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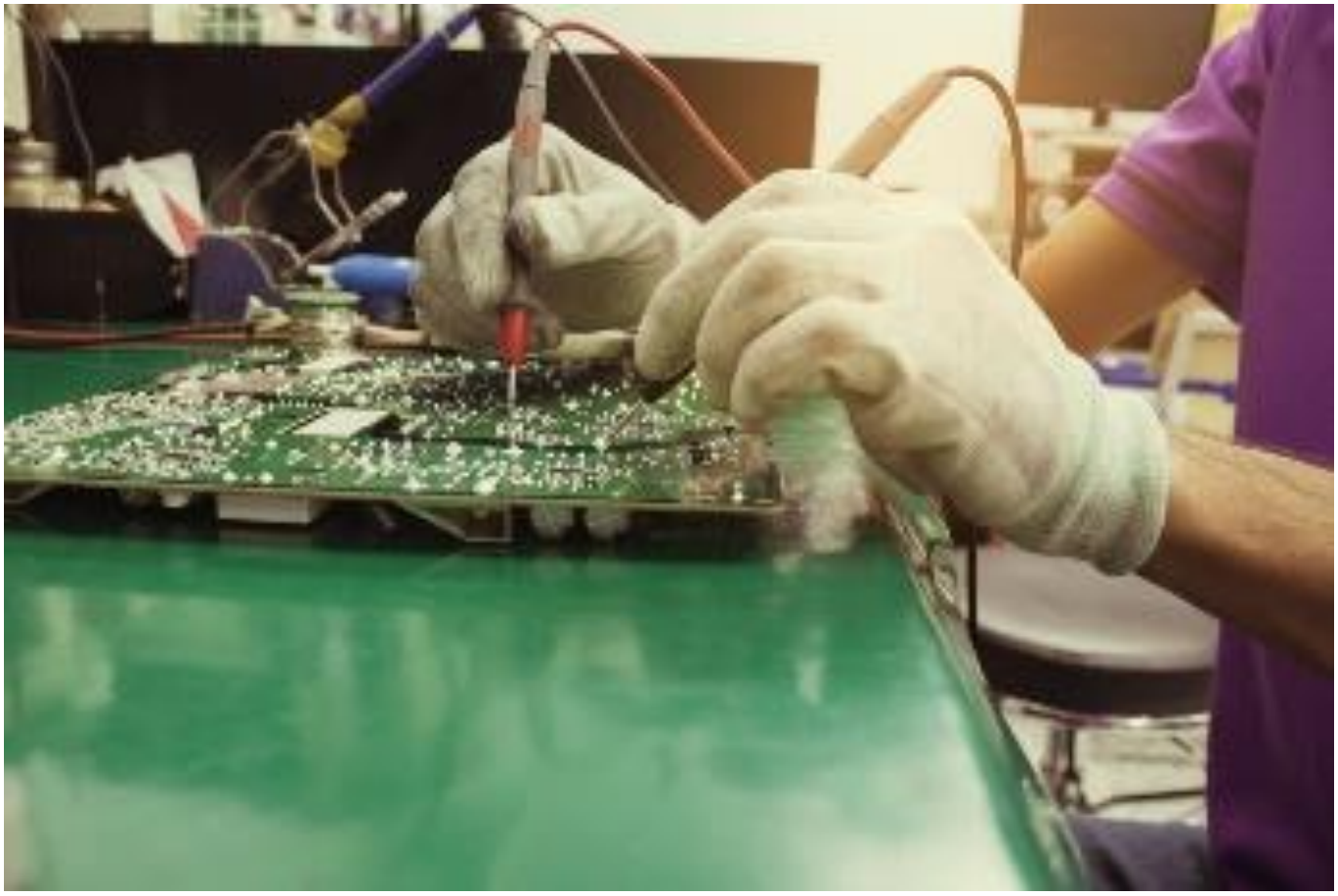
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

Qualification Pack

Transforming the skill landscape



Fitter- Electrical and electronic assembly

QP Code: CSC/Q0305

Version: 2.0

NSQF Level: 3

Capital Goods Skill Council || 1st Floor, L-29, Outer Circle, Connaught Place
New Delhi – 110001

Contents

CSC/Q0305: Fitter- Electrical and electronic assembly

Brief Job Description

A Fitter- Electrical and electronic assembly is responsible for assembling electrical and electronic panels, equipment/systems, components, sub-assemblies, etc. The individual is responsible for ensuring compliance with the applicable health, safety and quality standards along with the applicable regulations.

