

# Model Curriculum

## Hand Soldering Technician Telecom Board

**SECTOR: TELECOM**  
**SUB-SECTOR: HANDSET**  
**OCCUPATION: COMMUNICATION ELECTRONICS**  
**REF ID: TEL/Q2500, V1.0**  
**NSQF LEVEL: 4**



## Certificate

### CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

**TELECOM SECTOR SKILL COUNCIL**

for the

**MODEL CURRICULUM**

Complying to National Occupational Standards of  
Job Role/ Qualification Pack: 'Hand Soldering Technician Telecom Board'  
QP No. 'TEL/Q2500 NSQF Level 4'

Date of Issuance: **Nov 10<sup>th</sup>, 2017**

Valid up to\*: **Nov 10<sup>th</sup>, 2021**

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



Authorised Signatory  
(Telecom Sector Skill Council)

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# Hand Soldering Technician Telecom Board

## CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Hand Soldering Technician Telecom Board”, in the “Telecom” Sector/Industry and aims at building the following key competencies amongst the learner.

<b>Program Name</b>	<b>Hand Soldering Technician Telecom Board</b>		
<b>Qualification Pack Name &amp; Reference ID.</b>	Hand Soldering Technician Telecom Board & TEL/Q2500, Version 1.0		
<b>Version No.</b>	1.0	<b>Version Update Date</b>	10-11-2017
<b>Pre-requisites to Training</b>	10+2		
<b>Training Outcomes</b>	<p><b>After completing this programme, participants will be able to:</b></p> <ul style="list-style-type: none"> <li>• Illustrate working on hand soldering equipment with various level soldering techniques</li> <li>• Analyse on the defected equipment with precision on telecom board</li> <li>• Demonstrate cleaning and inspection of telecom boards as per the specified procedure and process</li> <li>• Inspect the working area environment and assure it meets requirement for health, safety and security</li> </ul>		

This course encompasses 4 out of 4 National Occupational Standards (NOS) of “Hand Soldering Technician Telecom Board” Qualification Pack issued by “TSSC: Telecom Sector Skill Council”

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1.	<p><b>Introduction</b></p> <p><b>Theory Duration</b> (hh:mm) 10:00</p> <p><b>Practical Duration</b> (hh:mm) 15:00</p> <p><b>Corresponding NOS Code</b> Bridge Module</p>	<ul style="list-style-type: none"> <li>Define basic electronics like active and passive components including resistors, capacitors, inductors and colour coding of capacitors and resistors</li> <li>Compare different kinds of diodes – switch and rectifier, transistors – amplifier and switch and logic gates</li> <li>Outline the functions of electronic circuits (transmitters, receivers, switches, power supplies, amplifiers, multiplexers, couplers, registers, memory and all RF circuits) in different telecom equipment</li> <li>Explain different types of Printed Circuit Boards (PCBs) like multi-layered PCB</li> <li>Illustrate the properties of Copper–Clad laminates (CCL), layout design and planning</li> <li>Illustrate cleaning of boards before soldering</li> </ul>	NA
2.	<p><b>High density hand soldering of component on telecom boards</b></p> <p><b>Theory Duration</b> (hh:mm) 35:00</p> <p><b>Practical Duration</b> (hh:mm) 50:00</p> <p><b>Corresponding NOS Code</b> TEL/N2500</p>	<ul style="list-style-type: none"> <li>Develop board and material/components for soldering on telecom boards</li> <li>Explain the basics of CAD specification</li> <li>Examine the impact of temperature and humidity on high-density soldering</li> <li>Handle different kinds of electronic parts or components &amp; connectors and their specifications</li> <li>Follow IPC standards for soldering activity</li> <li>Set the correct orientation of components on telecom boards</li> <li>Select correct solder bit, soldering wire and correct flux and check component leads and boards for any contamination</li> </ul>	BGA chip, de-soldering and soldering station, hot air gun, microscope, zinc and copper wire fume extractor, flux, Sponge, brass wool, ESO brush, Iso-Propyl Alcohol (IPA), lint-free cloth, automatic screwing machine, Hand Tools – (Precision screwdrivers, solder, flux, jumper wires, cutter, tweezers, wire strippers etc.)
3.	<p><b>Re-working on defected and selective soldering</b></p> <p><b>Theory Duration</b> (hh:mm) 30:00</p> <p><b>Practical Duration</b> (hh:mm) 35:00</p>	<ul style="list-style-type: none"> <li>Examine the board against the specification i.e. CAD and BOM (Bill of Material) before soldering</li> <li>Map the board components with CAD specification for accurate placement and orientation</li> <li>Identify the fault in the existing board (i.e. solder shot, pin holes/blow holes, spikes, peaks, gold fingers and dry solder) and rectify it with the use of proper tools and equipment</li> <li>Examine the re-use or replacement of component</li> <li>Elaborate the importance of ESD and hygiene</li> </ul>	BGA chip, de-soldering and soldering station, hot air gun, microscope, zinc and copper wire fume extractor, flux, Sponge, brass wool, ESO brush, Iso-Propyl Alcohol (IPA), lint-free cloth, automatic screwing machine, Hand Tools – (Precision screwdrivers, solder, flux, jumper wires,

