

# QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR TELECOM INDUSTRY

## What are Occupational Standards(OS)?

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

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## Introduction

### Qualifications Pack- BroadBand Technician

**SECTOR:** TELECOM

**SUB-SECTOR:** Service Provider

**OCCUPATION:** CUSTOMER SERVICES

**REFERENCE ID:** TEL/Q0102

**ALIGNED TO:** NCO-2015/3114.0804

**Brief Job Description:** Broadband Technician is responsible for installation, configuration and testing of CPE (modem, routers and switches) for broadband access. He also establishes connectivity between CPE and end-user device (CPU, Laptop, tablets, Smart/IP TV etc.) at customer premises and carries out basic trouble-shooting for identifying, localizing & rectifying cable, connectivity and equipment fault in coordination with NOC.

**Personal Attributes:** Personal Attributes: This job requires the individual to have good communication skills with a clear diction; regional language proficiency; strong customer service focus; pleasant personality; should be self-motivated; should be able to apply practical judgment to successfully perform the assigned responsibilities and a team player with ability to work under pressure.



Keywords /Terms	Description
Sector	Sector is a conglomeration of different business operations having similar businesses 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.
Function	Function is an activity necessary for achieving the key purpose of the sector, occupation, or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of OS.
Job Role	Job role defines a unique set of functions that together form a unique employment opportunity in an organization.
OS	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the knowledge and understanding they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria	Performance Criteria are statements that together specify the standard of performance required when carrying out a task.
NOS	NOS are Occupational Standards which apply uniquely in the Indian context.
Qualifications Pack Code	Qualifications Pack Code is a unique reference code that identifies a qualifications pack.
Qualifications Pack	Qualifications Pack comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A Qualifications Pack is assigned a unique qualification 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.
Knowledge and Understanding	Knowledge and Understanding are statements which together specify the technical, generic, professional and organizational specific knowledge that an individual needs in order to perform to the required standard.
Organizational Context	Organizational Context includes the way the organization 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 or Generic Skills	Core Skills or Generic Skills are a group of skills that are key to learning and working 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.

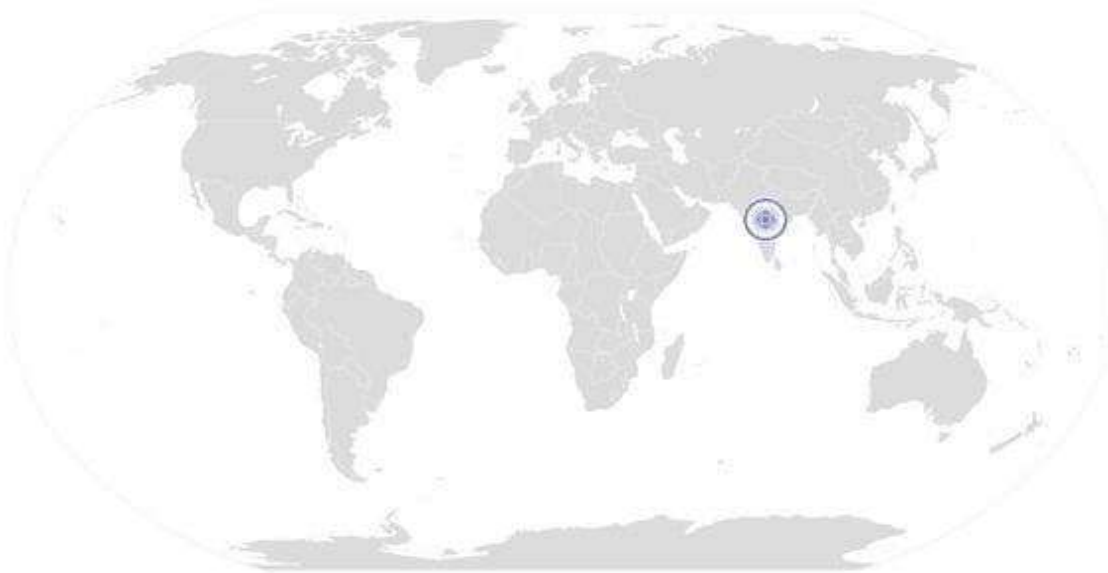
Qualifications Pack For Broadband Technician

