

QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR ELECTRONICS INDUSTRY

What are Occupational Standards (OS)?

- OS describe what individuals need to do, know and understand in order to carry out a particular job role or function
- OS are performance standards that individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding

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Introduction

Qualifications Pack – HVAC Technician

SECTOR/S: ELECTRONICS

SUB SECTOR: Consumer Electronics & IT Hardware

OCCUPATION: After Sales Support

REFERENCE ID: ELE/Q3112

ALIGNED TO: NCO-2015/ 3122.5611

Brief Job Description: The individual assist in Installation, maintains and repairs heating, air conditioning and ventilation systems in commercial and industrial areas. The individual engages with the client to understand the work requirement and follows organizational norms to complete the work.

Personal Attributes: The individual must be willing to work in the field and travel throughout the day from one location to another. The individual should have a patient, amenable demeanour and skills for interpersonal relationship building, critical thinking and punctuality.

Job Details	Qualification Pack Code	ELE/Q3112		
	Job Role	HVAC Technician		
	Credits NSQF	TBD	Version number	1.0
	Sector	Electronics	Drafted on	26/10/2018
	Sub-Sector	Consumer Electronics & IT Hardware	Last reviewed on	27/03/2019
	Occupation	After Sales Support	Next review date	27/03/2022
	NSQC Clearance On	NA		

Job Role	HVAC – Technician
Role Description	Servicing, performing maintenance and troubleshooting different types of heating, ventilation and air conditioning systems at a workshop or at a client's location.
NSQF Level	4
Minimum Educational Qualifications*	12 th Standard (Science PCM)* or ITI/Diploma (Electrical/Mechanical/RAC)
Prerequisite License or Training	NA
Minimum Job Entry Age	18
Experience	*Minimum 2 years in HVAC plant
Applicable National Occupational Standards (NOS)	Compulsory: ELE/N3101 Engage with customer for service ELE/N3122 Service, troubleshoot and repair a HVAC system – Chillers ELE/N9905 Work effectively at the workplace ELE/N1002 Apply health and safety practices at the workplace Optional (not mandatory): Option – 1 : Duct System ELE/N3123 Service, troubleshoot and repair packaged type HVAC ducted system
Performance Criteria	As described in the relevant OS units

Definition

Keywords/Terms	Description
Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the knowledge and understanding they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria	Performance criteria are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards, which apply, uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OSs, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributed to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.
Knowledge and Understanding	Knowledge and understanding are statements, which together specify the technical, generic, professional and organisational specific knowledge that an individual need to, perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.

Core Skills/ Generic Skills	Core skills or generic skills are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. In the context of the OS, these include communication related skills that are applicable to most job roles.
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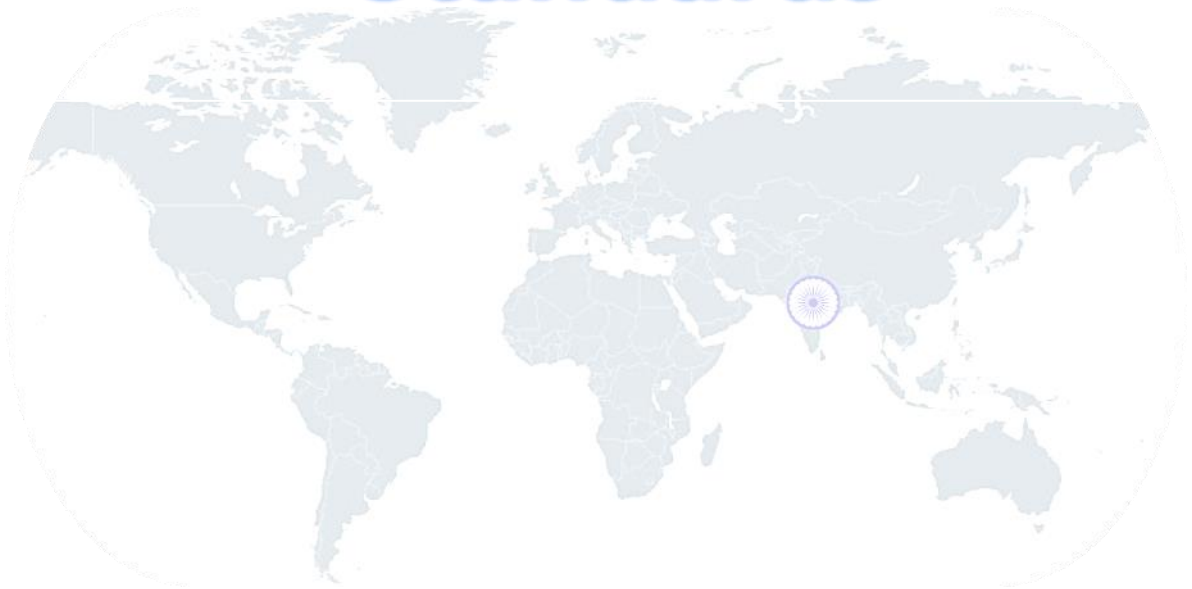
Acronyms

Keywords/Terms	Description
NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
HVAC	Heat, Ventilation and Air Conditioning
RAC	Refrigeration and Air Conditioning
FCU	Fan Cooling Unit
AHU	Air Handling Unit
ISHRAE	Indian Society of Heating, Refrigerating and Air Conditioning Engineers
SFU	Switch Fuse Unit.
MCB	Miniature Circuit Breaker
MCCB	Moulded Case Circuit Breaker
ACB	Air Circuit Breaker
DOL	Direct On Line
VFD	Variable Frequency Drive
CFM	Cubic Feet per Minute
FPM	Feet Per Minute
TR	Ton of Refrigeration
COP	Coefficient of Performance
EER	Energy Efficiency Ratio
ESD	Electro Static Discharge
CHW	Chilled Water
Cond. W	Condenser Water

ELE/N3101

Engage with customer for service

National Occupational Standards



Overview

This unit is about engaging with client prior to initiating work to understand the basic work requirement of servicing and maintaining a central air conditioning plant system (chillers).

ELE/N3101

Engage with customer for service

National Occupational Standard

Unit Code	ELE/N3101
Unit Title	Engage with customer for service
Description	This OS unit is about interacting with clients to understand their requirement with respect to servicing and performing maintenance of the HVAC system.
Scope	This unit/tasks covers the following: - Interact with the client prior to initiating work - Understand the work requirement - Suggest possible solutions to the client - Achieve productivity and quality as per the company's norms
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Interact with the client prior to initiating work	To be competent, the user/ individual must be able to: PC1. Get the client's requirement from customer care or the daily work schedule PC2. Call the client to confirm requirement and fix time for visit PC3. Greet the client and confirm the registered requirement PC4. Enquire about the symptoms of the problem(s) and the age of the appliance PC5. Check about warranty status and annual maintenance contract of the appliance PC6. Identify the problem based on the client's information PC7. Ascertain the client's location to make the route plan for the day
Understand the work requirement	To be competent, the user/ individual must be able to: PC8. Assess the condition and requirements of the site PC9. Seek client's requirement and study drawings and layouts of the work site PC10. Anticipate possible problems to carry tools and equipment parts accordingly PC11. Check the specification of equipment to be serviced or repaired
Suggest possible solutions to the client	To be competent, the user/ individual must be able to: PC12. Discuss the identified problem(s) with the client and educate on possible reasons PC13. Suggest possible solutions and costs involved PC14. Explain the time required and methodology for service or repair PC15. Seek client's approval on further action
Achieve productivity and quality as per the company's norms	To be competent, the user/ individual must be able to: PC16. Prepare most optimum route plan to complete daily target visits PC17. Assess the problem accurately and offer most appropriate and cost-effective service as per client's requirement to avoid repeat problems post service PC18. Set the system for optimum performance setting and record the details post repair and service work PC19. Record and report about work done
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the Company/ Organization)	The user/individual on the job needs to know and understand: KA1. Company's policies on incentives, personnel management, quality standards and warranty KA2. Company's code of conduct KA3. Organizational culture and typical client profile