Personal Attributes

The individual must be physically fit to work for long durations. The person must have attention to detail, and problem-solving skills along with numerical ability. The individual must have basic communication skills and the ability to work in coordination with others.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. CSC/N1335: Follow the health and safety practices at work
2. CSC/N1336: Coordinate with co-workers to achieve work efficiency
3. CSC/N0305: Assemble and wire electrical components and systems to mechanical equipment
4. CSC/N0306: Assemble and wire electronic equipment and systems to mechanical equipment

Qualification Pack (QP) Parameters

Sector	Capital Goods
Sub-Sector	Machine Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery
Occupation	Fitting and Assembly
Country	India
NSQF Level	3
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7241.10, 7241.20, 7242.90, 7242.10
Minimum Educational Qualification & Experience	Ability to Read and Write with 5 years of experience in the relevant field

	OR 5th Class Pass with 3 years of experience in the relevant field OR 8th Class Pass with 2 years of experience in the relevant field OR Class 8th + ITI (2 years) (Electrical and other relevant fields) Or Class 10th

Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	
Next Review Date	
Deactivation Date	
NSQC Approval Date	
Version	2.0
Reference code on NQR	2015/CCM/GCSC/00122

CSC/N1335: Follow the health and safety practices at work

Description

This OS unit is about following the appropriate health and safety practices at work. It covers responsibilities towards self and others to ensure a safe work environment.

Scope

This unit/task covers the following:

- Maintain personal health and safety
- Assist in hazard management
- Check the first aid box, firefighting and safety equipment
- Assist in waste management
- Follow the fire safety guidelines
- Follow the emergency and first-aid procedures
- Carry out relevant documentation and review

Elements and Performance Criteria

Maintain personal health and safety

To be competent, the user/individual on the job must be able to:

PC1. follow the recommended practices to ensure protection from infections and transmission to others, such as the use of hand sanitiser and face mask
PC2. check the work conditions, assess the potential health and safety risks, and take appropriate measures to mitigate them
PC3. select and use the appropriate Personal Protective Equipment (PPE) relevant to the task and work conditions
PC4. follow the recommended techniques while lifting and moving heavy objects to avoid injury
PC5. follow the manufacturer's instructions and workplace safety guidelines while working on heavy machinery, tools and equipment

Assist in hazard management

To be competent, the user/individual on the job must be able to:

PC6. identify existing and potential hazards at work
PC7. assess the potential risks and injuries associated with the identified hazards
PC8. coordinate with the supervisor or other relevant personnel to prevent or minimise the identified hazards
PC9. handle hazardous materials safely and store them in the designated storage

Check the first aid box, firefighting and safety equipment

To be competent, the user/individual on the job must be able to:

PC10. check the first aid box to ensure it is updated with the relevant first aid supplies
PC11. check and test the firefighting and various safety equipment to ensure they are in usable condition
PC12. coordinate with the supervisor for the repair and replacement of firefighting and safety equipment

Assist in waste management

To be competent, the user/individual on the job must be able to:

PC13. segregate waste into appropriate categories
PC14. recycle the recyclable waste appropriately
PC15. dispose of the non-recyclable waste in an environment-friendly manner, complying with the applicable regulations

Follow the fire safety guidelines

To be competent, the user/individual on the job must be able to:

PC16. use the appropriate type of fire extinguisher to extinguish different types of fires safely
PC17. follow the recommended practices for a safe rescue during a fire emergency
PC18. coordinate with the fire department to request assistance to extinguish a serious fire

Follow the emergency and first-aid procedures

To be competent, the user/individual on the job must be able to:

PC19. follow the organisational health and safety guidelines during workplace emergencies to ensure own and co-workers' safety
PC20. follow the recommended practices to minimise loss to organisational property during an emergency
PC21. follow the recommended procedure to free a person from electrocution
PC22. administer appropriate first aid to the injured personnel
PC23. perform Cardiopulmonary Resuscitation (CPR) on a potential victim of cardiac arrest
PC24. coordinate with the emergency services to request medical assistance for seriously injured/ ill personnel requiring professional medical attention or hospitalisation

Carry out relevant documentation and review

To be competent, the user/individual on the job must be able to:

PC25. carry out appropriate documentation following a health and safety incident at work, including all the required information
PC26. coordinate with the relevant personnel to review health and safety conditions at work regularly or following an incident
PC27. assist in implementing appropriate changes to improve the health and safety conditions at work

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the recommended practices to be followed to ensure protection from infections and transmission to others, such as the use of hand sanitiser and face mask
KU2. the importance and process of checking the work conditions, assessing the potential health and safety risks, and taking appropriate measures to mitigate them
KU3. the importance and process of selecting and using the appropriate PPE relevant to the task and work conditions
KU4. the recommended techniques to be followed while lifting and moving heavy objects to avoid injury
KU5. the importance of following the manufacturer's instructions and workplace safety guidelines while working on heavy machinery, tools and equipment
KU6. the importance and process of identifying existing and potential hazards at work
KU7. the process of assessing the potential risks and injuries associated with the various hazards

KU8. how to prevent or minimise different types of hazards
KU9. how to handle and store hazardous materials safely
KU10. the importance of ensuring the first aid box is updated with the relevant first aid supplies
KU11. the process of checking and testing the firefighting and various safety equipment to ensure they are in a usable condition
KU12. the criteria for segregating waste into appropriate categories
KU13. the appropriate methods for recycling the recyclable waste
KU14. the process of disposing of the non-recyclable waste safely and the applicable regulations
KU15. use of different types of fire extinguishers to extinguish different types of fires
KU16. the recommended practices to be followed for a safe rescue during a fire emergency
KU17. how to request assistance from the fire department to extinguish a serious fire
KU18. the appropriate practices to be followed during workplace emergencies to ensure safety and minimise loss to organisational property
KU19. common health and safety hazards present in a work environment, associated risks, and how to mitigate them
KU20. safe working practices to be followed while working at various hazardous sites and using electrical equipment
KU21. the importance of ensuring easy access to firefighting and safety equipment
KU22. the appropriate preventative and remedial actions to be taken in the case of exposure to toxic materials, such as poisonous chemicals and gases
KU23. various causes of fire in different work environments and the recommended precautions to be taken to prevent fire accidents
KU24. different methods of extinguishing fire
KU25. different materials used for extinguishing fire, such as sand, water, foam, CO2, dry powder, etc.
KU26. the applicable rescue techniques to be followed during a fire emergency
KU27. the importance of placing safety signs and instructions at strategic locations in a workplace and following them
KU28. different types of first aid treatment to be provided for different types of injuries
KU29. potential injuries associated with incorrect manual handling
KU30. how to move an injured person safely
KU31. various hazards associated with the use of various machinery, tools, implements, equipment and materials
KU32. the importance of ensuring no obstruction and free access to fire exits
KU33. how to free a person from electrocution safely
KU34. how to administer appropriate first aid to an injured person
KU35. how to perform Cardiopulmonary Resuscitation (CPR)
KU36. the importance of coordinating with the emergency services to request urgent medical assistance for persons requiring professional medical attention or hospitalisation
KU37. the appropriate documentation to be carried out following a health and safety incident at work, and the relevant information to be included
KU38. the importance and process of reviewing the health and safety conditions at work regularly or following an incident
KU39. the importance and process of implementing appropriate changes to improve the health and safety conditions at work

