

## Qualification Pack



# Technician - Automatic Train Protection System (ATPS)

QP Code: TEL/Q6304

Version: 2.0

NSQF Level: 4

Telecom Sector Skill Council || 3rd Floor, Plot No 126, Sector - 44  
Gurgaon - 122003

## Qualification Pack

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### TEL/Q6304: Technician - Automatic Train Protection System (ATPS)

#### Brief Job Description

An ATPS Technician is responsible for performing various activities, such as the installation of Radio Frequency (RF) antennas, Ultra High Frequency (UHF) antennas, feeder cables, and Radio Frequency Identification Tags (RFID) tags. The individual is also responsible for laying, terminating, splicing, and rectifying fibre, optical fibre, and copper cables. The individual also performs mast rigging operations, including mounting and aligning antennas.

#### Personal Attributes

The individual must be physically fit to work for long duration. The person must have attention to detail and problem-solving skills. The individual should be able to work in coordination with others and communicate appropriately, both verbally and in writing.

#### Applicable National Occupational Standards (NOS)

##### Compulsory NOS:

1. [TEL/N2500: High density hand soldering of components on telecom boards](#)
2. [TEL/N4126: Handle fiber Constructs, Performance and Selection Criteria](#)
3. [TEL/N4200: Installation of passive FTTH/X components](#)
4. [TEL/N6400: Splice Optical Fiber](#)
5. [TEL/N0111: Lay cable/system wiring and install equipment at customer premises](#)
6. [TEL/N6210: Perform Change Management at Radio Locations](#)
7. [TEL/N6310: Assist in the Installation of Telecom Equipment](#)
8. [TEL/N6311: Install RFID Tags on Pre-Stressed Concrete \(PSC\) Sleepers](#)
9. [TEL/N6300: Install SDH, DWDM, L2 and L3 Equipment](#)
10. [TEL/N6302: Perform Commissioning of SDH, DWDM, L2 and L3 Equipment](#)
11. [DGT/VSQ/N0102: Employability Skills \(60 Hours\)](#)

#### Qualification Pack (QP) Parameters

### Qualification Pack

<b>Sector</b>	Telecom
<b>Sub-Sector</b>	Network Managed Services
<b>Occupation</b>	Project Engineering
<b>Country</b>	India
<b>NSQF Level</b>	4
<b>Credits</b>	15
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/NIL
<b>Minimum Educational Qualification &amp; Experience</b>	12th grade Pass OR Completed 2nd year of the 3-year diploma after 10 OR Completed 2nd year of the 3-year diploma after 10 (Pursuing 2nd year of 3-year regular Diploma (after 10th) OR 10th grade pass (with two years of any combination of NTC/NAC/CITS or equivalent) OR 8th grade pass with 2 year NTC plus 1 year NAC plus 1 year CITS OR 10th grade pass and pursuing continuous schooling (with no experience required) OR Previous relevant Qualification of NSQF Level (3) with 3 Years of experience
<b>Minimum Level of Education for Training in School</b>	
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	17 Years
<b>Last Reviewed On</b>	NA
<b>Next Review Date</b>	26/05/2025
<b>NSQC Approval Date</b>	26/05/2022
<b>Version</b>	2.0
<b>Reference code on NQR</b>	QG-04-TL-00461-2023-V1.1-TSSC



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NQR Version	1.1
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## Qualification Pack

# TEL/N2500: High density hand soldering of components on telecom boards

## Description

This OS unit is about skills required to undertake high density hand soldering of components on telecom boards.

## Scope

The scope covers the following :

- Prepare board and material/components
- Soldering of components on boards

## Elements and Performance Criteria

### *Prepare board and material/components*

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

- PC1.** analyse Computer-aided Design (CAD) specifications
- PC2.** set the soldering jig/fixture as per the work specifications
- PC3.** gather all components to be soldered as per the specifications
- PC4.** set the temperature as per the work and component specifications and measure the same using sensors
- PC5.** select the correct solder bit and soldering wire for the given work
- PC6.** clean solder bits, component leads and boards of any contamination
- PC7.** clean the solder wire of any contamination
- PC8.** select the correct flux as per specifications