Acronyms

Keywords /Terms	Description
CPE	Customer Premise Equipment
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
Modem	Modulator/Demodulator
CPU	Central Processing Unit
PoP	Point of Presence
OHS	Organizational Health & Safety
EMI	Electro Magnetic Interference
EMC	Electro Magnetic Compatibility
JB	Junction Box
SHE	Safety Health & Environment
OHS	Operational Health & Safety
OFC	Optical Fiber Cable
STP	Shielded Twisted Pair
UTP	Un-Shielded Twisted Pair
MAC	Media Access Control
IP	Internet Protocol

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# National Occupational Standard



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## Overview

This unit is about cable/system wiring & installation of customer premises equipment (CPE).



TEL/N0111

**System wiring and equipment installation at customer premises**

National Occupational Standard	<b>Unit Code</b>	TEL/N0111
	<b>Unit Title (Task)</b>	System wiring & equipment installation at customer premises
	<b>Description</b>	This unit is about cable/system wiring & installation of customer premises equipment. Cables include OFC, UTP/STP and Co-axial.
	<b>Scope</b>	<p>This unit/task covers the following:</p> <ul style="list-style-type: none"> <li>Identify and mark cable route from PoP to customer premise</li> <li>Identify and mark cable route within customer premise</li> <li>Identify suitable position for equipment positioning</li> <li>Undertake wiring, termination and equipment installation</li> </ul>
	<b>Performance Criteria (PC) w.r.t. the Scope</b>	
	<b>Element</b>	<b>Performance Criteria</b>
	<b>Prepare for wiring and equipment installation</b>	<p>To be competent, the user/individual on the job must be able to</p> <p>PC1. arrange access to site according to required procedure</p> <p>PC2. organize tools, equipment and materials for a given work</p> <p>PC3. match cable type and connectors to installation environment and customer requirements</p> <p>PC4. check cable length for continuity</p> <p>PC5. verify cable route is free of electrical hazards and obstructions both outdoors and indoors</p> <p>PC6. verify that the cable running length is within the permissible limit to ensure designed throughput</p> <p>PC7. select suitable location for equipment installation wrt power point and signal coverage</p>
	<b>6   Page Undertake wiring &amp; Install system hardware</b>	<p>PC8. ensure structured wiring from PoP to Customer premise JB</p> <p>PC9. ensure neat wiring and clipping within customer premise</p> <p>PC10. ensure proper cable termination and use of appropriate connectors</p> <p>PC11. test the cable &amp; joints for transmission loss and strength. Re-terminate if loss exceeds prescribed limits</p> <p>PC12. install equipment following electrical safety principals and manufacturer's instructions</p> <p>PC13. power-up the system ensuring proper earthing arrangement</p>
	<b>Clean up worksite and complete documentation</b>	<p>PC14. removal and proper dispose of installation waste</p> <p>PC15. restore worksite to customer's satisfaction</p> <p>PC16. update plans and records with details of installation and test results</p> <p>PC17. complete all installation documents and customer signoff</p>



TEL/N0111

**System wiring and equipment installation at customer premises**

Knowledge and Understanding (K)	
<b>A. Organizational Context</b> (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. risk and impact of not following defined procedures/work instructions issued as per SHE & OSH guidelines. KA2. escalation matrix for reporting identified incidents, troubles and/ or emergencies e.g. system failures ,fire and power failures KA3. records to be maintained and implications of non-maintenance of the same KA4. knowledge of obtaining cables and equipment from company KA5. knowledge of payment options and procedures KA6. first aid requirements in case of electrical shocks, cuts, fall and other common injuries
<b>B. Technical Knowledge</b>	The user/individual on the job needs to know and understand: KB1. cabling types (OFC, UTP, STP, Twisted Pair etc.) and connectors (RJ-45, RJ-11 etc.) KB2. structured cabling norms (pertaining to laying the cables) KB3. working knowledge of cable laying and connectorisation KB4. knowledge of customer premise equipment (modem, routers, switches)
Skills (S)	
<b>A. Core Skills/ Generic Skills</b>	<b>Basic Reading &amp; Writing Skills</b>
	The user/ individual on the job needs to know and understand how to: SA1. fill up appropriate technical forms, activity logs in required format of the company SA2. maintain proper records as per given format SA3. read and understand manuals, work orders, health and safety instructions, memos, reports etc.
	<b>Communication Skills</b>
	The user/ individual on the job needs to know and understand how to: SA4. courteous to the customers SA5. liaisoning and coordination skills SA6. communicate with supervisor and peers SA7. communicate in the local language (preferable)
<b>B. Professional Skills</b>	<b>Equipment installation/Task Management Skills</b>
	The user/individual on the job needs to know and understand how to: SB1. select a suitable installation location adhering to cabling norms and signal coverage (for Wi-Fi equipment) SB2. work systematically with required attention to detail and adherence to all safety requirements
	<b>Technical Skills</b>
	The user/individual on the job needs to know and understand how to: SB3. read and comprehend/understand equipment installation manual SB4. perform fault clearance

