Qualification Pack

Surface Mount Technology (SMT)-Telecom Technician

QP Code: TEL/Q2501

Version: 5.0

NSQF Level: 4

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Contents

Qualification Pack

TEL/Q2501: Surface Mount Technology (SMT)-Telecom Technician

Brief Job Description

A Surface Mount Technology (SMT)-Telecom Technician is responsible for executing the complete SMT assembly process, ensuring high-quality telecom Printed Circuit Board (PCB) production. Key responsibilities include screen printing, precise component placement, reflow soldering, cleaning, inspection, and segregation of functional and defective PCBs. The individual also performs repairs and corrections on defective PCBs. The role requires operating and maintaining advanced SMT equipment while optimizing production efficiency and adhering to industry standards for PCB assembly.

Personal Attributes

The individual should possess strong technical acumen, keen analytical skills, and attention to detail. They must be process-oriented, focused, and capable of maintaining high concentration levels throughout shift hours.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. TEL/N2503: Screen Printing of PCBs
2. TEL/N2504: Component Placement on PCBs
3. TEL/N2505: Re-flow soldering on PCBs
4. TEL/N2502: Cleaning and Inspection of PCBs
5. TEL/N9107: Follow sustainability practices in telecom production and assembly line processes
6. DGT/VSQ/N0101: Employability Skills (30 Hours)

Qualification Pack (QP) Parameters

Sector	Telecom
Sub-Sector	Handset
Occupation	Communication Electronics
Country	India
NSQF Level	4

Credits	18
Aligned to NCO/ISCO/ISIC Code	NCO-2015/3114.1402
Minimum Educational Qualification & Experience	12th grade Pass OR Completed 2nd year of the 3-year diploma after 10 (in Electronics and Communication Engineering/ Electrical and Electronics Engineering/ Instrumentation and Control Engineering) OR 10th grade pass with 3 Years of experience in handset assembly OR Previous relevant Qualification of NSQF Level (3.0) with 3 Years of experience in handset assembly OR Previous relevant Qualification of NSQF Level (3.5) with 1.5 years of experience in handset assembly
Minimum Level of Education for Training in School	Not Applicable
Pre-Requisite License or Training	NA
Minimum Job Entry Age	17 Years
Last Reviewed On	NA
Next Review Date	30/04/2028
NSQC Approval Date	08/05/2025
Version	5.0
Reference code on NQR	QG-04-TL-04082-2025-V2-TSSC
NQR Version	2

TEL/N2503: Screen Printing of PCBs

Description

This unit is about performing screen printing of PCBs with precision and consistency to ensure uniform deposition of solder paste on designated positions, maintaining process efficiency and quality standards

Scope

The scope covers the following :

- Preparation and baking of boards
- Screen printing process
- Quality checks and process optimization

Elements and Performance Criteria

Preparation and baking of boards

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

PC1. determine baking requirements based on customer specifications, material type, and process standards

PC2. stack and place boards in the oven rack following specified alignment and spacing guidelines

PC3. set and monitor temperature, timer, and humidity conditions in the oven as per process requirements

PC4. inspect boards post-baking to check for moisture removal and surface readiness

Screen printing process

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

PC5. select appropriate tools and accessories, including stencil matching the PCB pattern, correct squeegee size, and specified solder paste formulation

PC6. clean stencil before and after use with approved solvents and specified processes to prevent contamination

PC7. apply solder paste evenly using controlled deposition techniques to achieve uniform thickness

PC8. thaw solder paste to the recommended temperature and maintain viscosity consistency before application

PC9. align stencil, PCB, and squeegee in the screen printer for accurate registration and positioning

PC10. operate the screen printing machine, adjusting pressure, speed, and alignment settings for optimal performance

PC11. measure and verify solder paste thickness post-printing, ensuring conformance to process specifications

PC12. troubleshoot printing defects such as misalignment, insufficient paste deposition, or excessive bridging, making necessary adjustments

Quality checks and process optimization

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

PC13. conduct visual and automated inspection to detect defects such as smudging, misalignment, or improper paste application

PC14. document and report deviations, corrective actions, and process improvements as per standard operating procedures

PC15. ensure proper storage and handling of consumables, including solder paste and stencils, to maintain process consistency

PC16. adhere to safety, health, and environmental guidelines while handling chemicals and operating equipment

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. industry standards and best practices for telecom PCB screen printing