### *Soldering of Components on Boards*

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

- PC9.** undertake correct placement and orientation of components
- PC10.** demonstrate amount of solder feeding application, sufficient flux addition, correct positioning and vector speed of nozzle, no solder on gold plated while holding the equipment
- PC11.** regulate soldering temperature throughout the process to maintain consistency
- PC12.** maintain solder stations as per the start and stop procedure

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** risk and impact of not following defined procedures/work instructions and timeline
- KU2.** escalation matrix for reporting identified incidents, troubles and/or emergencies
- KU3.** records to be maintained and implications of non-maintenance of the same



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- KU4.** Safety Health and Environment (SHE) and Occupational Health and Safety (OHS) guidelines and regulations as per company norms
- KU5.** impact of contamination of Printed Circuit Boards (PCBs), components and soldering material
- KU6.** cleaning procedures and processes
- KU7.** operational characteristics of soldering stations
- KU8.** impact of temperature and humidity on the process
- KU9.** process of CAD diagram preparation, soldering, component placement specifications

### Generic Skills (GS)

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

- GS1.** read and interpret necessary documents
- GS2.** read and understand manuals, requirement documents, operational health and safety instructions, memos, reports etc.
- GS3.** read and comprehend/understand material specifications
- GS4.** communicate with colleagues, peers and supervisor
- GS5.** liaise and coordinate with third party vendors/other stakeholders

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare board and material/components</i>	<b>16</b>	<b>31</b>	-	<b>13</b>
<b>PC1.</b> analyse Computer-aided Design (CAD) specifications	2	3	-	2
<b>PC2.</b> set the soldering jig/fixture as per the work specifications	2	4	-	2
<b>PC3.</b> gather all components to be soldered as per the specifications	2	4	-	2
<b>PC4.</b> set the temperature as per the work and component specifications and measure the same using sensors	2	5	-	2
<b>PC5.</b> select the correct solder bit and soldering wire for the given work	2	5	-	2
<b>PC6.</b> clean solder bits, component leads and boards of any contamination	2	4	-	1
<b>PC7.</b> clean the solder wire of any contamination	2	3	-	1
<b>PC8.</b> select the correct flux as per specifications	2	3	-	1
<i>Soldering of Components on Boards</i>	<b>9</b>	<b>24</b>	-	<b>7</b>
<b>PC9.</b> undertake correct placement and orientation of components	1	5	-	1
<b>PC10.</b> demonstrate amount of solder feeding application, sufficient flux addition, correct positioning and vector speed of nozzle, no solder on gold plated while holding the equipment	4	8	-	2
<b>PC11.</b> regulate soldering temperature throughout the process to maintain consistency	2	6	-	2
<b>PC12.</b> maintain solder stations as per the start and stop procedure	2	5	-	2
<b>NOS Total</b>	<b>25</b>	<b>55</b>	-	<b>20</b>

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	TEL/N2500
<b>NOS Name</b>	High density hand soldering of components on telecom boards
<b>Sector</b>	Telecom
<b>Sub-Sector</b>	Handset
<b>Occupation</b>	Communication Electronics
<b>NSQF Level</b>	4
<b>Credits</b>	1
<b>Version</b>	4.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	26/05/2025
<b>NSQF Clearance Date</b>	26/05/2022

## Qualification Pack

### TEL/N4126: Handle fiber Constructs, Performance and Selection Criteria

#### Description

This OS unit is about identifying and working with various fiber types, understanding specifications of passive components like Fiber Distribution Management System (FDMS), joint enclosure, patch chords, pigtailed, 0dB adapters, attenuators etc. and comply with use/deployment parameters.