TEL/N0111

**System wiring and equipment installation at customer premises**

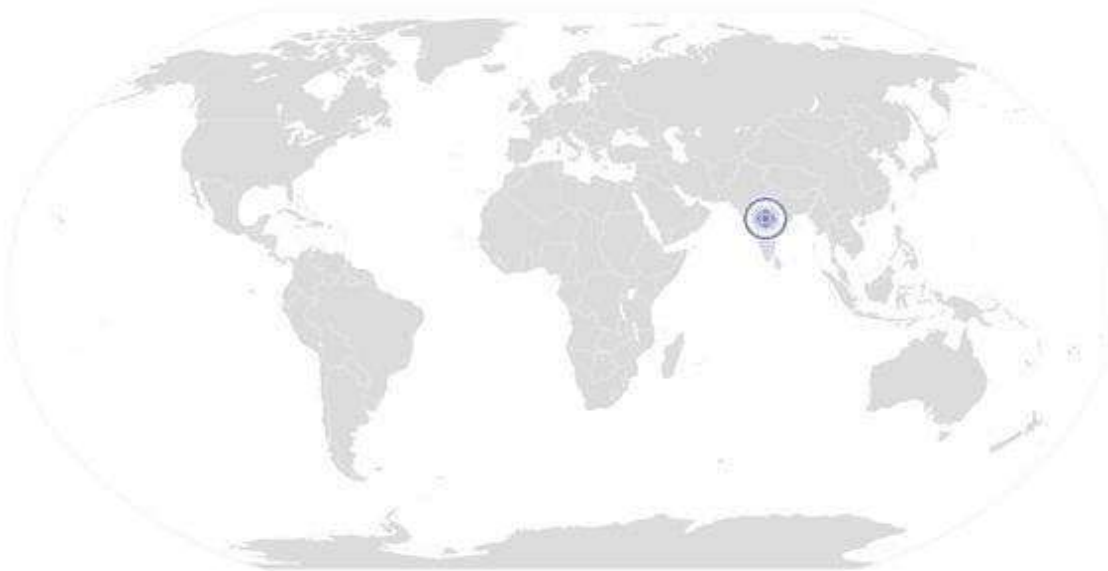
	<p>SB5. use diagnostic equipment</p> <p>SB6. use hand and power tools</p>
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# National Occupational Standard



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## Overview

This unit is about configuring of CPE and establishing broadband connectivity.