KU2. impact of moisture on PCBs and the necessity of baking for reliable solder paste adhesion

KU3. properties of different solder pastes and their suitability for various applications

KU4. importance of stencil cleaning and maintenance to prevent defects and ensure repeatability

KU5. effects of temperature, humidity, and process parameters on screen printing quality

KU6. principles of stencil alignment, fiducial mark recognition, and support pin positioning

KU7. operation, calibration, and maintenance of screen printing machines for optimal performance

KU8. quality control techniques, including paste thickness measurement and visual inspection criteria

KU9. safe handling and disposal of chemicals, solvents, and consumables as per regulatory standards

KU10. documentation and reporting requirements for process tracking and quality assurance

Generic Skills (GS)

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

GS1. read and interpret technical drawings, process specifications, and equipment manuals

GS2. understand material specifications and interpreting standard operating procedures

GS3. onduct effective verbal and written communication for reporting issues and coordinating with team members

GS4. apply problem-solving skills to troubleshoot screen printing defects and improve process efficiency

GS5. apply analytical skills to assess solder paste consistency, stencil alignment, and print quality deviations

GS6. attention to detail in handling delicate components, ensuring precision in printing operations

GS7. apply basic computer literacy to operate automated inspection systems and maintain digital process records

GS8. apply teamwork and collaboration for efficient workflow coordination in a high-speed manufacturing environment

GS9. adapt to learn and implement emerging screen printing technologies and industry innovations

GS10. adhere to workplace safety standards, ensuring compliance with environmental and occupational health regulations

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Preparation and baking of boards	**8**	**12**	**-**	**6**
PC1. determine baking requirements based on customer specifications, material type, and process standards	2	3	-	1
PC2. stack and place boards in the oven rack following specified alignment and spacing guidelines	2	3	-	1
PC3. set and monitor temperature, timer, and humidity conditions in the oven as per process requirements	2	3	-	2
PC4. inspect boards post-baking to check for moisture removal and surface readiness	2	3	-	2
Screen printing process	**14**	**24**	**-**	**10**
PC5. select appropriate tools and accessories, including stencil matching the PCB pattern, correct squeegee size, and specified solder paste formulation	2	3	-	2
PC6. clean stencil before and after use with approved solvents and specified processes to prevent contamination	2	3	-	1
PC7. apply solder paste evenly using controlled deposition techniques to achieve uniform thickness	2	3	-	2
PC8. thaw solder paste to the recommended temperature and maintain viscosity consistency before application	1	3	-	1
PC9. align stencil, PCB, and squeegee in the screen printer for accurate registration and positioning	1	3	-	1
PC10. operate the screen printing machine, adjusting pressure, speed, and alignment settings for optimal performance	2	3	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. measure and verify solder paste thickness post-printing, ensuring conformance to process specifications	2	3	-	1
PC12. troubleshoot printing defects such as misalignment, insufficient paste deposition, or excessive bridging, making necessary adjustments	2	3	-	1
Quality checks and process optimization	**8**	**14**	**-**	**4**
PC13. conduct visual and automated inspection to detect defects such as smudging, misalignment, or improper paste application	2	4	-	1
PC14. document and report deviations, corrective actions, and process improvements as per standard operating procedures	2	4	-	1
PC15. ensure proper storage and handling of consumables, including solder paste and stencils, to maintain process consistency	2	3	-	1
PC16. adhere to safety, health, and environmental guidelines while handling chemicals and operating equipment	2	3	-	1
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N2503
NOS Name	Screen Printing of PCBs
Sector	Telecom
Sub-Sector	Handset
Occupation	Communication Electronics
NSQF Level	4
Credits	5
Version	4.0
Last Reviewed Date	08/05/2025
Next Review Date	30/04/2028
NSQC Clearance Date	08/05/2025

TEL/N2504: Component Placement on PCBs

Description

This unit covers the process of screen printing of boards and associated procedures to ensure uniform deposition of solder paste at required positions. It includes operating chip shooter and fine pitch placer equipment for precise component placement on PCBs

Scope

The scope covers the following :

- Feed and verify placement data
- Load chip component rolls
- Load chip component trays
- Operate chip shooter and fine pitch placer

Elements and Performance Criteria

Feed and verify placement data

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

PC1. map board specifications to the correct software version of the chip shooter or fine pitch placer