#### Scope

The scope covers the following :

- Carry out Optical Fiber construction and transmission checks
- Identify fiber performance parameters
- Install suitable fiber types and identifiers
- Cable selection criteria

#### Elements and Performance Criteria

##### *Carry out Optical Fiber construction and transmission checks*

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

- PC1.** identify fiber cable construct (core, clad, buffer coating)
- PC2.** identify various cable components (fibers, strength members, jackets)
- PC3.** identify and work with strengthening members, rip cords and armored fibers
- PC4.** perform transmission checks for various types of fiber identified (multimode or single mode)

##### *Identify fiber performance parameters*

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

- PC5.** identify key performance parameters for an optical fiber (attenuation, fiber size and bandwidth)
- PC6.** gauge performance by reading characteristic chart/parameters
- PC7.** identify causes of attenuation (scattering, absorption, fiber bending radius and bending losses)
- PC8.** differentiate between speed and bandwidth
- PC9.** correlate between attenuation and wavelength

##### *Identify suitable fiber types and identifiers*

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

- PC10.** identify and differentiate various fiber types as per their construction (zip cord, distribution, loose tube, breakout)
- PC11.** identify and differentiate various fiber types as per use (armored, aerial, direct burial, underwater)
- PC12.** deploy suitable fiber type based on deployment and its characteristics
- PC13.** identify cables as per the standard color codes

##### *Cable selection criteria*

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

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- PC14.** select appropriate cable as per the criteria - pulling strength, water protection, rodent penetration
- PC15.** demonstrate grounding and bonding for armored cables

### Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the implication of induced potential and electrical hazards related to Electrical Traction Supply
- KU2.** risk and impact of not following defined procedures/work instructions
- KU3.** escalation matrix for reporting identified incidents, troubleshooting and/or emergencies, e.g. system failures, fire and power failures
- KU4.** Safety Health and Environment (SHE) and Occupational Health and Safety (OHS) guidelines and regulations as per company norms
- KU5.** optical fiber as communication medium
- KU6.** basics of optical fiber manufacturing and construction
- KU7.** optical fiber light transmission basics
- KU8.** cause and effect of reflection and dispersion (modal, chromatic, polarization)
- KU9.** relevance of cut-off wavelength
- KU10.** types of fibers based on core structure - multi-mode and single mode fibers
- KU11.** optical fiber performance parameters and selection criteria
- KU12.** optical fiber specifications

### Generic Skills (GS)

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

- GS1.** write system concepts and flows
- GS2.** maintain records and process documents
- GS3.** read and comprehend technical literature/parameters/performance graphs
- GS4.** read manuals, health and safety Instructions, memos, reports etc.
- GS5.** communicate with colleagues, peers and customers/stakeholders
- GS6.** liaise and coordinate with third party vendors or other stakeholders
- GS7.** plan and organize the work to achieve compliances and results
- GS8.** read customer interaction protocol

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Carry out Optical Fiber construction and transmission checks</i>	<b>8</b>	<b>16</b>	-	<b>7</b>
<b>PC1.</b> identify fiber cable construct (core, clad, buffer coating)	2	4	-	1
<b>PC2.</b> identify various cable components (fibers, strength members, jackets)	2	4	-	2
<b>PC3.</b> identify and work with strengthening members, rip cords and armored fibers	2	4	-	2
<b>PC4.</b> perform transmission checks for various types of fiber identified (multimode or single mode)	2	4	-	2
<i>Identify fiber performance parameters</i>	<b>10</b>	<b>15</b>	-	<b>5</b>
<b>PC5.</b> identify key performance parameters for an optical fiber (attenuation, fiber size and bandwidth)	2	4	-	1
<b>PC6.</b> gauge performance by reading characteristic chart/parameters	2	4	-	1
<b>PC7.</b> identify causes of attenuation (scattering, absorption, fiber bending radius and bending losses)	2	2	-	1
<b>PC8.</b> differentiate between speed and bandwidth	2	3	-	1
<b>PC9.</b> correlate between attenuation and wavelength	2	2	-	1
<i>Identify suitable fiber types and identifiers</i>	<b>8</b>	<b>14</b>	-	<b>6</b>
<b>PC10.</b> identify and differentiate various fiber types as per their construction (zip cord, distribution, loose tube, breakout)	2	3	-	2
<b>PC11.</b> identify and differentiate various fiber types as per use (armored, aerial, direct burial, underwater)	2	4	-	2
<b>PC12.</b> deploy suitable fiber type based on deployment and its characteristics	2	4	-	1

### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC13.</b> identify cables as per the standard color codes	2	3	-	1
<i>Cable selection criteria</i>	<b>4</b>	<b>5</b>	-	<b>2</b>
<b>PC14.</b> select appropriate cable as per the criteria - pulling strength, water protection, rodent penetration	2	3	-	1
<b>PC15.</b> demonstrate grounding and bonding for armored cables	2	2	-	1
<b>NOS Total</b>	<b>30</b>	<b>50</b>	-	<b>20</b>