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. maintain work-related notes and records
GS2. communicate clearly and politely with co-workers and clients
GS3. read the relevant literature to get the latest updates about the field of work
GS4. listen attentively to understand the information being shared
GS5. plan and prioritise tasks to ensure timely completion
GS6. take quick decisions to deal with workplace emergencies and accidents
GS7. identify possible disruptions to work and take appropriate preventive measures
GS8. coordinate with the co-workers to achieve the work objectives
GS9. evaluate all possible solutions to a problem to select the best one

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N1335
NOS Name	Follow the health and safety practices at work
Sector	Capital Goods
Sub-Sector	Machine Tools, Process Plant Machinery, Dies, Moulds and Press Tools, Electrical and Power Machinery, Plastics Manufacturing Machinery, Light Engineering Goods, Textile Manufacturing Machinery
Occupation	Machining
NSQF Level	3
Credits	TBD
Version	2.0
Last Reviewed Date	
Next Review Date	
Deactivation Date	
NSQC Clearance Date	

CSC/N1336: Coordinate with co-workers to achieve work efficiency

Description

This OS unit is about working in coordination with co-workers to achieve the work objectives efficiently. It also covers practising inclusion at work.

Scope

This unit/task covers the following:

- Work effectively with co-workers
- Communicate effectively with co-workers
- Practice inclusion at work

Elements and Performance Criteria

Work effectively with co-workers

To be competent, the user/individual on the job must be able to:

PC1. plan daily tasks at work to ensure their timely completion and efficient use of time
PC2. carry out work responsibilities adhering to the limits of authority
PC3. follow the supervisor's instructions to ensure adherence to the applicable quality standards and timescales
PC4. coordinate with the co-workers to achieve the work objectives efficiently
PC5. prepare the relevant documents and reports as per the supervisor's instructions, providing appropriate information clearly and systematically
PC6. coordinate with the supervisor or relevant personnel to deal with out of authority tasks and concerns
PC7. mentor and assist subordinates in the execution of their work responsibilities
PC8. identify possible disruptions to work through coordination with the relevant stakeholders and take appropriate preventive measures
PC9. use various resources efficiently to ensure maximum utilisation and minimum wastage
PC10. follow the recommended practices to avoid and resolve conflicts at work
PC11. follow the relevant organisational policies to ensure disciplined behaviour with maximum productivity at work

Communicate effectively with co-workers

To be competent, the user/individual on the job must be able to:

PC12. follow the organisational policy for the efficient and timely dissemination of information to the authorised personnel
PC13. communicate clearly and politely to ensure effective communication with co-workers
PC14. follow the appropriate techniques for active listening during interactions

Practice inclusion at work

To be competent, the user/individual on the job must be able to:

PC15. empathise with Persons with Disabilities (PwD)
PC16. adopt gender-neutral behaviour at work

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the importance and process of effective communication in the workplace
KU2. the barriers to effective communication and how to overcome them
KU3. the importance of teamwork in an organisation's and individual's success
KU4. the importance of active listening in the work environment
KU5. the appropriate techniques to be followed for active listening
KU6. importance of tone and pitch in effective communication
KU7. importance of avoiding casual expletives and unpleasant terms while communicating professional circles
KU8. the importance of maintaining discipline and ethical behaviour at work
KU9. the common reasons for interpersonal conflict and how to resolve them
KU10. the importance of developing effective working relationships for professional success
KU11. how expressing and addressing grievances appropriately and effectively
KU12. the importance and process of planning daily tasks to ensure their timely completion and efficient use of time
KU13. the importance of adhering to the limits of authority at work
KU14. the importance of following the applicable quality standards and timescales at work
KU15. the importance of coordinating with the co-workers to achieve the work objectives efficiently
KU16. the relevant documentation requirements
KU17. the importance of providing appropriate information clearly and systematically in work documents
KU18. the escalation matrix to be followed to deal with out of authority tasks and concerns
KU19. the importance and process of mentoring and assisting subordinates in the execution of their work responsibilities
KU20. how to identify possible disruptions to work prevent them
KU21. how to use various resources efficiently to ensure maximum utilisation and minimum wastage
KU22. the recommended practices to be followed at work to avoid and resolve conflicts at work
KU23. the importance and process of efficient and timely dissemination of information to the authorised personnel
KU24. how to communicate clearly and politely to ensure effective communication
KU25. the importance of following the recommended practices to ensure an inclusive environment for PwD and all genders at work