PC2. interpret Gerber and x-y coordinate data for component placement

PC3. navigate and operate the machine software interface effectively

PC4. input and verify component placement program data in the equipment

Load chip component rolls

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

PC5. check and confirm the operation of the roll feeder mechanism

PC6. feed Gerber data and insert feeder rolls into the designated slots of the chip shooter

PC7. verify component rolls against part numbers and work specifications

PC8. load chip component rolls in the feeder accurately

PC9. input x-y coordinate data for precise positioning of components

Load chip component trays

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

PC10. load components into the tray as per the placement program

PC11. ensure correct orientation of components in the feeder tray

PC12. check and calibrate the vision cameras for accurate placement

Operate chip shooter and fine pitch placer

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

PC13. verify the correct loading of boards, component placement program, and component rolls or trays

PC14. check placement vacuum pressure to ensure proper suction

PC15. inspect feeder mechanism functions for error-free operation
PC16. operate the component placement equipment according to defined procedures
PC17. apply the tape board technique to validate placement accuracy
PC18. inspect the first sample PCB under a microscope to verify component correctness and placement
PC19. identify and rectify common SMT defects such as tombstoning and solder shorts
PC20. document and report any deviations or errors in placement accuracy

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. work and project management concepts relevant to component placement
KU2. importance of following standard procedures for drawing components and potential impact of non-compliance
KU3. escalation matrix for reporting non-compliance issues
KU4. required process and work records for documentation
KU5. Safety, Health, and Environment (SHE) and Occupational Health and Safety (OHS) regulations as per industry standards
KU6. system specifications, part numbers, and Bill of Material (BOM)
KU7. operational parameters and maintenance requirements of component placement machines
KU8. interpretation of Gerber and x-y coordinate data for precise positioning
KU9. operational cycle and troubleshooting of component placement equipment
KU10. techniques for verifying components under a microscope to ensure correct placement and connectivity
KU11. electrostatic discharge (ESD) precautions, handling procedures, and workplace hygiene
KU12. different types of SMT defects, including misalignment, solder bridges, and component shifting
KU13. best practices for quality assurance and functional testing of PCBs

Generic Skills (GS)

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

GS1. read and comprehend technical documentation, including circuit diagrams and specifications
GS2. report errors and coordinate with team members effectively
GS3. interpret placement data and troubleshoot errors
GS4. use digital tools for data entry, verification, and reporting
GS5. ensure timely completion of placement tasks
GS6. apply problem-solving skills to identify, diagnose, and resolve SMT defects
GS7. adapt to work with evolving SMT technologies and machine software updates
GS8. collaborate with team members for efficient workflow in a production environment
GS9. practice attention to detail for ensuring high accuracy in component placement

GS10. follow standard operating procedures and safety protocols rigorously

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Feed and verify placement data	**5**	**9**	**-**	**4**
PC1. map board specifications to the correct software version of the chip shooter or fine pitch placer	2	3	-	1
PC2. interpret Gerber and x-y coordinate data for component placement	1	2	-	1
PC3. navigate and operate the machine software interface effectively	1	2	-	1
PC4. input and verify component placement program data in the equipment	1	2	-	1
Load chip component rolls	**9**	**14**	**-**	**5**
PC5. check and confirm the operation of the roll feeder mechanism	2	3	-	1
PC6. feed Gerber data and insert feeder rolls into the designated slots of the chip shooter	2	3	-	1
PC7. verify component rolls against part numbers and work specifications	2	3	-	1
PC8. load chip component rolls in the feeder accurately	1	2	-	1
PC9. input x-y coordinate data for precise positioning of components	2	3	-	1
Load chip component trays	**6**	**10**	**-**	**3**
PC10. load components into the tray as per the placement program	2	4	-	1
PC11. ensure correct orientation of components in the feeder tray	2	3	-	1
PC12. check and calibrate the vision cameras for accurate placement	2	3	-	1
Operate chip shooter and fine pitch placer	**10**	**17**	**-**	**8**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. verify the correct loading of boards, component placement program, and component rolls or trays	1	2	-	1
PC14. check placement vacuum pressure to ensure proper suction	1	2	-	1
PC15. inspect feeder mechanism functions for error-free operation	1	2	-	1
PC16. operate the component placement equipment according to defined procedures	2	3	-	1
PC17. apply the tape board technique to validate placement accuracy	1	2	-	1
PC18. inspect the first sample PCB under a microscope to verify component correctness and placement	1	2	-	1
PC19. identify and rectify common SMT defects such as tombstoning and solder shorts	2	2	-	1
PC20. document and report any deviations or errors in placement accuracy	1	2	-	1
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N2504
NOS Name	Component Placement on PCBs
Sector	Telecom
Sub-Sector	Handset
Occupation	Communication Electronics
NSQF Level	4
Credits	5
Version	4.0
Last Reviewed Date	08/05/2025
Next Review Date	30/04/2028
NSQC Clearance Date	08/05/2025