National Occupational Standards

ELE/N3101

Engage with customer for service

and its Processes)	KA4. Company's reporting structure KA5. Company's documentation policy
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Company's products and recurring problems reported in the system installed at the site KB2. Basic electrical and mechanical modules present at the site KB3. Different types of HVAC systems and their common and distinguishing features KB4. Functionality of the different features of the installed system KB5. Precautions to be taken while handling field calls and dealing with clients KB6. Relevant reference sheets, manuals and documents to carry in the field
Skill(s)	
A. Core Skills/Generic Skills	Reading and Writing Skills
	The user/individual on the job needs to know and understand how to: SA1. Read product and module serial numbers and interpret details such as make, date and availability SA2. Note problems and the details of the work done on the job sheet
	Oral Communication (Listening and Speaking Skills)
	The user/individual on the job needs to know and understand how to: SA3. Seek inputs and assess the problems SA4. Communicate in local language SA5. Communicate with the client engineer/consultant to put the person at ease SA6. Be polite and patient when interacting with the client SA7. Educate and inform the client about contractual issues such as warranty, cost of service and module replacement SA8. Educate on precautions to be taken post repairs to avoid recurrence of the problems
B. Professional Skills	Decision Making
	The user/individual on the job needs to know and understand how to: SB1. Decide on the spot on whether interaction of the client with the supervisor is necessary or not SB2. Decide when to call customer care and close the call after work is done to the client's satisfaction and the documentation is complete
	Client Centricity
	The user/individual on the job needs to know and understand how to: SB3. Seek the client's approval before performing any repair or service work SB4. Communicate effectively to secure client's confidence SB5. Ensure client satisfaction and positive feedback SB6. Discuss issue and related cost with the client
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB7. Identify all the issues and suggest best possible solution to the client SB8. Solve the problems in the given time while following the company policy

National Occupational Standards

ELE/N3101

Engage with customer for service

	Analytical Thinking
	The user/individual on the job needs to know and understand how to:
	SB9. Find out the issue in the system based upon the client complaint
	SB10. Check whether the problem can be solved on site or at the workshop
	Behavioural Skill
	The user/individual on the job needs to know and understand:
	SB11. Significance of etiquette to be followed at the client's premises such as maintaining appropriate physical distance with the client during conversation and not entering bedroom without permission
	SB12. Importance of personal grooming
	SB13. Importance of being patient and courteous with all types of clients
	SB14. Value of being polite and courteous under all circumstances
	SB15. Importance of maintaining clean surface/work area



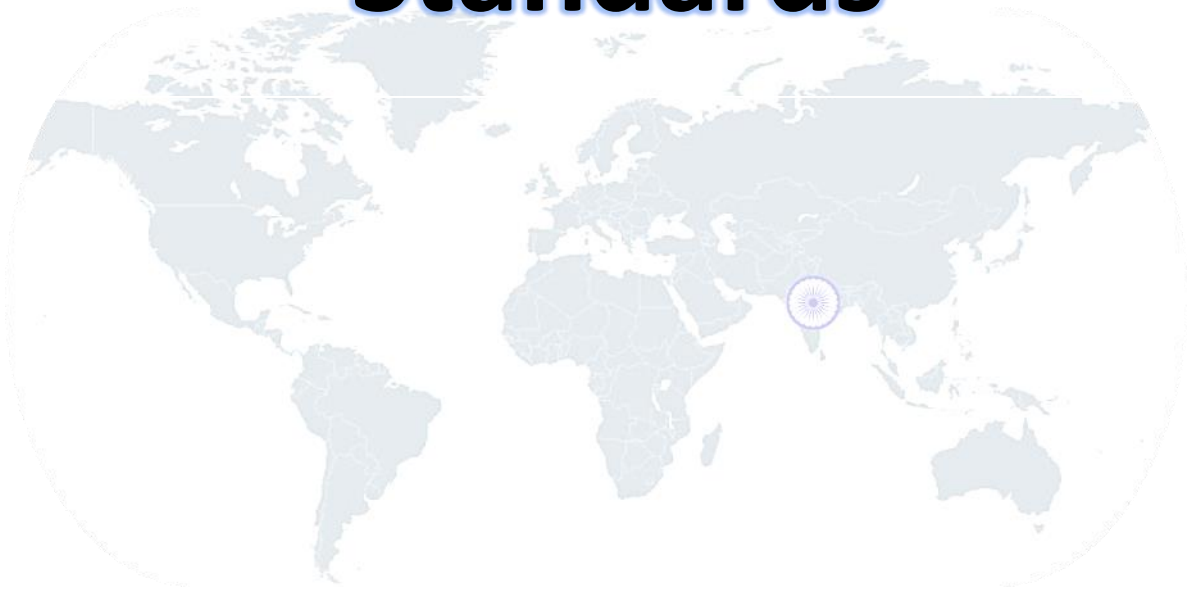
NOS Version Control

NOS Code	ELE/N3101		
Credits NSQF	TBD	Version Number	1.0
Sector	Electronics	Drafted on	26/10/2018
Sub Sector	Consumer Electronics & IT Hardware	Last reviewed on	27/03/2019
Occupation	After Sales Support	Next review Date	27/03/2022



ELE/N3122 Service, troubleshoot and repair a HVAC system – Chillers

National Occupational Standards



Overview

This unit is about servicing and repairing all parts of a central air conditioning plant system (chillers) as per pre-defined specifications.

ELE/N3122

Service, troubleshoot and repair a HVAC system – Chillers

Unit Code	ELE/N3122
Unit Title	Service, troubleshoot and repair a HVAC system – Chiller
Description	This OS unit is about troubleshooting and repairing HVAC system (chillers) and using HVAC codes and standards to do technical calculations for optimum performance.
Scope	This unit/tasks covers the following: • Perform maintenance and service of the system • Troubleshoot and repair the system • Check the performance after service and repair
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Perform maintenance and service of the system	To be competent, the user/ individual must be able to: PC1. Clean chiller, cooling tower, condenser, blower, filter, coils and pump valves PC2. Lubricate fan and motor bearings PC3. Adjust fan belt tension PC4. Check water treatment PC5. Fix broken gasket and insulation lining of water piping PC6. Fix cracks and leaks in water piping PC7. Tighten all screws and fasteners to remove vibration PC8. Tighten electrical connections PC9. Check and fix damper linkages, set screws and blade adjustment PC10. Clean, but not lubricate, the nylon damper rod bushings PC11. Prepare maintenance and service record PC12. Use appropriate tools and equipment for maintenance and service
Troubleshoot and repair the system	To be competent, the user/ individual must be able to: PC13. Perform basic troubleshooting of high side components such as chiller, cooling tower, compressor and pumps PC14. Troubleshoot low side components such as AHU, fan and filter PC15. Check electrical components such as electric circuit, Earthing connection, fuses, electrical panels etc. and make cable connections PC16. Check for any noise or vibration in the HVAC system PC17. Check flow of air through the grills and diffusers PC18. Check filters, contamination and indoor air quality PC19. Check the cooling temperature and pressure in refrigerant/water lines PC20. Use manometer to check pressure loss in filters PC21. Check FCU, water valves and expansion valves PC22. Check the motor conditions: overheat, noise, excessive vibration, slow run and failure to start PC23. Check and fix capacitor, relays etc. PC24. Perform leak detection test of refrigerants PC25. Repair faulty insulation in refrigerant lines and water pipes PC26. Use clamp meter to check current and voltage PC27. Replace the faulty electrical components such as capacitor, relay, motor and cables PC28. Replace faulty condenser, evaporator, filter and expansion valve PC29. Record and report the repair work done