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. maintain work-related notes and records
GS2. read work-related and other relevant literature
GS3. communicate politely and -professionally
GS4. listen attentively to understand the information or instructions being shared
GS5. plan and prioritise tasks to ensure timely completion
GS6. take prompt decisions to deal with workplace emergencies and accidents
GS7. evaluate all possible solutions to a problem to select the best one

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N1336
NOS Name	Coordinate with co-workers to achieve work efficiency
Sector	Capital Goods
Sub-Sector	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery, Light Engineering Goods
Occupation	Machining
NSQF Level	3
Credits	TBD
Version	2.0
Last Reviewed Date	
Next Review Date	
Deactivation Date	
NSQC Clearance Date	

CSC/N0305: Assemble and wire electrical components and systems to mechanical equipment

Description

This OS unit is about assembling and wiring electrical components, systems, and panels to mechanical equipment following the applicable procedures.

Scope

This unit/task covers the following:

- Assemble and wire electrical components and systems
- Use resources optimally

Elements and Performance Criteria

Assemble and wire electrical components and systems

To be competent, the user/individual on the job must be able to:

PC1. perform electrical calculations using a range of variables
PC2. select the appropriate tools and equipment for the assembly and testing operations
PC3. check the tools and equipment are calibrated, tested and in a safe and usable condition
PC4. prepare the electrical components and panels/enclosures for the assembly operations
PC5. use the recommended techniques to mount the electrical components on panels or in enclosures safely
PC6. assemble electrical components on panels or in enclosures, following the applicable standards, procedures and wiring regulations
PC7. use the appropriate methods and techniques to assemble the components in their correct positions
PC8. secure the components using the recommended connectors and securing devices
PC9. wire and terminate cables to the appropriate connections on the components
PC10. check the completed assembly to ensure that all the operations have been completed
PC11. follow the relevant assembly drawings and other applicable specifications
PC12. use the relevant Personal Protective Equipment (PPE) to ensure protection from Electrostatic Discharge (ESD)
PC13. ensure the finished assembly is secure and meets the required specifications
PC14. use the relevant Industry 4.0 manufacturing technologies to ensure interconnectivity, automation, machine learning, and real-time data collection and analysis
PC15. coordinate with the relevant personnel to resolve any complex problems that may arise with the electrical assembly and wiring operations
PC16. carry out minor repair and maintenance of the relevant tools and equipment and store them safely after use
PC17. collect and dispose of the industrial waste appropriately in compliance with the applicable regulations and organisational procedures

Use resources optimally

To be competent, the user/individual on the job must be able to:

PC18. use electricity and other resources optimally in various tasks and processes
PC19. connect the electrical tools and equipment safely and disconnect them when they are not in use