TEL/N2505: Re-flow soldering on PCBs

Description

This unit is about performing re-flow soldering on PCBs, including machine setup, operation, and Quality Assurance (QA) checks, ensuring compliance with industry standards and safety protocols

Scope

The scope covers the following :

- Preparation of the reflow machine
- Re-flow operation on the PCB and QA checks

Elements and Performance Criteria

Preparation of the reflow machine

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

PC1. interpret solder paste characteristics, including viscosity, flux content, and recommended re-flow temperature profile from datasheets and machine guidelines

PC2. set and load the required parameters in the re-flow machine, including temperature zones, conveyor speed, and cooling profile

PC3. verify the functionality of thermal profiling equipment and perform a sample PCB run to measure real-time thermal response

PC4. analyze thermal profiling data and make necessary adjustments to achieve optimal soldering results

PC5. ensure the machine is calibrated and functional before commencing full-scale operations

Re-flow operation on the PCB and QA checks

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

PC6. ensure proper placement of components and even application of solder paste before passing the PCB through the re-flow machine

PC7. monitor the re-flow process and check for deviations in temperature, conveyor movement, and gas flow inside the chamber

PC8. safely retrieve the PCB post re-flow cycle and allow it to cool under controlled conditions

PC9. inspect the PCB for defects such as dry solder joints, tombstoning, misalignment, delamination, and thermal stress-induced damage

PC10. conduct additional QA tests such as X-ray analysis, optical inspection, or functional testing to confirm solder joint integrity

PC11. record process parameters and defect data for continuous improvement and traceability

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. principles of surface mount technology (SMT) and its significance in telecom PCB manufacturing

KU2. SMT electronic components and their temperature capabilities

KU3. PCB, solder paste and SMT processes

KU4. specifications and functions of different solder pastes, including lead-free and leaded options

KU5. work instructions, standard operating procedures, and industry best practices for re-flow soldering

KU6. factors affecting solderability, including oxidation, contamination, humidity, and material compatibility

KU7. types of defects in re-flow soldering, their causes, and corrective measures

KU8. thermal profiling techniques and the impact of incorrect temperature settings on PCB performance

KU9. importance of belt speed, heat zones, and cooling rates in achieving proper solder reflow

KU10. industry standards and compliance requirements such as IPC-A-610 for electronic assemblies

KU11. occupational health and safety (OHS) practices, including safe handling of chemicals, fire prevention measures, and emergency response protocols

KU12. record-keeping and documentation requirements for traceability and process optimization

Generic Skills (GS)

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

GS1. read and interpret technical documents such as machine manuals, datasheets, and industry standards

GS2. communicate effectively with supervisors, quality inspectors, and maintenance personnel to address process issues

GS3. apply critical thinking to analyze process data and troubleshoot re-flow soldering defects

GS4. use digital tools and software for monitoring re-flow parameters and maintaining production logs

GS5. coordinate with team members to ensure smooth workflow and minimal downtime

GS6. adhere to time management practices to complete tasks within production deadlines

GS7. identify and report non-conformities in the soldering process and suggest corrective actions

GS8. apply mathematical skills for temperature calculations, conveyor speed adjustments, and defect analysis

GS9. practice workplace safety measures, including PPE usage, ventilation, and safe chemical handling

GS10. adapt to new technologies and process improvements in re-flow soldering techniques