TEL/N0112

**Configuration of equipment and establishing Broadband connectivity**

National Occupational Standard	<b>Unit Code</b>	TEL/N0112
	<b>Unit Title (Task)</b>	Configuration of equipment and establishing Broadband connectivity
	<b>Description</b>	Involves configuring of CPE (modem, router, switch) and establishing broadband connectivity between equipment and service provider gateway and also between the equipment and end user device.
	<b>Scope</b>	<p>This unit/task covers the following:</p> <ul style="list-style-type: none"> <li>• Configuration of CPE (wired and wireless)</li> <li>• Establishing connectivity with the service provider gateway</li> <li>• Establishing connectivity between CPE and end-user device</li> </ul>
	<b>Performance Criteria (PC) w.r.t. the Scope</b>	
	<b>Element</b>	<b>Performance Criteria</b>
	<b>Configuring CPE</b>	<p>To be competent, the user/individual on the job must be able to</p> <p>PC1. connect up laptop/PC, Smart/IP TV and other appropriate device to the CPE (modem, router, switch) and establish connectivity</p> <p>PC2. access CPE setting using default login credentials</p> <p>PC3. configure CPE as per the base setting (IP, Gateway, Mask etc.)</p>
	<b>Establishing connectivity with service provider gateway</b>	<p>PC4. ensure all cables/connectors are correctly plugged in</p> <p>PC5. ping service provider gateway</p> <p>PC6. analyze test results for connectivity and throughput parameters</p>
	<b>Establishing connectivity between CPE and end user device</b>	<p>PC7. configure end user device to establish LAN connectivity with the CPE</p> <p>PC8. ping CPE from end user device and analyze response</p>
	<b>Record configuration setting and testing steps for customer</b>	<p>PC9. record CPE configuration settings</p> <p>PC10. record end user device configuration setting</p> <p>PC11. record pinging procedure and expected result parameters</p> <p>PC12. brief customer on basic trouble-shooting steps/self-help</p>
<b>Knowledge and Understanding (K)</b>		
<b>A. Organizational Context</b> (Knowledge of the company / organization and its processes)	<p>The user/individual on the job needs to know and understand:</p> <p>KA1. risk and impact of not following defined procedures/work instructions as per SHE &amp; OHS guidelines</p> <p>KA2. escalation matrix for reporting identified incidents, troubles and/ or emergencies e.g. system failures ,fire and power failures</p> <p>KA3. knowledge of sourcing equipment and base configuration details</p>	

TEL/N0112

**Configuration of equipment and establishing Broadband connectivity**

	KA4. first aid requirements in case of electrical shocks, cuts, fall and other common injuries
<b>B. Technical Knowledge</b>	<p>The user/individual on the job needs to know and understand:</p> <p>KB1. basic concepts of network topologies, broadband network elements, gateways, TCP/IP, IP address, subnet masks, Ethernet address, MAC address, IPv4, IPv6</p> <p>KB2. basic commands like ping &amp; ipconfig and acceptable round-trip time for IP packets</p> <p>KB3. connectivity options and methods for CPE &amp; end user device</p> <p>KB4. configuration settings at CPE (wired &amp; wireless) &amp; end user device</p> <p>KB5. command line access and command prompts to execute basic commands</p> <p>KB6. knowledge of customer premise equipment</p> <p>KB7. features and operating requirements of test equipment</p> <p>KB8. how to test the speed of connection and to demonstrate same to customer</p>
<b>Skills (S)</b>	
<b>A. Core Skills/ Generic Skills</b>	<p><b>Basic Reading &amp; Writing Skills</b></p> <p>The user/ individual on the job needs to know and understand how to:</p> <p>SA1. read and comprehend technical data on networks, configurations and testing</p> <p>SA2. record system configuration and testing procedure</p> <p>SA3. read and comprehend organizational policies and procedures</p>
	<p><b>Communication Skills</b></p> <p>The user/ individual on the job needs to know and understand how to:</p> <p>SA4. courteous to the customers</p> <p>SA5. liaisoning and coordination skills</p> <p>SA6. communicate with supervisor and peers</p> <p>SA7. communicate in the local language (preferable)</p>
	<p><b>Equipment Configuration Skills</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <p>SB1. configure CPE &amp; end user equipment</p> <p>SB2. test configuration</p> <p>SB3. Level1 &amp; 2 diagnostics</p>
<b>B. Professional Skills</b>	<p><b>Technical interpretation/analysing Skills</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <p>SB4. interpret configuration screens for entering correct details</p> <p>SB5. interpret ping results</p> <p>SB6. interpret ipconfig and other basic command outputs</p> <p>SB7. interpret in-built diagnostics results for remedial action</p>



# National Occupational Standard



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## Overview

This unit is about trouble shooting to localize and rectify faults wrt cables, configuration, connectivity etc.