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<b>Corresponding NOS Code</b> TEL/N2501		cutter, tweezers, wire strippers etc.)
4.	<b>Cleaning and Inspection of Telecom boards</b>  <b>Theory Duration</b> (hh:mm) 30:00  <b>Practical Duration</b> (hh:mm) 35:00  <b>Corresponding NOS Code</b> TEL/N2502	<ul style="list-style-type: none"> <li>• Clean PCB from flux residues, white patches/powder using specified – solvent/agent</li> <li>• Ensure safe and proper storage of cleaned PCBs</li> <li>• Operate vapour de-greaser (boil, rinse, vaporize and dry) to clean the boards</li> <li>• Examine PCB for any missing components, wrongly placed components</li> <li>• Verify the soldering workmanship and defects</li> <li>• Check the PCB assembler for defects</li> <li>• Verify the completeness of requirement specifications and documentation</li> <li>• Inspect all available infrastructure and test equipment</li> <li>• Handle complaint and escalation process</li> <li>• Assure for proper jigs and settings</li> </ul>	Board Cleaning solvents/solutions, De-Greasers, PCB Storage system (ESD Compliant)
5.	<b>Health &amp; Safety</b>  <b>Theory Duration</b> (hh:mm) 5:00  <b>Practical Duration</b> (hh:mm) 15:00  <b>Corresponding NOS Code</b> TEL/N2509	<ul style="list-style-type: none"> <li>• Exhibit different safety equipment and their use/applicability</li> <li>• Illustrate organizational set-up for work safety</li> <li>• List the general causes of accident and hazards</li> <li>• Contrast the importance of safety measures and health practices</li> <li>• Explain the procedures for safety hazards</li> <li>• Interpret different types of fire-fighting equipment and their applicability</li> <li>• Outline the rescue techniques</li> <li>• Demonstrate the electrical safety practices</li> <li>• Identify instructions and charts and signage</li> </ul>	Health and Safety Kit
6.	<b>Industrial Education</b>  <b>Theory Duration</b> (hh:mm) 5:00  <b>Practical Duration</b> (hh:mm) 15:00  <b>Corresponding NOS Code</b> Bridge Module	<ul style="list-style-type: none"> <li>• Communicate with colleagues, peers and supervisor and stakeholders</li> <li>• Follow liaising and coordination skills</li> <li>• Listen effectively and orally communicate information accurately</li> <li>• Identify Quality Check (QC) tools</li> <li>• Follow maintenance procedures and management</li> <li>• Take part in routine, preventive predictive, break down maintenance and basic store management</li> <li>• Summarize industrial act, company standards</li> <li>• Maintain ERP and Log sheet/Log book</li> </ul>	NA