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Preparation of the reflow machine	**14**	**25**	**-**	**8**
PC1. interpret solder paste characteristics, including viscosity, flux content, and recommended re-flow temperature profile from datasheets and machine guidelines	3	5	-	2
PC2. set and load the required parameters in the re-flow machine, including temperature zones, conveyor speed, and cooling profile	3	5	-	2
PC3. verify the functionality of thermal profiling equipment and perform a sample PCB run to measure real-time thermal response	3	5	-	2
PC4. analyze thermal profiling data and make necessary adjustments to achieve optimal soldering results	3	5	-	1
PC5. ensure the machine is calibrated and functional before commencing full-scale operations	2	5	-	1
Re-flow operation on the PCB and QA checks	**16**	**25**	**-**	**12**
PC6. ensure proper placement of components and even application of solder paste before passing the PCB through the re-flow machine	3	5	-	2
PC7. monitor the re-flow process and check for deviations in temperature, conveyor movement, and gas flow inside the chamber	3	5	-	2
PC8. safely retrieve the PCB post re-flow cycle and allow it to cool under controlled conditions	3	3	-	2
PC9. inspect the PCB for defects such as dry solder joints, tombstoning, misalignment, delamination, and thermal stress-induced damage	2	2	-	2
PC10. conduct additional QA tests such as X-ray analysis, optical inspection, or functional testing to confirm solder joint integrity	3	5	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. record process parameters and defect data for continuous improvement and traceability	2	5	-	2
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N2505
NOS Name	Re-flow soldering on PCBs
Sector	Telecom
Sub-Sector	Handset
Occupation	Communication Electronics
NSQF Level	4
Credits	3
Version	4.0
Last Reviewed Date	08/05/2025
Next Review Date	30/04/2028
NSQC Clearance Date	08/05/2025

TEL/N2502: Cleaning and Inspection of PCBs

Description

This unit covers the process of cleaning and inspecting completed PCBs to ensure quality, reliability, and compliance with industry standards

Scope

The scope covers the following :

- Cleaning of PCBs
- Quality checks and assurance

Elements and Performance Criteria

Cleaning of PCBs

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

PC1. clean PCBs to remove flux residues, white patches, and other contaminants using specified solvents and cleaning agents

PC2. operate vapor de-greaser, ultrasonic cleaner, and other industry-recommended equipment for cleaning PCBs, ensuring effective removal of impurities

PC3. dry PCBs using controlled methods to prevent damage and contamination

PC4. package and store cleaned PCBs using electrostatic discharge (ESD)-safe materials and procedures to maintain integrity and prevent damage

Quality checks and assurance

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

PC5. check PCBs for missing, wrongly mounted, or misaligned components as per specifications and bill of materials (BOM)

PC6. inspect soldering quality, including workmanship, joint integrity, and adherence to IPC standards

PC7. verify placement of board identifiers, conformal coatings, and compliance with customer or regulatory requirements

PC8. identify defects such as cold solder joints, bridging, and insufficient solder, and take corrective action

PC9. identify and segregate functional and defective PCBs

PC10. document findings and escalate non-conformities as per established reporting protocols

PC11. carry out routine maintenance of the SMT equipment to ensure their optimal functioning

PC12. conduct routine shop floor audits to ensure adherence to process parameters, including temperature and humidity control

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. work/project management principles and their application in PCB inspection
KU2. risks and consequences of non-compliance with defined procedures
KU3. escalation matrix for reporting incidents such as system failures, contamination issues, and non-conformities
KU4. importance of record-keeping and potential consequences of poor documentation
KU5. Safety, Health, and Environment (SHE) and Occupational Health and Safety (OHS) regulations as per company and industry standards
KU6. properties, usage, and handling of cleaning chemicals/solvents used for PCB cleaning
KU7. principles and techniques of PCB cleaning, including solvent-based and ultrasonic methods
KU8. operation and maintenance of cleaning equipment such as vapor de-greasers and ultrasonic cleaners
KU9. quality control and quality assurance parameters related to PCB inspection
KU10. IPC and industry standards for soldering, component placement, and PCB integrity
KU11. ESD-safe handling procedures and their impact on PCB reliability

Generic Skills (GS)

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

GS1. read and interpret technical documents, including schematics, BOMs, and work instructions
GS2. comprehend and apply safety manuals, operational guidelines, and quality standards
GS3. communicate effectively with team members, supervisors, and external stakeholders
GS4. problem-solving skills to identify, analyze, and resolve quality or process-related issues
GS5. practice attention to detail to detect defects, inconsistencies, and non-conformities in PCBs
GS6. collaborate effectively in a production and quality control environment
GS7. adapt to learn and implement new inspection techniques, tools, and industry best practices
GS8. manage time effectively to meet production deadlines and quality standards
GS9. use digital tools and software for data recording, reporting, and analysis
GS10. ensure quality standards align with end-user requirements and expectations