National Occupational Standards

ELE/N3122

Service, troubleshoot and repair a HVAC system – Chillers

Check performance after service and repair	To be competent, the user/ individual must be able to: PC30. Check the performance of the HVAC system as per standards PC31. Check that the voltage and the current range of the supply to the electrical systems is in optimum range PC32. Check the airflow through the ducts using an anemometer PC33. Check the level of humidity PC34. Test cooling and heating temperature range as per requirement PC35. Record dry bulb and wet bulb temperature at each cooling/heating region PC36. Check the efficiency of the system PC37. Record performance parameters of the system
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the Company/ Organization and its Processes)	The user/individual on the job needs to know and understand: KA1. Company's policies on: incentives, delivery standards, personnel management and call closure KA2. Company's after sales support policy KA3. Importance of the individual's role in the workflow KA4. Reporting structure KA5. Company's policy on product's warranty and other terms and conditions
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Basic electrical & electronics theory KB2. The Ohm's law and components of an electrical circuit such as resistor, inductor & capacitor KB3. Series & parallel circuit used in HVAC KB4. Electrical work, power and efficiency KB5. SFU, MCB, MCCB, ACB, Earthing and neutral connections KB6. Electrical wiring: single line diagram, star-delta, VFD and DOL connections KB7. Basic electrical motor theory, types of electric motors used in HVAC (single phase & three phase squirrel cage induction) and their application KB8. The basic measurements: length, area, volume, circumference, diameter of circle, circle area, weight, angles, pressure, temperature CFM, FPM etc. KB9. Method of selection and maintenance of various tools used during the service and repair work KB10. Types & uses of measuring instruments in HVAC such as clamp meter, multimeter, anemometer, sling psychrometers, etc. KB11. Method of using different gauges to check the pressure level: types of pressure gauges, gauge manifold, high pressure gauges, low pressure gauges, compound gauges and calibration of gauges KB12. Fundamentals of refrigeration & air conditioning and vapour compression cycle KB13. Various systems of units used in HVAC KB14. Basic components of refrigeration cycle: compressor, condenser, refrigerant control and evaporator KB15. Terms of heat: sensible heat, latent heat, specific heat and modes of heat transfer KB16. Study & use of psychrometric charts (dry bulb, wet bulb, dew point temperature, relative humidity, enthalpy etc.)

ELE/N3122

Service, troubleshoot and repair a HVAC system – Chillers

	KB17. The Gas Laws and other related laws of thermodynamics and their importance in refrigeration KB18. Use of temperature scales, instruments and measurements, saturation temperature and conversion of temperatures (°C to °F) & (°F to °C) KB19. Factors affecting heating/cooling load calculations in a given environment KB20. Principle and working of variable refrigerant volume (VRV) and variable refrigerant flow (VRF) systems KB21. Terms related to HVAC systems such as TR, COP and EER KB22. Refrigeration & electrical symbols for compressor, condenser, refrigerant control valves, evaporators, switch, gear, lamp, fuses etc. KB23. Refrigeration Cycle, electrical single line diagram, electrical / mechanical accessories & line diagrams KB24. Basic components of a refrigeration cycle: compressor, condenser, refrigerant control and evaporator KB25. Condenser and its types: air cooled condenser, water cool condenser and evaporative condenser KB26. Evaporator and its types according to construction, temperature, flow and uses KB27. Basic working of a HVAC system and its types KB28. Types of chiller, cooling tower, AHU and pumps
Skill(s) [Optional]	
A. Core Skills/Generic Skills	Reading and Writing Skills
	The user/individual on the job needs to know and understand how to:
	SA1. Read product and module serial numbers and interpret details such as make, date and availability SA2. Note problems and the details of the work done on the job sheet
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to:
	SA3. Seek inputs and assess the problems SA4. Communicate in local language SA5. Communicate with the clients to put them at ease SA6. Educate and inform the clients about contractual issues such as warranty, cost of service and module replacement SA7. Educate on precautions to be taken post repairs to avoid recurrence of the problems
B. Professional Skills	Plan and Organize
	The user/individual on the job needs to know and understand:
	SB1. Prioritize the work according to the work requirement SB2. Organize the work area and tools
	Behavioural Skill
	The user/individual on the job needs to know and understand:
	SB3. Significance of etiquette to be followed at the client's premises such as maintaining appropriate physical distance with the client during conversation and not entering bedroom without permission SB4. Importance of personal grooming SB5. Importance of being patient and courteous with all types of clients SB6. Value of being polite and courteous under all circumstances SB7. Importance of maintaining clean surface/work area

ELE/N3122 Service, troubleshoot and repair a HVAC system – Chillers

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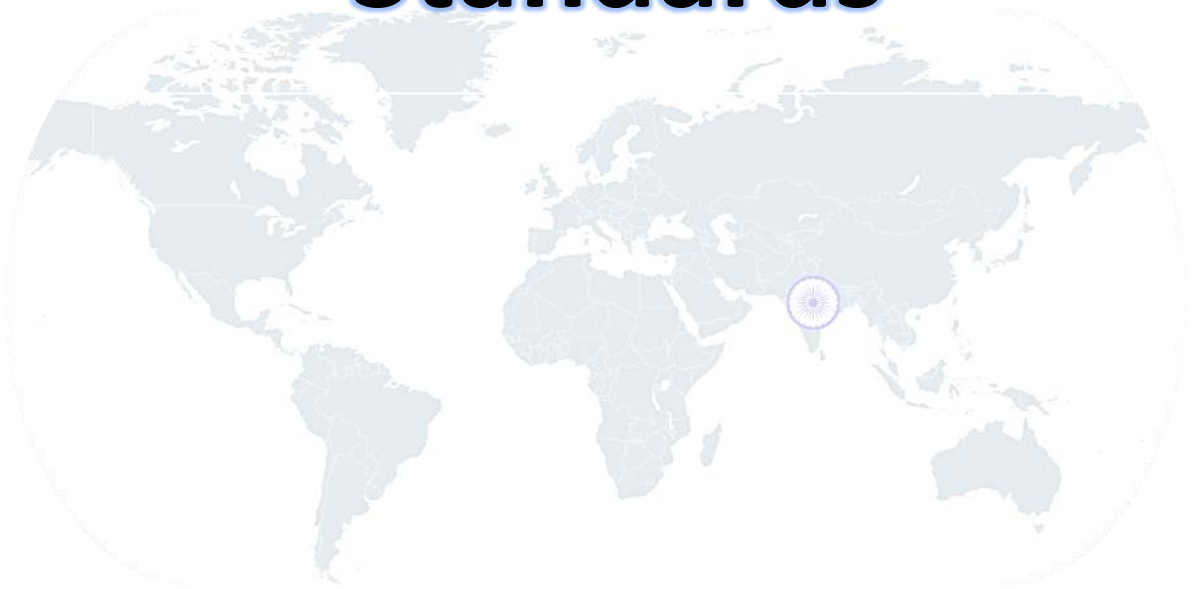
NOS Code	ELE/N3122		
Credits NSQF	TBD	Version Number	1.0
Sector	Electronics	Drafted on	26/10/2018
Sub Sector	Consumer Electronics & IT Hardware	Last reviewed on	27/03/2019
Occupation	After Sales Support	Next review Date	27/03/2022



ELE/N 9905

Work effectively at the workplace

National Occupational Standards



Overview

This unit is about the communicating and managing work effectively at the workplace as well as taking measures to enhance own competence and working in a disciplined and ethical manner.