National Occupational Standard	<b>Unit Code</b>	TEL/N0113
	<b>Unit Title (Task)</b>	Trouble-shoot to localize and rectify faults
	<b>Description</b>	This unit is about trouble shooting to localize and rectify faults
	<b>Scope</b>	<p>This unit/task covers the following:</p> <ul style="list-style-type: none"> <li>• Trouble shoot cable and connector faults</li> <li>• Trouble shoot CPE (modem, router, switch)</li> <li>• Trouble shoot configuration and connectivity issues between CPE &amp; service provider gateway and between CPE &amp; end user device</li> <li>• Report and document fault, corrective action and the status</li> </ul>
	<b>Performance Criteria (PC) w.r.t. the Scope</b>	
	<b>Element</b>	<b>Performance Criteria</b>
	<b>Locate and trouble shoot cable &amp; connector fault</b>	<p>To be competent, the user/individual on the job must be able to</p> <p>PC1. differentiate between types of cables</p> <p>PC2. Identify correct cable pairs</p> <p>PC3. Undertake continuity check and localize fault distance</p>
	<b>Troubleshoot CPE fault</b>	<p>PC4. understand relevance of various indicative lights on the CPE</p> <p>PC5. connect CPE to laptop/CPU/portable device for fault diagnostic</p> <p>PC6. install CPE access software, if required</p> <p>PC7. access CPE through browser/software application and run diagnostic application</p> <p>PC8. decipher results to localize fault</p>
	<b>Rectify the faults with cable, connectors and CPE</b>	<p>PC9. carry out re-conectorization/crimping (of cable pairs with connector) or replace cable, if required</p> <p>PC10. re-configure the CPE to correct settings</p> <p>PC11. reset CPE, if required.</p>
	<b>Complete documentation and clean up worksite</b>	<p>PC12. record steps undertaken for fault localization/isolation</p> <p>PC13. record changes undertaken for fault rectification</p> <p>PC14. Restore any changes made to the worksite during fault repair to the client's satisfaction</p>
<b>Knowledge and Understanding (K)</b>		
<b>A. Organizational Context</b> (Knowledge of the company / organization and	<p>The user/individual on the job needs to know and understand:</p> <p>KA1. risk and impact of not following defined procedures/work instructions</p> <p>KA2. escalation matrix for reporting identified incidents, troubles and/ or emergencies e.g. system failures ,fire and power failures</p>	

TEL/N0113

**Trouble-shoot to localize and rectify faults**

its processes)	<p>KA3. knowledge of sourcing equipment and base configuration details          KA4. SHE and OHS guidelines and regulations as per company's norms          KA5. first aid requirements in case of electrical shocks, cuts, fall and other common injuries usage of fire safety equipment</p>
<b>B. Technical Knowledge</b>	<p>The user/individual on the job needs to know and understand:</p> <p>KB1. correct identifications of cables and cable pairs          KB2. knowledge of cable connectors          KB3. crimping or soldering expertise          KB4. knowledge of supported cable lengths to achieve designed throughput          KB5. basic knowledge of EMI/EMC and preventive approach specific to modem          KB6. use of test equipment</p>
<b>Skills (S)</b>	
<b>A. Core Skills/ Generic Skills</b>	<p><b>Basic Reading &amp; Writing Skills</b></p> <p>The user/ individual on the job needs to know and understand how to:</p> <p>SA1. read and comprehend technical manual and literature          SA2. maintain proper records as per given format          SA3. read and understand work orders, health and safety instructions, memos, reports etc.</p>
	<p><b>Communication Skills</b></p> <p>The user/ individual on the job needs to know and understand how to:</p> <p>SA4. be courteous to end users/customers          SA5. liaise with local authorities, especially for outdoor cabling          SA6. communicate with supervisor and peers          SA7. communicate in the local language</p>
<b>B. Professional Skills</b>	<p><b>Equipment operating Skills</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <p>SB1. operate trouble-shooting equipment for localizing cable &amp; connector faults          SB2. operate crimping and soldering equipment          SB3. Operate laptop or other specific portable device to connect to CPE and carry out fault diagnostics &amp; repairs</p>
	<p><b>Technical interpretation Skills</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <p>SB4. interpret data on CPE interface accessed through laptop browser          SB5. interpret right cable pairs for connecterisation          SB6. interpret output of trouble shooting equipment/device</p>
	<b>Problem solving skills</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <p>SB7. utilize appropriate tools for cable fault rectification          SB8. use appropriate commands to reconfigure/rectify fault with CPE          SB9. assess correct applications and reconfigure in end user device          SB10. utilize appropriate communication channels to escalate unresolved problems</p>