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. applicable documentation requirements and related procedures in the job role
KU2. the concepts and benefits of Industry 4.0 and Industrial Internet of Things (IIoT)
KU3. the relevant safety practices and procedures to be followed while assembling and wiring electrical components mounted on panels or in enclosures
KU4. applicable regulations and codes of practice for the activities, equipment or materials)
KU5. various items used with panels and enclosures such as drives and PLC; enclosure partitions; bases for plug-in devices; limit switches; component mounting plates; push and toggle switches; sensors; etc.
KU6. various hazards associated with assembling and wiring electrical panels, such as the use of sharp instruments for stripping cable insulation, and soldering equipment, and how to minimise them
KU7. the importance and process of using appropriate PPE such as anti-static earthed wrist straps and mats
KU8. the importance of maintaining cleanliness in the work area
KU9. how to deal with hazardous voltage
KU10. how to free a victim from electrocution and the appropriate first-aid to be administered to them
KU11. the use of insulated tools, rubber matting and isolating transformers to reduce the risks of a phase to earth shock
KU12. the relevant precautions to be taken to prevent Electrostatic Discharge (ESD) damage to circuits and sensitive components
KU13. how to interpret drawings, circuit and physical layouts, charts, specifications, graphical electrical symbols, etc.
KU14. applicable national and international wiring regulations
KU15. the functions of different types of components and sub-assemblies used in the assembly activities such as contactors; relays/ Switch Mode Power Supply (SMPS); circuit breakers/fuses; solenoids; switches; transformers; ballast chokes; terminal blocks; etc.
KU16. the appropriate preparations to be undertaken on the components and enclosure before the mounting activities
KU17. how the components must be aligned and positioned before securing, and the use of relevant tools and equipment
KU18. how to identify any orientation requirements, values or polarity for the components used in the electrical assembly and wiring activities
KU19. types of cabling to be used in the assembly and wiring of the panels or enclosures, such as single-core, screened, twisted pair/ribbon, multicore, fibre-optic, data/communication, laminated copper, braided copper, etc.
KU20. the importance of electrical bonding/earthing, and the process of ensuring it is mechanically and electrically secure
KU21. the process of selecting wires and cables according to the requirement and applicable safety procedures
KU22. the applicable assembly methods and techniques to be used when wiring electrical panels or components mounted in enclosures
KU23. the process of cable stripping, soldering, crimping, securing wires and cables using cable ties/ lacing/strapping/ harnessing of wires, insulation stripping; cable routing; cable forming/bending; adding cable protection such as sleeves or grommets, etc.
KU24. different types, applications, and methods of attaching identification markers/labels during the electrical wiring activities
KU25. the process of conducting necessary checks to ensure the accuracy and quality of assembly

KU26. how to check the positional accuracy of all components; termination of all wires to components; orientation; security of terminations; alignment; completeness; component security; freedom from damage and of debris; etc.
KU27. the process of checking cable offcuts/insulation, enclosure/trunking breakouts; continuity of cable/wiring connections e.g. battery and lamp checks
KU28. the importance of checking that tools and equipment are free from damage or defects, and in a safe and usable condition with appropriate testing and calibration
KU29. the functions and application of various electrical components
KU30. the current and voltage distribution in series and parallel circuits
KU31. how to make screwed/clamped connections; install and terminate pre-formed looms; make crimped and soldered connections, etc.
KU32. different types of cable and wires such as single-core, screened, twisted pair/ribbon, multicore, fibre-optic, data/communication, laminated copper, braided copper, etc.
KU33. the importance of conducting visual checks for the completeness of conductors or components; mechanical checks to be conducted for the security of components and connections
KU34. checks to be conducted to ensure electrical continuity and earth continuity
KU35. the benefits and methods of resource optimisation

Generic Skills (GS)

User/individual on the job needs to know how to:

GS8. maintain work-related notes and records
GS9. undertake work-related numerical computations
GS10. use the appropriate units of measurement and measuring techniques
GS11. read the relevant literature to learn about the latest developments in the field of work
GS12. listen attentively to understand the information or instructions being shared
GS13. communicate politely and professionally
GS14. plan and prioritise tasks to ensure timely completion
GS15. coordinate with co-workers to achieve the work objectives
GS16. evaluate all possible solutions to a problem to select the best one
GS17. take prompt decisions to deal with workplace emergencies and accidents

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0305
NOS Name	Assemble and wire electrical components and systems to mechanical equipment
Sector	Capital Goods
Sub-Sector	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery, Light Engineering Goods
Occupation	Fitting and Assembly
NSQF Level	3
Credits	TBD
Version	2.0
Last Reviewed Date	
Next Review Date	
Deactivation Date	
NSQC Clearance Date	

CSC/N0306: Assemble and wire electronic equipment and systems to mechanical equipment

Description

This OS unit is about assembling and wiring electronic equipment and sub-assemblies to mechanical equipment following the applicable procedures.