ELE/N9905

Work effectively at the workplace

Unit Code	ELE/N9905
Unit Title	Work effectively at the workplace
Description	This unit is about the communicating and managing work effectively at the workplace as well as taking measures to enhance own competence and working in a disciplined and ethical manner.
Scope	This unit/tasks covers the following: - Communicate effectively at the workplace - Work in an effective manner - Maintain and enhance professional competence - Work in a disciplined and ethical manner
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Communicate effectively at the workplace	To be competent, the user/ individual must be able to: PC1. Exchange information and instructions with others at the workplace clearly, accurately and within agreed timelines PC2. Seek clarification to obtain complete information and confirm understanding while receiving communications PC3. Display helpful behaviour by assisting others in performing tasks where required PC4. Follow communication etiquette while working to convey politeness, assertiveness, care and professionalism PC5. Share all relevant information with stakeholders in agreed formats and as per agreed timelines
Work in an effective manner	To be competent, the user/ individual must be able to: PC6. Identify and obtain clarity regarding organisational, team and own goals and targets PC7. Prioritise and plan work in order to achieve goals and targets PC8. Monitor own and team performance as per agreed plan PC9. Complete duties accurately, systematically and within required timeframes PC10. Maintain orderliness and cleanliness in the work area
Maintain and enhance professional competence	To be competent, the user/ individual must be able to: PC11. Identify own strengths and weaknesses in relation to goals and targets PC12. Select opportunities for continuous learning and maintaining currency of professional practice PC13. Develop a professional development plan to enhance professional capabilities PC14. Examine developments and trends in field of work and potential impact on work PC15. Invite peers and others to observe, and provide feedback, on own performance and practices PC16. Use feedback from colleagues and clients to identify and introduce, improvements at work
Work in a disciplined and ethical manner	To be competent, the user/ individual must be able to: PC17. Perform tasks as per workplace standard and in compliance with organisational policies and legislative requirements PC18. Display appropriate professional appearance for the workplace while adhering to organisational policy for dress code

	PC19. Demonstrate responsible and disciplined behaviour in the workplace PC20. Disciplined behaviours': e.g. punctuality; completing tasks as per given time and standards; using professional behaviour at all times, adopting environment-friendly practices, etc. PC21. Identify the cause of conflict and options for resolution when faced with situations of conflict PC22. Escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict PC23. Protect the rights of the client and organisation when delivering services PC24. Ensure services are delivered equally to all clients regardless of personal and cultural beliefs PC25. Operate within an agreed ethical code of practice PC26. Recognise unethical conduct and report to an appropriate person PC27. Follow organisational guidelines and legal requirements on disclosure and confidentiality
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the Company/ Organization and its Processes)	The user/individual on the job needs to know and understand: KA1. Organisation's policies on dress code, workplace timings, workplace behaviour, performance management, incentives, delivery standards, information security, etc. KA2. Organizational hierarchy and escalation matrix KA3. Importance of the individual's role in the workflow KA4. Organisational health safety and environment KA5. Work area inspection procedures and practices
B. Technical Knowledge	The user/individual on the job needs to know and understand how to: KB1. Importance of displaying professional appearance behaviour at all times KB2. Communication etiquette KB3. Importance of developing personal and professional goals and objectives KB4. Importance of identifying strengths and weaknesses in relation to goals and objectives KB5. How to identify strengths and weaknesses and evaluate own capacity to meet goals and objectives KB6. How to determine personal development needs KB7. Importance of continuous learning and developing a professional development plan KB8. Development opportunities to support continuous learning and maintain currency of professional practice KB9. Developments and trends impacting on professional practice KB10. Importance of taking and using feedback from colleagues and clients to identify and introduce, improvements in work performance KB11. Perform tasks to the required workplace standard KB12. Importance of discipline and ethics in a professional workplace KB13. Importance of recognising unethical conduct and reporting to the appropriate authority KB14. Guidelines and legal requirements on disclosure and confidentiality KB15. Importance of collaboratively with colleagues through sharing information and ideas and working together on agreed outcomes KB16. How to recognise, avoid and/or address any conflict of interest KB17. How to respond to inappropriate behaviour towards self and others in a professional manner

Skill(s) [Optional]	
A. Core Skills/Generic Skills	Writing Skills The user/individual on the job needs to know and understand how to: SA1. Complete forms such as work orders, invoices, maintenance records SA2. Fill up appropriate forms, activity logs, attendance sheets as per organizational format in English and/or local language SA3. Write basic accident or incident report as witnessed in an appropriate format to the relevant authority
	Reading Skills The user/individual on the job needs to know and understand how to: SA4. Read warnings, instructions and other text material on product labels, components, etc. SA5. Read relevant signage, warnings, labels or descriptions on equipment, etc. while carrying out work activities
	Oral Communication (Listening and Speaking skills) The user/individual on the job needs to know and understand how to: SA6. Convey and share technical information clearly using appropriate language SA7. Check and clarify task-related information SA8. Liaise with appropriate authorities using correct protocol SA9. Communicate with people in respectful form and manner in line with organizational protocol
	Decision Making The user/individual on the job needs to know and understand: SB1. Seek clarification from immediate supervisor or responsible authority on how to secure safety at work when faced with difficult decisions SB2. Exercise most appropriate solutions to safety breaches at work SB3. Report to the supervisor and when to deal with a colleague depending on the type of concern
B. Professional Skills	Plan and Organize The user/individual on the job needs to know and understand: SB4. Use basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time SB5. Deliver product to next work process on time SB6. Improve work process
	Problem Solving The user/individual on the job needs to know and understand: SB7. Communicate problems appropriately to others SB8. Seek assistance and support from other sources to solve problems SB9. Follow standard operating procedures and workplace guidelines while searching for solutions to problems SB10. Report potential areas of disruptions to work process
	Critical Thinking The user/individual on the job needs to know and understand: SB11. Match symptoms of the fault noticed to the cause of the problem SB12. Anticipate and avoid hazards that may occur during repairs because of tools, materials used or repair processes SB13. Spot process disruptions and delays

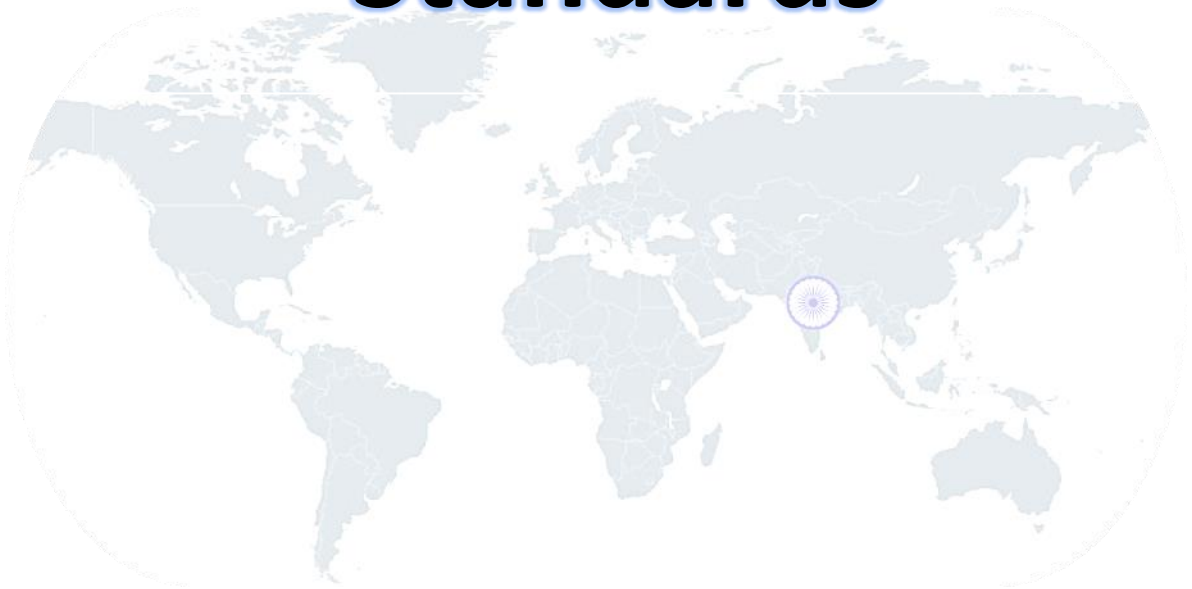
NOS Version Control

NOS Code	ELE/N9905		
Credits NSQF	TBD	Version Number	1.0
Sector	Electronics	Drafted on	1/11/2019
Sub Sector	Consumer Electronics & IT Hardware	Last reviewed on	16/01/2019
Occupation	After Sales Support	Next review Date	16/01/2019