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Cleaning of PCBs	**10**	**20**	**-**	**6**
PC1. clean PCBs to remove flux residues, white patches, and other contaminants using specified solvents and cleaning agents	2	5	-	2
PC2. operate vapor de-greaser, ultrasonic cleaner, and other industry-recommended equipment for cleaning PCBs, ensuring effective removal of impurities	3	5	-	2
PC3. dry PCBs using controlled methods to prevent damage and contamination	3	5	-	1
PC4. package and store cleaned PCBs using electrostatic discharge (ESD)-safe materials and procedures to maintain integrity and prevent damage	2	5	-	1
Quality checks and assurance	**20**	**30**	**-**	**14**
PC5. check PCBs for missing, wrongly mounted, or misaligned components as per specifications and bill of materials (BOM)	3	4	-	2
PC6. inspect soldering quality, including workmanship, joint integrity, and adherence to IPC standards	3	4	-	2
PC7. verify placement of board identifiers, conformal coatings, and compliance with customer or regulatory requirements	3	4	-	2
PC8. identify defects such as cold solder joints, bridging, and insufficient solder, and take corrective action	3	4	-	2
PC9. identify and segregate functional and defective PCBs	2	4	-	2
PC10. document findings and escalate non-conformities as per established reporting protocols	2	3	-	1
PC11. carry out routine maintenance of the SMT equipment to ensure their optimal functioning	2	3	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. conduct routine shop floor audits to ensure adherence to process parameters, including temperature and humidity control	2	4	-	2
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N2502
NOS Name	Cleaning and Inspection of PCBs
Sector	Telecom
Sub-Sector	Handset
Occupation	Communication Electronics
NSQF Level	4
Credits	3
Version	5.0
Last Reviewed Date	08/05/2025
Next Review Date	30/04/2028
NSQC Clearance Date	08/05/2025

TEL/N9107: Follow sustainability practices in telecom production and assembly line processes

Description

This unit covers sustainability practices in telecom production and assembly lines. It includes identification, segregation, recycling, and responsible disposal of telecom components and materials, ensuring compliance with environmental regulations and promoting sustainable manufacturing processes.

Scope

The scope covers the following :

- Identify and segregate recyclable, refurbishable, and hazardous components
- Follow green manufacturing and sustainable assembly practices
- Dispose of and recycle waste
- Comply with environmental and sustainability regulations

Elements and Performance Criteria

Identify and segregate recyclable, refurbishable, and hazardous components

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

PC1. inspect incoming and outgoing materials to identify recyclable, refurbishable, and hazardous components

PC2. categorize telecom components such as PCBs, cables, batteries, and plastic casings for appropriate processing

PC3. maintain an inventory of recyclable and hazardous materials to track waste management

PC4. store e-waste separately and label it in accordance with Extended Producer Responsibility (EPR) guidelines

PC5. identify and report any improper disposal practices to the designated authority

Follow green manufacturing and sustainable assembly practices

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

PC6. use energy-efficient equipment, tools, and automated systems to reduce carbon footprint

PC7. follow low-emission soldering and lead-free assembly processes to minimize pollution

PC8. optimize the use of materials, water, and electricity during production

PC9. conduct regular maintenance and calibration of energy-efficient machinery to ensure optimal performance

PC10. adopt ISO 14001 (Environmental Management System) compliance in production workflows

Dispose of and recycle waste

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

PC11. dispose of hazardous waste (e.g., lithium batteries, chemical residues) in accordance with environmental safety protocols

PC12. deposit non-hazardous, recyclable materials (e.g., plastics, aluminum, copper) in designated collection areas

PC13. maintain documentation for waste disposal and recycling compliance audits

PC14. conduct periodic waste audits to identify opportunities for further waste reduction

PC15. coordinate with authorized e-waste recyclers to ensure proper processing and disposal

Comply with environmental and sustainability regulations

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

PC16. follow the applicable national and international environmental laws and regulations for telecom manufacturing

PC17. participate in sustainability audits and assessments as per company policies

PC18. check for adherence to sustainability guidelines and report deviations

PC19. follow corrective actions based on environmental audits and assessments

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the organization's sustainability policies and goals

KU2. EPR guidelines, ISO 14001, and e-waste disposal laws

KU3. the methods for identifying recyclable and hazardous components

KU4. green manufacturing practices, including energy-efficient tools, lead-free soldering, and automation