Scope

This unit/task covers the following:

- Assemble and wire electronic equipment and systems
- Follow safety guidelines

Elements and Performance Criteria

Assemble and wire electronic equipment and systems

To be competent, the user/individual on the job must be able to:

PC1. analyse the assembly drawings and charts; interconnection net diagrams; schedules of specified components; wiring specifications; wire running lists to determine the job specifications

PC2. check the availability of the required components and examine them to ensure they are in a usable condition

PC3. check the availability of the appropriate type of solder and associated fluxes in the required quantity, ensuring they have the appropriate shelf life

PC4. follow the applicable risk assessment procedures and regulations

PC5. examine the wire strippers and cutters to ensure they have the appropriate size and are in a usable condition

PC6. check crimp tooling and attachments for the recommended sizes and calibration

PC7. ensure cables and individual wiring/fibre optic links are available in the required types and sizes and are in usable condition

PC8. prepare cable strapping for use by cutting them to nominal length in appropriate sizes, ensuring their availability in the required quantities

PC9. check and prepare consumables and specialized tools to be used for the wiring and interconnections

PC10. use the appropriate methods and techniques to assemble the components in their correct positions

PC11. set up, program and use automated wiring termination equipment, as appropriate

PC12. attach wire terminations following an appropriate method such as soldering, crimping, etc.

PC13. set the interconnection wiring as per the requirement, and bundle/strap/tie wiring looms and cables

PC14. cut wires appropriately to the required length, and strip insulation from wire ends

PC15. set out and terminate any fibre optic links

PC16. check and prepare components, and complete the preparatory assembly

PC17. use the relevant manual/ automatic tools to secure all fastenings;

PC18. assemble sub-units to support housings/brackets, along with connectors and allied devices

PC19. secure the components using the appropriate connectors and securing devices

PC20. check the completed assembly to ensure it has the required specifications and all the necessary operations have been completed

PC21. check the security of all the assembled and interconnected items

PC22. examine the insulation resistance between housing assembly and interconnection wiring
PC23. check for the continuity of all interconnections,
PC24. identify and remove unwanted short circuits between wires
PC25. select the appropriate software as specified for use, and load it on electronic components following the SOP
PC26. check the output of software and functionality of the completed electronic assembly
PC27. ensure compliance with the applicable national and international wiring regulations and procedures in the assembly and wiring activities
PC28. maintain the relevant records as per the applicable organisational procedures

Follow safety guidelines

To be competent, the user/individual on the job must be able to:

PC29. comply with the applicable health, safety, environmental and other relevant regulations
PC30. select and use the appropriate Personal Protective Equipment (PPE) during machining operations
PC31. follow the organisational policy to deal with any hazards encountered during operations
PC32. use the relevant power and manual tools, equipment, and accessories as per the manufacturer's instructions to avoid injury and achieve work efficiency

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the importance of leaving the work area in a safe and clean condition on completion of the electronic assembly and wiring activities
KU2. the importance of storing the tools and equipment safely at the designated storage
KU3. the process of dealing with and disposing of industrial waste
KU4. the relevant safety precautions to be taken while working with soldering and crimping equipment/tools and wiring aids within an electronics assembly and wiring environments, such as avoiding hot solder splashes and flying ends from cut wires
KU5. how to use the relevant PPE while carrying out the electronic wiring activities, such as overall or apron, hearing protection, anti-static devices, face shield, eyeglasses, etc.
KU6. regulations and standards relevant to electronic wiring and assembly operations
KU7. how to interpret and use single line diagram
KU8. how mechanical assembly instructions are represented and how to interpret them
KU9. how to set up, program and use automated wiring termination equipment
KU10. the process of attaching wire terminations following the appropriate methods such as soldering, crimping, etc.
KU11. how to set/position interconnection wiring and bundle/strap/tie wiring looms and cables
KU12. the process of setting and terminating fibre optic links
KU13. how to strip insulation from wires ends
KU14. the process of termination identification such as ferruling, transfer printing; tin/lead soldering; lead-free soldering systems; no-wash fluxing; crimping, etc.
KU15. how different types of electronic wiring and insulation are coded and specified
KU16. how information on wiring interconnections is specified concerning the role of wiring schedules, wire-running lists; and backplane net interconnect lists
KU17. various accessories and aids used for securing electronic wiring such as heat shrink sleeves, strapping, cable ties, P-Clips, etc.
KU18. various tools and aids used in wiring and assembly work, such as soldering tools and equipment, crimp tools, joint/crimp, etc.