ELE/N 1002 Apply health and safety practices at the workplace

National Occupational Standards



Overview

This OS unit is about knowledge and practices relating to health, safety and security that candidates need to use in the workplace.

ELE/N1002 Apply health and safety practices at the workplace

Unit Code	ELE/N1002
Unit Title	Apply health and safety practices at the workplace
Description	This OS unit is about knowledge and practices relating to health, safety and security that candidates need to use in the workplace.
Scope	This unit/tasks covers the following: • Deal with workplace hazards • Apply fire safety practices • Follow emergencies, rescue and first-aid procedures
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Deal with workplace hazards	To be competent, the user/ individual must be able to: PC1. Identify job-site hazardous work and state possible causes of risk or accident in the workplace PC2. Carry out safe working practices while dealing with hazards to ensure the safety of self and others PC3. Use appropriate personal protective equipment (PPE) Appropriate PPE: For specific tasks and work conditions; as per type of contaminant (concentration w.r.t air); as per severity of hazard; conformity to Indian/International standards; in line with organisational policy PC4. Follow standard safety procedures while handling tools and equipment PC5. Follow standard safety procedures while handling hazardous substances or working in hazardous environments PC6. Dispose electronic waste as per industry approved techniques Electronic waste: toxins; metals such as lead, cadmium, barium; flame-retardant plastics, welding slag etc. PC7. Avoid damage of components due to negligence in electrostatic discharge (ESD) procedures PC8. State the name and location of people responsible for health and safety in the workplace PC9. State the names and location of documents that refer to health and safety in the workplace PC10. Follow methods of accident prevention in the work environment of the job role Methods of accident prevention: training in health and safety procedures; using health and safety procedures; use of equipment and working practices (such as safe carrying procedures); safety notices, advice; instruction from colleagues and supervisors PC11. State location of general health and safety equipment in the workplace General health and safety equipment: fire extinguishers; first aid equipment; safety instruments and clothing; safety installations (eg fire exits, exhaust fans) PC12. Lift heavy objects safely using correct procedures PC13. Apply good housekeeping practices at all times PC14. Identify common hazard signs displayed in various areas Various areas: on chemical containers; equipment; packages; inside buildings; in open areas and public spaces, etc.

National Occupational Standards

ELE/N1002

Apply health and safety practices at the workplace

Apply fire safety practices	To be competent, the user/ individual must be able to: PC15. Use the various appropriate fire extinguishers on different types of fires correctly Types of fires: Class A: e.g. ordinary solid combustibles, such as wood, paper, cloth, plastic, charcoal, etc.; Class B: flammable liquids and gases, such as gasoline, propane, diesel fuel, tar, cooking oil, and similar substances; Class C: e.g. electrical equipment such as appliances, wiring, breaker panels, etc. (These categories of fires become Class A, B, and D fires when the electrical equipment that initiated the fire is no longer receiving electricity); Class D: combustible metals such as magnesium, titanium, and sodium PC16. Demonstrate rescue techniques applied during fire hazard PC17. Take preventive measures in order to prevent fire hazards PC18. Demonstrate the correct use of a fire extinguisher
Follow emergencies, rescue and first-aid procedures	To be competent, the user/ individual must be able to: PC19. Demonstrate how to free a person from electrocution PC20. Administer appropriate first aid to victims where required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc. PC21. Demonstrate basic techniques of bandaging PC22. Administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases PC23. Participate in emergency procedures Emergency procedures: raising alarm, safe/efficient, evacuation, correct means of taking shelter and escaping, correct assembly point, roll call, correct return to work PC24. Demonstrate correct method to move injured people and others during an emergency
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the Company/ Organization and its Processes)	The user/individual on the job needs to know and understand: KA1. Importance of working in clean and safe environmental practices and procedures KA2. Health and safety roles and responsibilities of relevant personal within and outside the organisation KA3. Key internal and external sources of health and safety information KA4. Names and location of documents that refer to health and safety in the workplace
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Meaning of “hazards” and “risks” KB2. Various types of health and safety hazards commonly present in the work environment Types of health and safety hazards: Physical hazards, electrical hazards, chemical hazards, fire hazards, equipment related hazards, health hazards, etc. KB3. How accidents are caused and the role and function of accident recording and investigation KB4. Methods of accident prevention KB5. General principles for identifying and controlling health and safety risks KB6. Importance of using protective clothing/equipment while working KB7. Main hazards and preventive as well as controls for work equipment

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Apply health and safety practices at the workplace

	KB8. Importance of carrying out electrical and non-electrical isolation to prevent hazards from loss of machine/system/process control KB9. Main hazards and preventive as well as control measures when working with electrical systems or using electrical equipment KB10. Forms and classification of hazardous substances KB11. Prevention and control measures that should be used to reduce the risk of ill-health from exposure to hazardous substances KB12. Health effects associated with exposure to noise and vibration and the appropriate control measures KB13. Safe working practices while working at various hazardous sites KB14. Where to find all the general health and safety equipment in the workplace KB15. Precautionary activities to prevent the fire accident KB16. Various causes of fire Causes of fires: heating of metal; spontaneous ignition; sparking; electrical heating; loose fires (smoking, welding, etc.); chemical fires; etc. KB17. techniques of using the different fire extinguishers KB18. Different methods of extinguishing fire KB19. Different materials used for extinguishing fire Materials: sand, water, foam, CO2, dry powder KB20. Rescue techniques applied during a fire hazard KB21. Various types of safety signs and what they mean KB22. Appropriate basic first aid treatment relevant to the condition eg. shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries KB23. Content of written accident report KB24. Potential injuries and ill health associated with incorrect manual handling KB25. Safe lifting and carrying practices KB26. Personal safety, health and dignity issues relating to the movement of a person by others KB27. Potential impact to a person who is moved incorrectly KB28. Basic knowledge of electronics devices and related health risks KB29. Knowledge of 5S & ESD measures
Skill(s) [Optional]	
A. Core Skills/Generic Skills	Reading Skills
	The user/individual on the job needs to know and understand how to:
	SA1. Interpret general health and safety guidelines
	SA2. Interpret health and safety related labels, charts, signages
	SA3. Comprehend basic English to read manuals of operations
	Writing Skills
	The user/individual on the job needs to know and understand how to:
	SA4. Write health and safety compliance report
	SA5. Write an accident/incident report in local language or English
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to:
	SA6. Communicate general health and safety guidelines to workers
	SA7. Question co-workers appropriately in order to clarify instructions and other issues
	SA8. Provide an emergency or safety incident brief to seniors or relevant authorities in a calm, clear and to-the-point manner