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> <li>Compile the importance of standard operating procedure</li> </ul>	
7.	<b>Soft Skills</b>  <b>Theory Duration</b> (hh:mm) 5:00  <b>Practical Duration</b> (hh:mm) 15:00  <b>Corresponding NOS Code</b> Bridge Module	<ul style="list-style-type: none"> <li>Explain grooming guidelines w.r.t a hand soldering technician</li> <li>Discover the importance of grooming</li> <li>Demonstrate professional grooming guidelines w.r.t hand soldering technician</li> <li>Identify the need for effective communication as a hand soldering technician</li> <li>Demonstrate effective process of communication at workplace</li> <li>Demonstrate effective listening skills in day-to-day life</li> <li>Explain effective time management techniques and its benefits</li> <li>Identify time wasters from daily schedule</li> <li>Demonstrate effective time management skills by using building blocks</li> </ul>	NA
	<b>Total Duration</b>  <b>Theory Duration</b> <b>120:00</b>  <b>Practical Duration</b> <b>180:00</b>	<b>Unique Equipment Required:</b>  Laptop/PC, white board, marker, projector, first aid kit, BGA chip, de-soldering and soldering station, hot air gun, microscope, zinc and copper wire, fume extractor, flux, Sponge, brass wool, ESO brush, Iso- Propyl Alcohol (IPA), lint-free cloth, automatic screwing machine, Hand Tools – (Precision screwdrivers, solder, flux, jumper wires, cutter, tweezers, wire strippers etc.), Board Cleaning solvents/solutions, De-Greasers, PCB Storage system (ESD Compliant), Health and Safety Kit	

Grand Total Course Duration: **300Hours, 0 Minute**

*(This syllabus/ curriculum has been approved by **TSSC: Telecom Sector Skill Council**)*

## Trainer Prerequisites for Job role: “Hand Soldering Technician Telecom Board” mapped to Qualification Pack: “TEL/Q2500, V1.0”

Sr. No.	Area	Details
1	<b>Description</b>	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack “TEL/Q2500, Version No. 1.0”
2	<b>Personal Attributes</b>	Aptitude for conducting training, and pre/post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field
3	<b>Minimum Educational Qualifications</b>	ITI/Diploma
4a	<b>Domain Certification</b>	Certified for Job Role: “ <u>Hand Soldering Technician Telecom Board</u> ” mapped to QP: “ <u>TEL/Q2500</u> ”, Version No. 1.0 Minimum accepted score should be mentioned as 80%.
4b	<b>Platform Certification</b>	Recommended that the Trainer is certified for the Job Role: “ <u>Trainer</u> ”, mapped to the Qualification Pack: “ <u>MEP/Q0102</u> ”, Version No. 1.0 Minimum accepted score as per SSC guidelines is 80%.
5	<b>Experience</b>	<ul style="list-style-type: none"> <li>The trainer should be certified by TSSC as ‘Train the Trainer’ and ‘Assessor’</li> <li>Worked on shop floor of a manufacturing company or with relevant experience in Handset repair for a minimum of 1 year</li> </ul>



## Annexure: Assessment Criteria

<b>Assessment Criteria</b>	
<b>Job Role</b>	<b>Hand Soldering Technician Telecom Board</b>
<b>Qualification Pack</b>	<b>TEL/Q2500, V. 1.0</b>
<b>Sector Skill Council</b>	<b>Telecom</b>

<b>Sr. No.</b>	<b>Guidelines for Assessment</b>
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC
3	Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS
4	Individual assessment agencies will create unique question papers for theory and skill practical part for each candidate at each examination/ training center.
5	To pass the Qualification Pack, every trainee should score a minimum 70% of aggregate marks to successfully clear the assessment
6	In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