KU5. proper handling, storage, and disposal of e-waste

KU6. the techniques for reducing material wastage without impacting production quality

KU7. safe and responsible handling of hazardous and non-hazardous materials

KU8. environmental impact assessment techniques for telecom production

KU9. the documentation requirements for sustainability audits and compliance tracking

Generic Skills (GS)

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

GS1. read and interpret technical manuals, regulatory guidelines, and environmental compliance documents

GS2. effectively report waste management data, sustainability initiatives, and compliance issues

GS3. identify and implement solutions to reduce material wastage and improve resource efficiency

GS4. coordinate with waste management teams, auditors, and suppliers to implement sustainable practices

GS5. assess and interpret sustainability data to improve environmental impact measures

GS6. evaluate options for waste management and select the most sustainable alternative

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Identify and segregate recyclable, refurbishable, and hazardous components	**6**	**10**	**-**	**5**
PC1. inspect incoming and outgoing materials to identify recyclable, refurbishable, and hazardous components	1	2	-	1
PC2. categorize telecom components such as PCBs, cables, batteries, and plastic casings for appropriate processing	1	2	-	1
PC3. maintain an inventory of recyclable and hazardous materials to track waste management	1	2	-	1
PC4. store e-waste separately and label it in accordance with Extended Producer Responsibility (EPR) guidelines	1	2	-	1
PC5. identify and report any improper disposal practices to the designated authority	2	2	-	1
Follow green manufacturing and sustainable assembly practices	**10**	**15**	**-**	**5**
PC6. use energy-efficient equipment, tools, and automated systems to reduce carbon footprint	2	3	-	1
PC7. follow low-emission soldering and lead-free assembly processes to minimize pollution	2	3	-	1
PC8. optimize the use of materials, water, and electricity during production	2	3	-	1
PC9. conduct regular maintenance and calibration of energy-efficient machinery to ensure optimal performance	2	3	-	1
PC10. adopt ISO 14001 (Environmental Management System) compliance in production workflows	2	3	-	1
Dispose of and recycle waste	**10**	**15**	**-**	**6**
PC11. dispose of hazardous waste (e.g., lithium batteries, chemical residues) in accordance with environmental safety protocols	2	3	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. deposit non-hazardous, recyclable materials (e.g., plastics, aluminum, copper) in designated collection areas	2	3	-	2
PC13. maintain documentation for waste disposal and recycling compliance audits	2	3	-	1
PC14. conduct periodic waste audits to identify opportunities for further waste reduction	2	3	-	1
PC15. coordinate with authorized e-waste recyclers to ensure proper processing and disposal	2	3	-	1
Comply with environmental and sustainability regulations	**4**	**10**	**-**	**4**
PC16. follow the applicable national and international environmental laws and regulations for telecom manufacturing	1	2	-	1
PC17. participate in sustainability audits and assessments as per company policies	1	3	-	1
PC18. check for adherence to sustainability guidelines and report deviations	1	3	-	1
PC19. follow corrective actions based on environmental audits and assessments	1	2	-	1
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N9107
NOS Name	Follow sustainability practices in telecom production and assembly line processes
Sector	Telecom
Sub-Sector	
Occupation	Generic
NSQF Level	4
Credits	1
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	30/04/2028
NSQC Clearance Date	08/05/2025

DGT/VSQ/N0101: Employability Skills (30 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

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

PC1. understand the significance of employability skills in meeting the job requirements

Constitutional values – Citizenship

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

PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices

Becoming a Professional in the 21st Century

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

PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.

Basic English Skills

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

PC4. speak with others using some basic English phrases or sentences

Communication Skills

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

PC5. follow good manners while communicating with others

PC6. work with others in a team

Diversity & Inclusion

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

PC7. communicate and behave appropriately with all genders and PwD

PC8. report any issues related to sexual harassment

Financial and Legal Literacy

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

PC9. use various financial products and services safely and securely

PC10. calculate income, expenses, savings etc.