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Apply health and safety practices at the workplace

B. Professional Skills	Decision Making
	The user/individual on the job needs to know and understand: SB1. Act in case of any potential hazards observed in the work place
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB2. Take adequate measures to ensure the safety of clients and visitors at the workplace
	Problem Solving
	The user/individual on the job needs to know and understand: SB3. Think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s) SB4. Identify immediate or temporary solutions to resolve delays SB5. Identify sources of support that can be availed of for problem solving for various kind of problems SB6. Seek appropriate assistance from other sources to resolve problems SB7. Report problems that you cannot resolve to appropriate authority
	Analytical Thinking
	The user/individual on the job needs to know and understand: SB8. Analyse what could constitute a health and safety Risk or Hazard SB9. Identify cause and effect relations in their area of work SB10. Use cause and effect relations to anticipate potential problems and their solution
	Critical Thinking
	The user/individual on the job needs to know and understand: SB11. Recognise emergency and potential emergency situations SB12. Identify what should or should not be done to protect from a health and safety risk or hazard

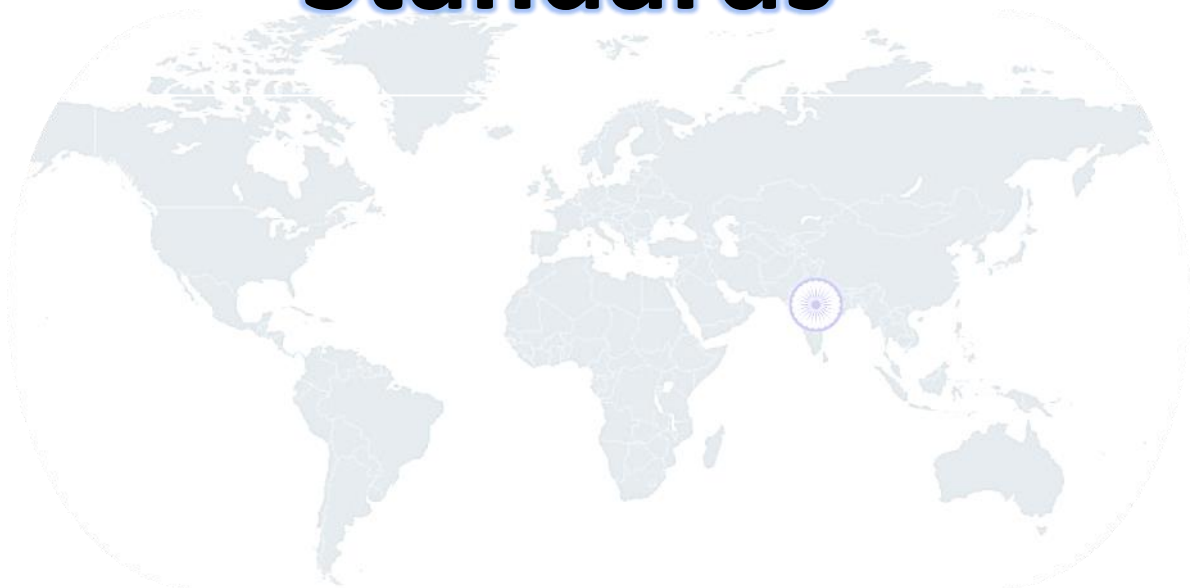
NOS Version Control

NOS Code	ELE/N1002		
Credits NSQF	TBD	Version Number	1.0
Sector	Electronics	Drafted on	1/11/2019
Sub Sector	Consumer Electronics & IT Hardware	Last reviewed on	16/01/2019
Occupation	After Sales Support	Next review Date	16/01/2019



ELE/N3123 Service, troubleshoot and repair packaged type HVAC ducted System

National Occupational Standards



Overview

This unit is about servicing, troubleshooting and repairing components of a packaged type HVAC ducted system at a site.

ELE/N3123 Service, troubleshoot and repair packaged type HVAC ducted system

Unit Code	ELE/N3123
Unit Title	Service ,troubleshoot and repair packaged type HVAC ducted system
Description	This OS unit is about performing service, repair and performance check of a packaged type HVAC ducted system at a site.
Scope	This unit/tasks covers the following: • Perform service repair of duct system • Perform service repair of packaged type HVAC system • Check performance of ducts and packaged system repaired
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Perform service repair of duct system	To be competent, the user/ individual must be able to: PC1. Identify any fault in beam clamp, conduit, dampers, pipe hanger, duct hanger and the refrigeration system PC2. Check bend, kink or crack in ducts PC3. Inspect return air, supply air and duct sizes PC4. Check the fan, blower and motors PC5. Perform cleaning of ducts by robotic/manual methods PC6. Descale water cooled condensers PC7. Check the drains of AHU and FCU PC8. Fix air leaks in ducts PC9. Tighten all insulation and acoustic seals PC10. Replace leaking dampers on ventilation system PC11. Use proper tools and equipment and maintain safety while working
Perform service repair of packaged type HVAC system	To be competent, the user/ individual must be able to: PC12. Check, clean and tighten electrical terminals, thermostat and fuses PC13. Check voltage balance PC14. Check and clean cooling tower PC15. Check and clean coils of evaporator and air cooled condenser PC16. Inspect and fix belts, pulleys, bearings, and lubricate motors and bearings PC17. Lubricate motor bearings PC18. Clean or replace air filters PC19. Check and fix refrigerant pressure and leaks PC20. Check the refrigerant gas level and charge the gas PC21. Check and replace compressor and metering devices PC22. Adjust the controls of the system as per requirement PC23. Use proper tools while doing repair PC24. Maintain safety while handling refrigerants PC25. Complete maintenance checklist and report
Check performance of ducts and packaged system required	To be competent, the user/ individual must be able to: PC26. Check cooling efficiency and heating efficiency PC27. Check the air flow with anemometer PC28. Check the static pressure PC29. Check the refrigerant charge PC30. Check the EER of the system PC31. Check the temperature drop across the coils PC32. Check the parameters as per the requirements

ELE/N3123 Service, troubleshoot and repair packaged type HVAC ducted system

Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the Company/ Organization and its Processes)	The user/individual on the job needs to know and understand: KA1. company's policies on: incentives, delivery standards and personnel management KA2. Company's occupational safety and health policy KA3. Company's emergency evacuation procedure and company's medical policy
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Right Control methods (temperature & pressure) KB2. Types of duct systems and their components KB3. Selection process of suitable duct system for the site KB4. Types of packaged type HVAC ducted systems and its components KB5. Types of compressors and their parts: reciprocating compressor and scroll compressor KB6. Metering devices: thermostatic and electronic expansion valve KB7. Liquid line driers and air filters KB8. Refrigerants and their types & properties: R-32, R-410A, R-134A, R-22, R-290, R-600A, R-407A KB9. ODP and GWP of different types of refrigerant gas KB10. Types of refrigerant control: thermostatic expansion valve, capillary tubes and expansion valves KB11. Safety standards while dealing with refrigerant gases KB12. Emergency procedure in case of gas leak or fire
Skill(s) [Optional]	
A. Core Skills/Generic Skills	Reading and Writing Skills
	The user/individual on the job needs to know and understand how to: SA1. Read product and module serial numbers and interpret details such as make, date and availability SA2. Note problems and the details of the work done on the job sheet
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA3. Seek inputs and assess the problems SA4. Communicate in local language SA5. Communicate with the clients to put them at ease SA6. Educate and inform the clients about contractual issues such as warranty, cost of service and module replacement SA7. Educate on precautions to be taken post repairs to avoid recurrence of the problems
B. Professional Skills	Handling Safety Equipment
	The user/individual on the job needs to know and understand: SB1. Significance of using safety materials such as gloves, etc. SB2. How to use safety equipment such as fire extinguisher during fire accidents
	Decision Making
	The user/individual on the job needs to know and understand how to: SB3. Decide on the spot on whether interaction of the client with the supervisor is necessary or not SB4. Decide when to call customer care and close the call after work is done to the client's satisfaction and the documentation is complete