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### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	TEL/N4126
<b>NOS Name</b>	Handle fiber Constructs, Performance and Selection Criteria
<b>Sector</b>	Telecom
<b>Sub-Sector</b>	Passive Infrastructure
<b>Occupation</b>	Operations and Maintenance - Passive Infrastructure
<b>NSQF Level</b>	5
<b>Credits</b>	1
<b>Version</b>	4.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	26/05/2025
<b>NSQC Clearance Date</b>	26/05/2022

## Qualification Pack

### TEL/N4200: Installation of passive FTTH/X components

#### Description

This OS unit is about installation of passive FTTH/X components like splitters and undertaking basic installation checks.

#### Scope

The scope covers the following :

- Installation of passive FTTH/X components (Splitter)
- Perform terminal connections (single incoming/multiple outgoing)
- Undertake power test

#### Elements and Performance Criteria

##### *Installation of passive FTTH/X components (Splitter)*

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

- PC1.** identify components of passive devices (splitters)
- PC2.** demonstrate installation practices for wall mount splitters (1x8, 1x16, 1x32)
- PC3.** identify feeder and distribution ports on the devices

##### *Perform terminal connections (single incoming/multiple outgoing)*

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

- PC4.** identify feeder and distribution cables/pigtails
- PC5.** demonstrate feeder and distribution connections

##### *Undertake power test*

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

- PC6.** demonstrate insertion loss testing of optical splitters (olts and light source)
- PC7.** demonstrate power output measurement at output port by use of power meter and light source (using olts & light source)

#### Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** risk and impact of not following defined procedures/work instructions
- KU2.** escalation matrix for reporting identified incidents, troubles and/or emergencies e.g. system failures, fire and power failures
- KU3.** types of documentation in organization and importance of the same
- KU4.** records to be maintained and implications of non-maintenance of the same
- KU5.** spare management and repair and return process for faulty equipment
- KU6.** Safety Health and Environment (SHE) and Occupational Health and Safety (OHS) guidelines and regulations as per company norms

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- KU7.** passive network components and their deployment environment
- KU8.** principle of operation of optical splitters
- KU9.** concept of feeder and distribution connections in a splitter
- KU10.** types of optical splitters and relative features/limitations

### Generic Skills (GS)

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

- GS1.** fill up standard technical forms and activity logs
- GS2.** maintain records and process documents
- GS3.** read and comprehend technical literature/parameters/performance graphs
- GS4.** read manuals, health and safety Instructions, memos, reports etc.
- GS5.** communicate with colleagues, peers and customers/stakeholders
- GS6.** liaise and coordinate with third party vendors or other stakeholders
- GS7.** plan and organize the work to achieve compliances and results
- GS8.** read customer interaction protocol

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Installation of passive FTTH/X components (Splitter)</i>	<b>16</b>	<b>21</b>	-	<b>4</b>
<b>PC1.</b> identify components of passive devices (splitters)	5	5	-	1
<b>PC2.</b> demonstrate installation practices for wall mount splitters (1x8, 1x16, 1x32)	7	8	-	2
<b>PC3.</b> identify feeder and distribution ports on the devices	4	8	-	1
<i>Perform terminal connections (single incoming/multiple outgoing)</i>	<b>10</b>	<b>14</b>	-	<b>2</b>
<b>PC4.</b> identify feeder and distribution cables/pigtails	5	6	-	1
<b>PC5.</b> demonstrate feeder and distribution connections	5	8	-	1
<i>Undertake power test</i>	<b>9</b>	<b>20</b>	-	<b>4</b>
<b>PC6.</b> demonstrate insertion loss testing of optical splitters (olts and light source)	5	9	-	2
<b>PC7.</b> demonstrate power output measurement at output port by use of power meter and light source (using olts & light source)	4	11	-	2
<b>NOS Total</b>	<b>35</b>	<b>55</b>	-	<b>10</b>

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### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	TEL/N4200
<b>NOS Name</b>	Installation of passive FTTH/X components
<b>Sector</b>	Telecom
<b>Sub-Sector</b>	Passive Infrastructure
<b>Occupation</b>	Network (Passive) Installation
<b>NSQF Level</b>	3
<b>Credits</b>	1
<b>Version</b>	5.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	26/05/2025
<b>NSQF Clearance Date</b>	26/05/2022

## Qualification Pack

### TEL/N6400: Splice Optical Fiber

#### Description

This OS unit is about preparing and carrying out efficient optical splicing.