PC11. approach the concerned authorities for any exploitation as per legal rights and laws

Essential Digital Skills

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

PC12. operate digital devices and use its features and applications securely and safely

PC13. use internet and social media platforms securely and safely

Entrepreneurship

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

PC14. identify and assess opportunities for potential business

PC15. identify sources for arranging money and associated financial and legal challenges

Customer Service

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

PC16. identify different types of customers

PC17. identify customer needs and address them appropriately

PC18. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

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

PC19. create a basic biodata

PC20. search for suitable jobs and apply

PC21. identify and register apprenticeship opportunities as per requirement

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use basic spoken English language

KU6. Do and dont of effective communication

KU7. inclusivity and its importance

KU8. different types of disabilities and appropriate communication and behaviour towards PwD

KU9. different types of financial products and services

KU10. how to compute income and expenses
KU11. importance of maintaining safety and security in financial transactions
KU12. different legal rights and laws
KU13. how to operate digital devices and applications safely and securely
KU14. ways to identify business opportunities
KU15. types of customers and their needs
KU16. how to apply for a job and prepare for an interview
KU17. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

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

GS1. communicate effectively using appropriate language
GS2. behave politely and appropriately with all
GS3. perform basic calculations
GS4. solve problems effectively
GS5. be careful and attentive at work
GS6. use time effectively
GS7. maintain hygiene and sanitisation to avoid infection

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction to Employability Skills	**1**	**1**	**-**	**-**
PC1. understand the significance of employability skills in meeting the job requirements	-	-	-	-
Constitutional values – Citizenship	**1**	**1**	**-**	**-**
PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices	-	-	-	-
Becoming a Professional in the 21st Century	**1**	**3**	**-**	**-**
PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.	-	-	-	-
Basic English Skills	**2**	**3**	**-**	**-**
PC4. speak with others using some basic English phrases or sentences	-	-	-	-
Communication Skills	**1**	**1**	**-**	**-**
PC5. follow good manners while communicating with others	-	-	-	-
PC6. work with others in a team	-	-	-	-
Diversity & Inclusion	**1**	**1**	**-**	**-**
PC7. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC8. report any issues related to sexual harassment	-	-	-	-
Financial and Legal Literacy	**3**	**4**	**-**	**-**
PC9. use various financial products and services safely and securely	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. calculate income, expenses, savings etc.	-	-	-	-
PC11. approach the concerned authorities for any exploitation as per legal rights and laws	-	-	-	-
Essential Digital Skills	**4**	**6**	**-**	**-**
PC12. operate digital devices and use its features and applications securely and safely	-	-	-	-
PC13. use internet and social media platforms securely and safely	-	-	-	-
Entrepreneurship	**3**	**5**	**-**	**-**
PC14. identify and assess opportunities for potential business	-	-	-	-
PC15. identify sources for arranging money and associated financial and legal challenges	-	-	-	-
Customer Service	**2**	**2**	**-**	**-**
PC16. identify different types of customers	-	-	-	-
PC17. identify customer needs and address them appropriately	-	-	-	-
PC18. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	**1**	**3**	**-**	**-**
PC19. create a basic biodata	-	-	-	-
PC20. search for suitable jobs and apply	-	-	-	-
PC21. identify and register apprenticeship opportunities as per requirement	-	-	-	-
NOS Total	**20**	**30**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0101
NOS Name	Employability Skills (30 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	2
Credits	1
Version	1.0
Last Reviewed Date	30/04/2025
Next Review Date	30/04/2028
NSQC Clearance Date	30/04/2025

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Element/ 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 Element/ 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 center (as per assessment criteria below).

5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.

6. To pass the Qualification Pack assessment, every trainee should score the Recommended Pass % aggregate for the QP.

7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Minimum Aggregate Passing % at QP Level : 70

(**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
TEL/N2503.Screen Printing of PCBs	30	50	0	20	100	20
TEL/N2504.Component Placement on PCBs	30	50	0	20	100	20
TEL/N2505.Re-flow soldering on PCBs	30	50	0	20	100	20
TEL/N2502.Cleaning and Inspection of PCBs	30	50	0	20	100	15
TEL/N9107.Follow sustainability practices in telecom production and assembly line processes	30	50	0	20	100	15
DGT/VSQ/N0101.Employability Skills (30 Hours)	20	30	-	-	50	10
Total	**170**	**280**	**0**	**100**	**550**	**100**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
TSSC	Telecom Sector Skill Council
TRAI	Telecom Regulatory Authority of India
PCB	Printed Circuit Board
RPA	Robotic Process Automation
ERP	Enterprise Resource Planning
AR	Augmented Reality
IoT	Internet of Things
SMT	Surface Mount Technology
ESD	Electrostatic Discharge
EPR	Extended Producer Responsibility

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 which 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.