KU19. the process of testing and checking equipment for continuity, and short circuit testing
KU20. how to recognise wiring types and sizes, their identification, coding and range of termination methods
KU21. how to identify the types and read the values of electronic components such as resistors, capacitors, diodes, and integrated circuits with reference to their polarity, orientation, colour coding, value, tolerance, and working voltage/current
KU22. how to take anti-static precautions concerning component handling during the wiring and assembly of electronic products
KU23. the handling requirements and termination methods used for Switch-Mode Power Supply (SMPS), high-level protective devices and fibre-optic links
KU24. various checks and tests carried out within wiring and assembly work such as insulation resistance, flashover testing, continuity, short circuit testing, etc.
KU25. the calibration requirements for tools and equipment used in wiring
KU26. the importance of maintaining a dust-free environment for electronic assembly
KU27. how to handle multilayered populated Printed Circuit Boards (PCBs)
KU28. the relevant documentation requirements in the job role
KU29. various problems encountered with wiring and assembly work and how to resolve them
KU30. the basic units used in electro-technology
KU31. function and applications of various electrical components
KU32. process of current and voltage distribution in series and parallel circuits
KU33. magnetic fields for bar magnets in various configurations
KU34. the polarity of a solenoid
KU35. the construction of a capacitor
KU36. sine wave displayed on an oscilloscope
KU37. the process of determining input and output voltage of double wound transformers
KU38. how to construct a simple bridge rectifier circuit, its functions and termination identification, such as ferruling and transfer printing; tin/lead soldering; lead-free soldering; no-wash fluxing; crimping, etc.

Generic Skills (GS)

User/individual on the job needs to know how to:

GS18. maintain work-related notes and records
GS19. read the relevant literature to learn about the latest developments in the field of work
GS20. listen attentively to understand the information or instructions being shared
GS21. undertake work-related numerical computations
GS22. use the appropriate units of measurement and measuring techniques
GS23. communicate politely and professionally
GS24. organise and analyse work-related information
GS25. plan and prioritise tasks to ensure timely completion
GS26. take prompt decisions to deal with workplace emergencies and accidents
GS27. identify possible disruptions to work and take appropriate preventive measures
GS28. evaluate all possible solutions to a problem to select the best one
GS29. coordinate with co-workers to achieve the work objectives

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0306
NOS Name	Assemble and wire electronic equipment and systems to mechanical equipment
Sector	Capital Goods
Sub-Sector	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery, Light Engineering Goods
Occupation	Fitting and Assembly
NSQF Level	3
Credits	TBD
Version	2.0
Last Reviewed Date	
Next Review Date	
Deactivation Date	
NSQC Clearance Date	

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for the Qualification Pack will be created by CGSC.
2. Performance Criteria (PC) have been assigned marks proportional to their importance in NOS. SSC will also lay down the proportion of marks for Theory and Skills Practical for each PC.
3. The assessment for the theory part will/may be based on a knowledge bank of questions approved by CGSC.
4. Assessment will be conducted for all compulsory NOS, and where applicable, on the selectedelective/option NOS/set of NOS.
5. Assessment Agencies will create Assessor Guides comprising of Theory and Practical Assessment Set and Guidelines for each examination/training centre (as per assessment criteria below). The same will beapproved by CGSC for adequacy.
6. To successfully attain Certification on the Qualification Pack, the trainee must score a minimum of 70% in each Core NOS and a minimum of 50% in all non-core NOS. In addition, a candidate needs to attain a minimum overall pass percentage of 70% for certification.
7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Minimum Aggregate Passing % at QP Level: 50

(**Please note**: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage

Total						

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
CO2	Carbon Dioxide
CPR	Cardiac Pulmonary Resuscitation
PPE	Personal Protective Equipment
ESD	Electrostatic Discharge
PCB	Printed Circuit Board

Glossary

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 (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards that apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
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 (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order 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 (GS)	Core skills or Generic Skills (GS) 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. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive 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.