TEL/N0113

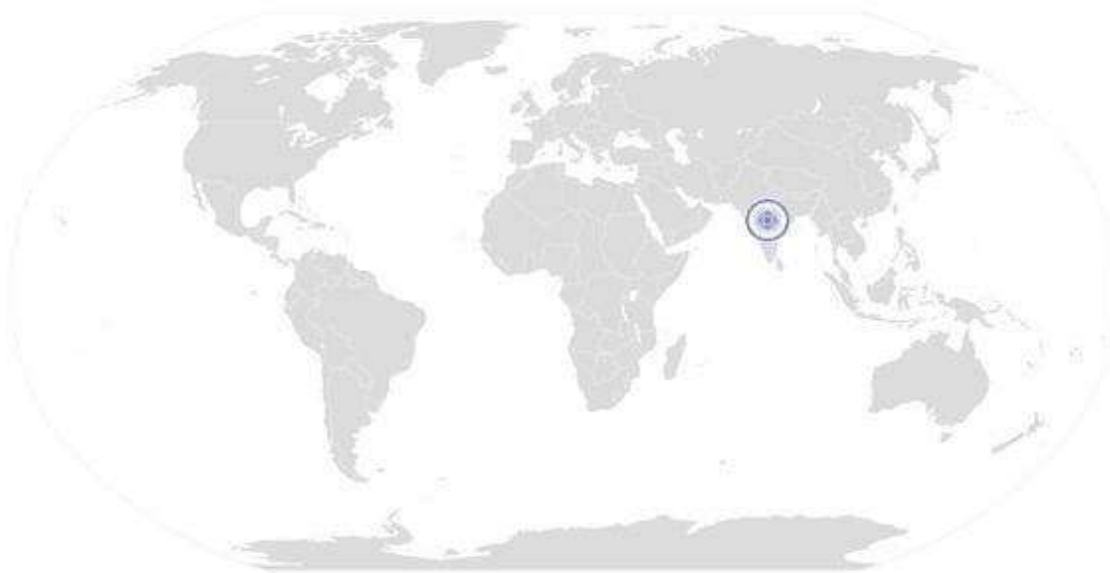
### Trouble-shoot to localize and rectify faults

	to relevant personnel
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# National Occupational Standard



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## Overview

This unit is about undertaking power supply checks & UPS installation at service provider / customer premise.



TEL/N0114

UPS installation & Domestic Power Supply checks

Occupational Standard	<b>Unit Code</b>	TEL/N0114
	<b>Unit Title (Task)</b>	UPS installation & Domestic Power Supply checks
	<b>Description</b>	This unit is about undertaking power supply checks & UPS installation at service provider / customer premise.
	<b>Scope</b>	<ul style="list-style-type: none"> <li>• Use of voltage/current meters</li> <li>• Power Supply checks at 5/15 Amp power socket</li> <li>• Earthing checks</li> <li>• Installation of UPS</li> <li>• Routing of supply to equipment through UPS</li> <li>• Precautions whilst handling live power supply</li> <li>• Familiarity with UPS (battery, charger etc.)</li> <li>• Basic maintenance of AC</li> </ul>
<b>Performance Criteria (PC) w.r.t. the Scope</b>		
<b>Element</b>	<b>Performance Criteria</b>	
	<p>To be competent, the user/individual on the job must be able to</p> <p>PC1. carry out voltage, current checks</p> <p>PC2. carry out earthing checks</p> <p>PC3. installation of ups</p> <p>PC4. routing of power supply through ups</p> <p>PC5. calculate equipment load vis-à-vis ups rating</p> <p>PC6. exercise precautions whilst handling power supplies</p> <p>PC7. UPS battery checks &amp; replacement</p>	
<b>Knowledge and Understanding (K)</b>		
<b>B. Organizational Context</b> (Knowledge of the company / organization and its processes)	<p>The user/individual on the job needs to know and understand:</p> <p>KA1. UPS installation norms</p> <p>KA2. compliance to Voltage/Current norms</p> <p>KA3. UPS &amp; compatible batteries</p> <p>KA4. the basic process for maintaining AC</p>	
<b>B. Technical Knowledge</b>	<p>The user/individual on the job needs to know and understand:</p> <p>KB1. UPS &amp; types of UPS</p> <p>KB2. power rating of UPS</p> <p>KB3. basic load calculations</p>	