#### Scope

The scope covers the following :

- Ensure availability of tools and spares
- Prepare cable for splicing for new installation
- Carry out maintenance of the laid Optical Fiber Cables (OFCs)
- Perform splicing operations

#### Elements and Performance Criteria

##### *Ensure availability of tools and spares*

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

- PC1.** ensure availability of optical cable test equipment (Optical Time Domain Reflectometer (OTDR), power meter, etc.)
- PC2.** confirm availability of optical equipment (spool, joint closure, connectors, splicer and cleaver)
- PC3.** check availability of joint kits, pigtails, patch cords, FDF (Fiber Distribution Frame), ODB (Optical Distribution Box) connector, protection sleeves and heat shrink
- PC4.** send faulty equipment to the logistics team for repair or replacement
- PC5.** ensure availability of RCC (Reinforced Cement Concrete) joint chambers with covers and adequate sand as per specifications
- PC6.** confirm availability of one spare cable drum for emergency replacement of laid cables
- PC7.** ensure calibration status of the equipment to be perform (e.g. splicing machine, OTDR, power meter, cleaver)

##### *Prepare cable for splicing for new installation*

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

- PC8.** identify exact location and fiber/fiber group for which the splicing is to be done as per network route and connectivity plan
- PC9.** inspect cable for sheath damage visually
- PC10.** dismantle/install the fiber joint box/splitter box carefully
- PC11.** ensure maintenance of minimum bend ratios as per manufacturer specifications to prevent cable damage and signal degradation
- PC12.** secure cable in accordance with the industry practices to avoid cable and sheath damage
- PC13.** determine appropriate fibers to be joined based on color coding and sequence
- PC14.** identify an appropriate place for the joint chamber location
- PC15.** clean fiber as per manufacturer specifications

##### *Carry out maintenance of the laid Optical Fiber Cables (OFCs)*

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

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- PC16.** identify the route/fiber and location where splicing/maintenance needs to be done in coordination with Fiber Technician/Operation and Maintenance (O&M) team
- PC17.** arrange outage exclusion time (maintenance window timeline) for the fiber and route in consultation with O&M team
- PC18.** visit the site to identify the exact location and fiber/fiber group for which the splicing is to be done
- PC19.** expose the fiber fault point (by digging for trenched fiber, or opening manholes etc., as required)
- PC20.** inspect cable for sheath damage visually
- PC21.** dismantle/install the fiber joint box/splitter box carefully
- PC22.** ensure to maintain minimum bend ratios as per manufacturer specifications to prevent cable damage and signal degradation
- PC23.** secure cable in accordance with the industry practice to avoid cable and sheath damage
- PC24.** determine appropriate fibers to be joined based on color coding and sequence
- PC25.** identify an appropriate place for the joint chamber location
- PC26.** clean the fiber as per manufacturer specifications

### *Perform splicing operations*

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

- PC27.** strip cables at areas where splicing has to be performed
- PC28.** cleave fiber with a precision cleaver
- PC29.** inspect cleaved fiber ends with magnifier to ensure appropriateness
- PC30.** insert fiber strands to the fusion machine in accordance with the product/equipment specifications in case of fusion splicing
- PC31.** align fibers together by a precision-made sleeve and place the prepared fiber in mechanical splicing kit in case of mechanical splicing
- PC32.** use proper splice protectors like heat shrink splice protectors to protect the splice

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** spare part management process
- KU2.** repair and return process for faulty equipment
- KU3.** characteristics of Optical fiber like refraction, polarization, attenuation and dispersion
- KU4.** characteristics of wavelength bands in optical fiber
- KU5.** signal strength and quality Key Performance Indicators (KPIs) of OFCs
- KU6.** color coding of fiber optic cable
- KU7.** principles of optical transport media
- KU8.** types of OFC connectors
- KU9.** functioning of optical equipment like cleaver, mechanical and fusion splicing kit, protection sleeves, fiber stripper, fiber reinforced plaster during splicing and jointing
- KU10.** alignment errors during splicing of optical fibers like Lateral, Axial, Angular and Poor end finish