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ELE/N3123 Service ,troubleshoot and repair packaged type HVAC ducted system

	Plan and Organise
	The user/individual on the job needs to know and understand: SB5. Prioritize the work according to the work requirement SB6. Organize the work area and tools



ELE/N3123 Service, troubleshoot and repair packaged type HVAC ducted system

NOS Version Control

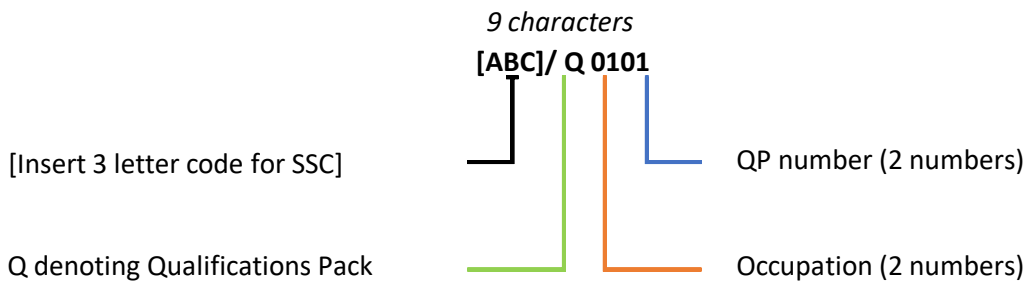
NOS Code	ELE/N3123		
Credits NSQF	TBD	Version Number	1.0
Sector	Electronics	Drafted on	26/10/2018
Sub Sector	Consumer Electronics & IT Hardware	Last reviewed on	27/03/2019
Occupation	After Sales Support	Next review Date	27/03/2022



Annexure

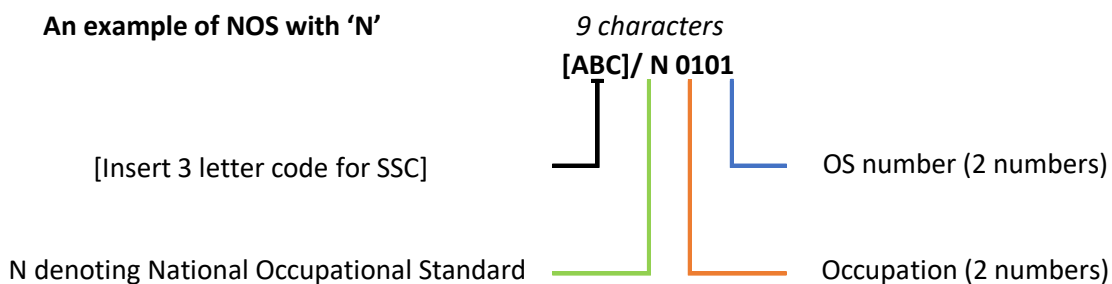
Nomenclature for QP and NOS

Qualifications Pack



Occupational Standard

An example of NOS with 'N'



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The following acronyms/codes have been used in the nomenclature above:

Sub-sector	Range of Occupation numbers
Consumer Electronics & IT Hardware	31 - 40, 76 - 80
Security Surveillance	41 - 50
Semiconductor & Components	01 - 20
PCB Design and Manufacturing	21 - 30, 86 - 90
Electronics Manufacturing System	51 - 55
Solar and LED	56 - 60, 91 - 95
E-Mobility and Battery	66 - 70
Communication and Broadcasting	81 - 85
Industrial Automation	61 - 65, 71 - 75

Sequence	Description	Example
Three letters	Industry Name	ELE
Slash	/	/
Next letter	Whether QP or NOS	Q
Next two numbers	Occupation code	01
Next two numbers	OS number	01

Criteria for Assessment of Trainees

Job Role : HVAC Technician

Qualification Pack : ELE/Q 3112

Sector Skill Council : Electronics Sector Skills Council of India

Guidelines for Assessment

1. The Sector Skill Council will create criteria for assessment for each Qualification Pack. 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, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion.
6. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Compulsory NOS				Marks Allocation	
Total Marks: 500					
Assessment outcomes	Assessment Criteria for outcomes	Total marks	Out of	Theory	Skills Practical
ELE/N3101 Engage with customer for service	PC1. Get the client’s requirement from customer care or the daily work schedule	100	3	2	1
	PC2. Call the client to confirm requirement and fix time for visit		3	2	1
	PC3. Greet the client and confirm the registered requirement		3	2	1
	PC4. Enquire about the symptoms of the problem(s) and the age of the appliance		4	1	3
	PC5. Check about warranty status and annual maintenance contract of the appliance		4	1	3
	PC6. Identify the problem based on the client’s information		3	2	1
	PC7. Ascertain the client’s location to make the route plan for the day		3	2	1
	PC8. Understand the condition and requirements of the site		4	1	3
	PC9. Seek client’s requirement and study drawings and layouts of the work site		4	2	2
	PC10. Anticipate possible problems to carry tools and equipment parts accordingly		18	5	13
	PC11. Check the specification of equipment to be serviced or repaired		4	2	2
	PC12. Discuss the identified problem(s) with the client and educate on possible reasons		4	2	2

	PC13. Suggest possible solutions and costs involved		4	2	2
	PC14. Explain the time required and methodology for service or repair		4	2	2
	PC15. Seek client’s approval on further action		4	2	2
	PC16. Prepare most optimum route plan to complete daily target visits		5	2	3
	PC17. Assess the problem accurately and offer most appropriate and cost-effective service as per client’s requirement to avoid repeat problems post service		19	5	14
	PC18. Set the system for optimum performance setting and record the details post repair and service work		4	2	2
	PC19. Record and report about work done		3	1	2
Total			100	40	60
ELE/N3122 Service, troubleshoot and repair a HVAC system	PC1. Clean chiller, cooling tower, condenser, blower, filter, coils and pump valves	100	3	1	2
	PC2. Lubricate fan and motor bearings		2	1	1
	PC3. Adjust fan belt tension		2	1	1
	PC4. Check water treatment		2	1	1
	PC5. Fix broken gasket and insulation lining of water piping		2	1	1
	PC6. Fix cracks and leaks in water piping		2	1	1
	PC7. Tighten all screws and fasteners to remove vibration		2	1	1
	PC8. Tighten electrical connections		2	1	1
	PC9. Check and fix damper linkages, set screws and blade adjustment		2	1	1
	PC10. Clean, but not lubricate, the nylon damper rod bushings		2	1	1
	PC11. Prepare maintenance and service record		2	1	1
	PC12. Use appropriate tools and equipment for maintenance and service		2	1	1
	PC13. Perform basic troubleshooting of high side components such as chiller, cooling tower, compressor and pumps		3	1	2
	PC14. Troubleshoot low side components such as AHU, fan and filter		3	1	2
	PC15. Check electrical components such as electric circuit, Earthing connection, fuses, electrical panels etc. and make cable connections		3	1	2
	PC16. Check for any noise or vibration in the HVAC system		3	1	2
	PC17. Check flow of air through the grills and diffusers		3	1	2
	PC18. Check filters, contamination and indoor air quality		3	1	2
	PC19. Check the cooling temperature and pressure in refrigerant/water lines		3	1	2
	PC20. Use manometer to check pressure loss in filters		3	1	2
	PC21. Check FCU, water valves and expansion valves		3	1	2