TEL/N0114

**UPS installation & Domestic Power Supply checks**

	<p>KB4. routing of power supply through UPS          KB5. earth &amp; continuity checks for power supply          KB6. use of test equipment for checking/measuring power supply          KB7. checks &amp; replacement of UPS batteries</p>
<b>Skills (S)</b>	
<b>C. Core Skills/ Generic Skills</b>	<p style="background-color: #d9e1f2; padding: 2px;"><b>Reading Skills</b></p> <p>The user/ individual on the job needs to know and understand how to:</p> <p>SA1. installation manual for UPS          SA2. read and comprehend basic wiring diagrams</p>
	<p style="background-color: #d9e1f2; padding: 2px;"><b>Oral communication Skills</b></p> <p>The user/ individual on the job needs to know and understand how to:</p> <p>SA3. communicate the issue/fault to the customer          SA4. communicate the issue/fault with complete details to the supervisor</p>
<b>D. Professional Skills</b>	<p style="background-color: #d9e1f2; padding: 2px;"><b>Analytical Skills</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <p>SB1. analyse basic wiring diagrams to facilitate correct installation of UPS          SB2. analyse house-hold circuits for correct installation of devices          SB3. calculate equipment load and suggest UPS connection configuration</p>
	<p style="background-color: #d9e1f2; padding: 2px;"><b>Planning and Execution</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <p>SB1. plan installation/check activities          SB2. carry out installation with minimum disturbance</p>





	Record configuration setting and testing steps for customer	PC9. record CPE configuration settings PC10. record end user device configuration setting PC11. record pinging procedure and expected result parameters PC12. brief customer on basic troubleshooting steps/self-help	30	10	10	0	
				5	5	0	
				5	5	0	
				10	0	10	
			<b>Total</b>	<b>100</b>	<b>40</b>	<b>60</b>	
3.TEL/N0113 (Trouble-shoot to localize and rectify faults)	Locate and trouble shoot cable & connector fault	PC1. differentiate between types of cables	20	5	5	0	
		PC2. Identify correct cable pairs		5	0	5	
		PC3. Undertake continuity check and localize fault distance		10	0	10	
	Troubleshoot CPE fault	PC4. understand relevance of various indicative lights on the CPE	40	5	5	0	
		PC5. connect CPE to laptop/CPU/portable device for fault diagnostic		5	0	5	
		PC6. install CPE access software, if required		10	0	10	
		PC7. access CPE through browser/software application and run diagnostic application		10	0	10	
	Rectify the faults with cable, connectors and CPE	PC8. decipher results to localize fault	20	10	5	5	
		PC9. carry out re-conectorization/crimping (of cable pairs with connector) or replace cable, if required		5	0	5	
		PC10. re-configure the CPE to correct settings		10	0	10	
		PC11. reset CPE, if required.		5	0	5	
	Complete documentation and clean up worksite	PC12. record steps undertaken for fault localization/isolation	20	10	10	0	
		PC13. record changes undertaken for fault rectification		5	5	0	
		PC14. Restore any changes made to the worksite during fault repair to the client's satisfaction		5	5	0	
			<b>Total</b>	<b>100</b>	<b>35</b>	<b>65</b>	
4. TEL/N0114 (UPS installation & Domestic Power Supply checks)	Scope	PC1. carry out voltage, current checks	100	100	15	5	10
		PC2. carry out earthing checks			15	5	10
		PC3. installation of ups			10	5	5
		PC4. routing of power supply through ups			15	5	10
		PC5. calculate equipment load vis-à-vis ups rating			15	15	0
		PC6. exercise precautions whilst handling power supplies			15	10	5
		PC7. UPS battery checks & replacement			15	5	10
			<b>Total</b>	<b>100</b>	<b>50</b>	<b>50</b>	