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**KU11.** procedure for sealing joints, heat shrinking/multi-diameter seals/mechanical seals etc

### Generic Skills (GS)

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

- GS1.** fill up standard technical forms and activity logs
- GS2.** maintain proper records in the prescribed format
- GS3.** communicate with supervisor and peers
- GS4.** communicate in the local language (preferably)
- GS5.** maintain effective working relationships
- GS6.** use resources efficiently and effectively
- GS7.** execute tasks in a high-pressure environment
- GS8.** be flexible and accept changes in job requirements, schedules, or work environments

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Ensure availability of tools and spares</i>	<b>11</b>	<b>19</b>	-	<b>2</b>
<b>PC1.</b> ensure availability of optical cable test equipment (Optical Time Domain Reflectometer (OTDR), power meter, etc.)	1	2	-	1
<b>PC2.</b> confirm availability of optical equipment (spool, joint closure, connectors, splicer and cleaver)	1	3	-	-
<b>PC3.</b> check availability of joint kits, pigtailed, patch cords, FDF (Fiber Distribution Frame), ODB (Optical Distribution Box) connector, protection sleeves and heat shrink	2	3	-	1
<b>PC4.</b> send faulty equipment to the logistics team for repair or replacement	2	3	-	-
<b>PC5.</b> ensure availability of RCC (Reinforced Cement Concrete) joint chambers with covers and adequate sand as per specifications	2	3	-	-
<b>PC6.</b> confirm availability of one spare cable drum for emergency replacement of laid cables	1	2	-	-
<b>PC7.</b> ensure calibration status of the equipment to be perform (e.g. splicing machine, OTDR, power meter, cleaver)	2	3	-	-
<i>Prepare cable for splicing for new installation</i>	<b>9</b>	<b>16</b>	-	<b>3</b>
<b>PC8.</b> identify exact location and fiber/fiber group for which the splicing is to be done as per network route and connectivity plan	1	3	-	-
<b>PC9.</b> inspect cable for sheath damage visually	1	2	-	1
<b>PC10.</b> dismantle/install the fiber joint box/splitter box carefully	1	2	-	-
<b>PC11.</b> ensure maintenance of minimum bend ratios as per manufacturer specifications to prevent cable damage and signal degradation	1	2	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC12.</b> secure cable in accordance with the industry practices to avoid cable and sheath damage	1	2	-	1
<b>PC13.</b> determine appropriate fibers to be joined based on color coding and sequence	3	1	-	-
<b>PC14.</b> identify an appropriate place for the joint chamber location	1	3	-	-
<b>PC15.</b> clean fiber as per manufacturer specifications	-	1	-	-
<i>Carry out maintenance of the laid Optical Fiber Cables (OFCs)</i>	<b>10</b>	<b>13</b>	-	<b>3</b>
<b>PC16.</b> identify the route/fiber and location where splicing/maintenance needs to be done in coordination with Fiber Technician/Operation and Maintenance (O&M) team	1	1	-	-
<b>PC17.</b> arrange outage exclusion time (maintenance window timeline) for the fiber and route in consultation with O&M team	1	1	-	-
<b>PC18.</b> visit the site to identify the exact location and fiber/fiber group for which the splicing is to be done	1	1	-	1
<b>PC19.</b> expose the fiber fault point (by digging for trenched fiber, or opening manholes etc., as required	1	1	-	-
<b>PC20.</b> inspect cable for sheath damage visually	1	3	-	1
<b>PC21.</b> dismantle/install the fiber joint box/splitter box carefully	1	1	-	1
<b>PC22.</b> ensure to maintain minimum bend ratios as per manufacturer specifications to prevent cable damage and signal degradation	1	1	-	-
<b>PC23.</b> secure cable in accordance with the industry practice to avoid cable and sheath damage	-	1	-	-
<b>PC24.</b> determine appropriate fibers to be joined based on color coding and sequence	2	1	-	-

### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC25.</b> identify an appropriate place for the joint chamber location	1	1	-	-
<b>PC26.</b> clean the fiber as per manufacturer specifications	-	1	-	-
<i>Perform splicing operations</i>	<b>5</b>	<b>7</b>	-	<b>2</b>
<b>PC27.</b> strip cables at areas where splicing has to be performed	1	1	-	-
<b>PC28.</b> cleave fiber with a precision cleaver	1	1	-	1
<b>PC29.</b> inspect cleaved fiber ends with magnifier to ensure appropriateness	-	1	-	1
<b>PC30.</b> insert fiber strands to the fusion machine in accordance with the product/equipment specifications in case of fusion splicing	1	2	-	-
<b>PC31.</b> align fibers together by a precision-made sleeve and place the prepared fiber in mechanical splicing kit in case of mechanical splicing	1	1	-	-
<b>PC32.</b> use proper splice protectors like heat shrink splice protectors to protect the splice	1	1	-	-
<b>NOS Total</b>	<b>35</b>	<b>55</b>	-	<b>10</b>

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	TEL/N6400
<b>NOS Name</b>	Splice Optical Fiber
<b>Sector</b>	Telecom
<b>Sub-Sector</b>	Network Managed Services
<b>Occupation</b>	Operations and Maintenance - Passive Infrastructure
<b>NSQF Level</b>	3
<b>Credits</b>	2
<b>Version</b>	5.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	26/05/2025
<b>NSQC Clearance Date</b>	26/05/2022

## Qualification Pack

### TEL/N0111: Lay cable/system wiring and install equipment at customer premises

#### Description

This OS unit describes the knowledge, understanding and skills required for an individual to lay down the cable/system wiring and install equipment at customer premises.

#### Scope

The scope covers the following :

- Prepare for wiring and equipment installation
- Undertake wiring and install system hardware
- Clean up worksite and complete documentation

#### Elements and Performance Criteria

##### *Prepare for wiring and equipment installation*

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

- PC1.** collect work requirements, tools, equipment and materials required for installation
- PC2.** visit site/customer premises for installation
- PC3.** analyse installation environment and customer requirements to select the correct type of cables and connectors
- PC4.** inspect indoor and outdoor cable route to ensure that the route is free of electrical hazards
- PC5.** verify that the cable running length is within the permissible limit to ensure continuity and designed throughput
- PC6.** verify that the equipment installation location is near power point and has proper signal coverage

##### *Undertake wiring and install system hardware*

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

- PC7.** install structured wiring (interior and exterior) from PoP to customer premises
- PC8.** perform cable splicing and crimping wherever required
- PC9.** perform neat wiring and clipping within customer premises
- PC10.** use appropriate connectors and ensure that the cables are terminated properly
- PC11.** perform fault clearance
- PC12.** test the cable and joints for transmission loss and strength, re-terminate if loss exceeds prescribed limits.
- PC13.** install equipment such as modem, router and/or switch
- PC14.** demonstrate and explain the use of equipment to customers

##### *Install/replace UPS and check domestic power supply*

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

- PC15.** perform checks for voltage, current and earthing

## Qualification Pack

- PC16.** perform checks for battery in case of a defective UPS
- PC17.** install/replace UPS as per manufacturer's instructions
- PC18.** route the power supply through the UPS
- PC19.** calculate equipment load and compare it with UPS rating

*Clean up work site and complete documentation*

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

- PC20.** dispose of the installation waste properly and restore work site
- PC21.** record the details of installation, test results and update plans
- PC22.** complete all installation documents and get customer signoff

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** process of obtaining cables and equipment from company
- KU2.** different sizes and colors of wires
- KU3.** different types of cables (OFC, UTP, STP, Twisted Pair etc.) and connectors (RJ-45, RJ-11 etc.)
- KU4.** structured cabling norms (pertaining to laying the cables)
- KU5.** process of crimping, splicing of cables of various sizes and types
- KU6.** process of cable laying and connectorisation
- KU7.** process of accurately measuring distances using tapes and other measuring devices
- KU8.** selection of suitable installation location adhering to cabling norms and signal
- KU9.** usage of diagnostic equipment
- KU10.** usage of hand and power tools
- KU11.** escalation matrix for reporting identified incidents, troubles and/ or emergencies e.g. system failures, fire and power failures
- KU12.** functioning of customer premise equipment(modem, routers, switches)
- KU13.** basic computer skills
- KU14.** risk and impact of not following defined procedures/work instructions issued as per SHE & OSH guidelines
- KU15.** records to be maintained and implications of non-maintenance of the same
- KU16.** payment options and procedures

