaging materials, label and store them in designated area, free from pests, flies and infestations		10	3	7
	PC5. Clean, maintain and monitor milk processing equipment periodically, using it only for the specified purpose		10	3	7
	PC6. Use safety equipment such as fire		10	3	7

	extinguisher, first aid kit and eye-wash station when required				
	PC7. Follow housekeeping practices by having designated area for materials/tools		5	1	4
	PC8. Attend training on hazard management to understand types of hazards such as physical, chemical and biological hazards and measures to control and prevent them		10	3	7
	PC9. Identify, document and report problems such as rodents and pests to supervisors		5	2	3
	PC10. Conduct workplace checklist audits before and after work to ensure safety and hygiene		5	1	4
	PC11. Document and maintain procured milk,storage container or packaging material, process and finished milk and milk products for the credibility and effectiveness of the food safety control system		5	3	2
	PC12. Determine the quality of produce using criteria such as smell, appearance, taste and take immediate measures to prevent spoilage		10	3	7
	PC13. Store different varieties of produce, chemicals, gases separately to prevent cross-contamination		5	1	4
	PC14. Label produce, chemicals, gases and store in designated storage areas according to safe milk practices		5	1	4
			100	**30**	**70**
TOTAL			**400**	**150**	**250**