Compulsory NOS		Total Marks: 400		Marks Allocation	
Assessable Outcomes	Assessment criteria for outcomes	Total Marks	Out of	Theory	Skills Practical
TEL/N2500 Preparing board and material/components	PC1. read and understand basics of CAD specifications	100	8	5	3
	PC2. set the soldering jig/ fixture as per the work specifications		9	4	5
	PC3. gather all components to be soldered as per the specifications		8	2	6
	PC4. set the temperature as per the work and component specifications and measure the same using sensors		9	2	7
	PC5. select the correct solder bit and soldering wire for the given work		10	4	6
	PC6. clean solder bits, component leads and boards of any contamination		9	0	9
	PC7. clean the solder wire of any contamination		9	0	9
	PC8. select the correct flux as per specifications		10	5	5
Soldering of components on boards	PC9. undertake correct placement and orientation of components and demonstrate (amount of solder feeding, sufficient flux addition, correct positioning and vector speed of nozzle, no solder on gold figures) while holding the equipment		12	4	8
	PC10. regulate soldering temperature throughout the process so that it remains consistent		8	2	6
	PC11. maintain solder stations as per the procedure (start and shut down procedures)		8	2	6
	<b>Total</b>		<b>100</b>	<b>30</b>	<b>70</b>
TEL/N2501 Verification of completed board against specification	PC1. identify (from software library/ system) the correct CAD and BOM vis-à-vis the board to be verified	100	10	5	5
	PC2. map the on-board components vis-à-vis CAD specifications for correct placement and orientation and demonstrate the same specifications for correct placement and orientation and demonstrate the same		10	5	5
	PC3. ascertain values and specifications of the components vis-à-vis the drawings/ work order		16	7	9
	PC4. demonstrate ability to check defects (excess burr in component base, visible damages to the board and components, solder shorts, pin holes/ blow holes, spikes, peaks, gold figures and dry solder)		14	6	8
	PC5. analyse result of functional checks of the board		15	9	6
Selective soldering and re-work	PC6. identify/ mark all components to be reworked/re-soldered		10	5	5
	PC7. ascertain if the same component can be re-used or source a replacement		15	6	9
	PC8. re-solder as per the soldering process		10	5	5
	<b>Total</b>		<b>100</b>	<b>48</b>	<b>52</b>

TEL/N2502 Cleaning of telecom boards	PC1. demonstrate ability to clean the board from flux residues, white patches and/ or powder, using correct and specified solvent	<b>100</b>	15	5	10
	PC2. operate vapour de-greaser (boil, rinse, vapourise and dry) to clean the boards		15	7	8
	PC3. demonstrate safe packaging and storage of telecom boards, using the specified wrapping material		15	4	11
Inspection – QA/QC	PC4. demonstrate ability to check telecom boards for any missing components, wrongly mounted components (location, value) or improper placement, vis-à-vis the specifications		12	7	5
	PC5. demonstrate ability to check the telecom boards for soldering workmanship and defects, proper placement of board identifier, adherence to specifications, conformal coatings		13	6	7
	PC6. demonstrate complaint handling and escalation processes		15	8	7
	PC7. undertake checks of shop-floor with respect to adherence to the processes and parameters (temperature, humidity)		15	7	8
<b>Total</b>			<b>100</b>	<b>44</b>	<b>56</b>
TEL/N2509 Health & safety	PC1. ensure that work is carried out in accordance with the laid down safety, security policies and procedures of the organization	<b>100</b>	10	6	4
	PC2. ensure that site is assessed for safety and emergency readiness compliance as per company's guidelines		12	6	6
	PC3. ensure electrical safety compliances and EMI/EMC hygiene requirements are met as per the guidelines		15	9	6
	PC4. identify and correct any hazards that you can deal with safely, competently and within the limits of your authority		15	10	5
	PC5. report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected		12	7	5
	PC6. follow your organizations' emergency procedures promptly, calmly and efficiently		12	6	6
	PC7. identify and recommend opportunities for improving health, safety, security to the designated person		14	8	6
	PC8. complete any health and safety records legibly and accurately		10	5	5
<b>Total</b>			<b>100</b>	<b>57</b>	<b>43</b>