	PC22. Check the motor conditions: overheat, noise, excessive vibration, slow run and failure to start		3	1	2
	PC23. Check and fix capacitor, relays etc.		3	1	2
	PC24. Perform leak detection test of refrigerants		3	1	2
	PC25. Repair faulty insulation in refrigerant lines and water pipes		3	1	2
	PC26. Use clamp meter to check current and voltage		3	1	2
	PC27. Replace the faulty electrical components such as capacitor, relay, motor and cables		3	1	2
	PC28. Replace faulty condenser, evaporator, filter and expansion valve		3	1	2
	PC29. Record and report the repair work done		3	2	1
	PC30. Check the performance of the HVAC system as per standards		3	1	2
	PC31. Check that the voltage and the current range of the supply to the electrical systems is in optimum range		3	1	2
	PC32. Check the airflow through the ducts using an anemometer		3	1	2
	PC33. Check the level of humidity		3	1	2
	PC34. Test cooling and heating temperature range as per requirement		3	1	2
	PC35. Record dry bulb and wet bulb temperature at each cooling/heating region		3	2	1
	PC36. Check the efficiency of the system		3	1	2
	PC37. Record performance parameters of the system		3	2	1
Total		100	40	60	
ELE/N9905 Work effectively at the workplace	PC1. Exchange information and instructions with others at the workplace clearly, accurately and within agreed timelines	100	5	2	3
	PC2. Seek clarification to obtain complete information and confirm understanding while receiving communications		4	2	2
	PC3. Display helpful behaviour by assisting others in performing tasks where required		3	1	2
	PC4. Follow communication etiquette while working to convey politeness, assertiveness, care and professionalism		5	2	3
	PC5. Share all relevant information with stakeholders in agreed formats using appropriate mode of communication		5	2	3
	PC6. Identify and obtain clarity regarding organisational, team and own goals and targets		5	2	3
	PC7. Prioritise and plan work in order to achieve goals and targets		5	2	3
	PC8. Monitor own and team performance as per agreed plan		4	1	3
	PC9. Complete duties accurately, systematically and within required timeframes		3	1	2

	PC10. Maintain orderliness and cleanliness in the work area		4	2	2
	PC11. Identify own strengths and weaknesses in relation to goals and targets		4	2	2
	PC12. Select opportunities for continuous learning and maintaining currency of professional practice		4	2	2
	PC13. Develop a professional development plan to enhance professional capabilities		5	2	3
	PC14. Examine developments and trends in field of work and potential impact on work		4	2	2
	PC15. Invite peers and others to observe, and provide feedback, on own performance and practices		3	1	2
	PC16. Use feedback from colleagues and clients to identify and introduce, improvements at work		3	1	2
	PC17. Perform tasks as per workplace standard and in compliance with organisational policies and legislative requirements		3	1	2
	PC18. Display appropriate professional appearance for the workplace while adhering to organisational policy for dress code		3	1	2
	PC19. Demonstrate responsible and disciplined behaviors in the workplace		5	2	3
	PC20. Identify the cause of conflict and options for resolution when faced with situations of conflict		4	2	2
	PC21. Escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict		3	1	2
	PC22. Protect the rights of the client and organisation when delivering services		4	2	2
	PC23. Ensure services are delivered equally to all clients regardless of personal and cultural beliefs		3	1	2
	PC24. Operate within an agreed ethical code of practice		3	1	2
	PC25. Recognise unethical conduct and report to an appropriate person		3	1	2
	PC26. Follow organisational guidelines and legal requirements on disclosure and confidentiality		3	1	2
	Total		100	40	60
ELE/N1002 Apply health and safety practices at the workplace	PC1. Identify job-site hazardous work and state possible causes of risk or accident in the workplace	100	5	2	3
	PC2. Carry out safe working practices while dealing with hazards to ensure the safety of self and others		7	3	4
	PC3. Use appropriate personal protective equipment (PPE)		5	2	3
	PC4. Follow standard safety procedures while handling tools and equipment		5	2	3

	PC5. Follow standard safety procedures while handling hazardous substances or working in hazardous environments		4	1	3	
	PC6. Dispose electronic waste as per industry approved techniques		5	2	3	
	PC7. Avoid damage of components due to negligence in electrostatic discharge (ESD) procedures		4	1	3	
	PC8. State the name and location of people responsible for health and safety in the workplace		3	1	2	
	PC9. State the names and location of documents that refer to health and safety in the workplace		3	1	2	
	PC10. Follow methods of accident prevention in the work environment of the job role		5	2	3	
	PC11. State location of general health and safety equipment in the workplace		3	1	2	
	PC12. Lift heavy objects safely using correct procedures		4	1	3	
	PC13. Apply good housekeeping practices at all times		5	2	3	
	PC14. Identify common hazard signs displayed in various areas		3	1	2	
	PC15. Use the various appropriate fire extinguishers on different types of fires correctly		6	2	4	
	PC16. Demonstrate rescue techniques applied during fire hazard		6	2	4	
	PC17. Take preventive measures in order to prevent fire hazards		5	2	3	
	PC18. Demonstrate how to free a person from electrocution		3	1	2	
	PC19. Administer appropriate first aid to victims where required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc.		5	2	3	
	PC20. Demonstrate basic techniques of bandaging		3	1	2	
	PC21. Administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases		4	1	3	
	PC22. Participate in emergency procedures		3	1	2	
	PC23. Demonstrate correct method to move injured people and others during an emergency		4	1	3	
Total			100	35	65	
ELE/N3123 Service ,troubleshoot and repair packaged type HVAC ducted system (Optional NOS)	PC1. Identify any fault in beam clamp, conduit, dampers, pipe hanger, duct hanger and refrigeration system		100	4	2	2
	PC2. Check bend, kink or crack in ducts			3	1	2
	PC3. Inspect return air, supply air and duct sizes			3	2	1
	PC4. Check the fan, blower and motors	3		1	2	

PC5. Perform cleaning of ducts by robotic/manual methods	3	2	1
PC6. Descale water cooled condensers	3	1	2
PC7. Check the drains of AHU and FCU	3	1	2
PC8. Fix air leaks in ducts	3	1	2
PC9. Tighten all insulation and acoustic seals	3	1	2
PC10. Replace leaking dampers on ventilation system	3	1	2
PC11. Use proper tools and equipment and maintain safety while working	4	2	2
PC12. Check, clean and tighten electrical terminals, thermostat and fuses	3	1	2
PC13. Check voltage balance	3	2	1
PC14. Check and clean cooling tower	3	1	2
PC15. Check and clean coils of evaporator and air cooled condenser	3	1	2
PC16. Inspect and fix belts, pulleys, bearings, and lubricate motors and bearings	4	2	2
PC17. Lubricate motor bearings	3	1	2
PC18. Clean or replace air filters	3	1	2
PC19. Check and fix refrigerant pressure and leaks	3	1	2
PC20. Check the refrigerant gas level and charge the gas	3	1	2
PC21. Check and replace compressor and metering devices	3	1	2
PC22. Adjust the controls of the system as per requirement	3	2	1
PC23. Use proper tools while doing repair	3	1	2
PC24. Maintain safety while handling refrigerants	3	1	2
PC25. Complete maintenance checklist and report	3	1	2
PC26. Check cooling efficiency and heating efficiency	3	1	2
PC27. Check the air flow with anemometer	3	1	2
PC28. Check the static pressure	3	1	2
PC29. Check the refrigerant charge	3	1	2
PC30. Check the EER of the system	3	1	2
PC31. Check the temperature drop across the coils	3	1	2
PC32. Check the parameters as per the requirements	4	2	2
Total	100	40	60
Grand Total	500		