## Generic Skills (GS)

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

- GS1.** read and understand documents and other materials
- GS2.** interact respectfully with end users/customers
- GS3.** liaise with customers/vendors
- GS4.** communicate in the local language (preferable)
- GS5.** work in coordination with team



## Qualification Pack

- GS6.** work systematically with attention to detail and adherence to all safety requirements
- GS7.** maintain proper records as per given format

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for wiring and equipment installation</i>	<b>12</b>	<b>14</b>	-	<b>2</b>
<b>PC1.</b> collect work requirements, tools, equipment and materials required for installation	2	-	-	-
<b>PC2.</b> visit site/customer premises for installation	1	-	-	-
<b>PC3.</b> analyse installation environment and customer requirements to select the correct type of cables and connectors	3	4	-	1
<b>PC4.</b> inspect indoor and outdoor cable route to ensure that the route is free of electrical hazards	2	3	-	1
<b>PC5.</b> verify that the cable running length is within the permissible limit to ensure continuity and designed throughput	2	3	-	-
<b>PC6.</b> verify that the equipment installation location is near power point and has proper signal coverage	2	4	-	-
<i>Undertake wiring and install system hardware</i>	<b>13</b>	<b>21</b>	-	<b>5</b>
<b>PC7.</b> install structured wiring (interior and exterior) from PoP to customer premises	2	3	-	1
<b>PC8.</b> perform cable splicing and crimping wherever required	1	1	-	-
<b>PC9.</b> perform neat wiring and clipping within customer premises	1	2	-	1
<b>PC10.</b> use appropriate connectors and ensure that the cables are terminated properly	2	3	-	1
<b>PC11.</b> perform fault clearance	2	3	-	-
<b>PC12.</b> test the cable and joints for transmission loss and strength, re-terminate if loss exceeds prescribed limits.	2	4	-	1

### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC13.</b> install equipment such as modem, router and/or switch	2	4	-	1
<b>PC14.</b> demonstrate and explain the use of equipment to customers	1	1	-	-
<i>Install/replace UPS and check domestic power supply</i>	<b>9</b>	<b>9</b>	-	<b>3</b>
<b>PC15.</b> perform checks for voltage, current and earthing	1	1	-	-
<b>PC16.</b> perform checks for battery in case of a defective UPS	2	2	-	1
<b>PC17.</b> install/replace UPS as per manufacturer's instructions	2	2	-	1
<b>PC18.</b> route the power supply through the UPS	2	2	-	1
<b>PC19.</b> calculate equipment load and compare it with UPS rating	2	2	-	-
<i>Clean up work site and complete documentation</i>	<b>6</b>	<b>6</b>	-	-
<b>PC20.</b> dispose of the installation waste properly and restore work site	2	2	-	-
<b>PC21.</b> record the details of installation, test results and update plans	2	2	-	-
<b>PC22.</b> complete all installation documents and get customer signoff	2	2	-	-
<b>NOS Total</b>	<b>40</b>	<b>50</b>	-	<b>10</b>

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	TEL/N0111
<b>NOS Name</b>	Lay cable/system wiring and install equipment at customer premises
<b>Sector</b>	Telecom
<b>Sub-Sector</b>	Passive Infrastructure
<b>Occupation</b>	Customer Service - Passive Infrastructure
<b>NSQF Level</b>	4
<b>Credits</b>	2
<b>Version</b>	5.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	26/05/2025
<b>NSQC Clearance Date</b>	26/05/2022

## Qualification Pack

# TEL/N6210: Perform Change Management at Radio Locations

## Description

This OS unit is about carrying out change management activities (system upgrade/site capacity augmentation/re-alignment of antenna/physical optimization) at radio locations.

## Scope

The scope covers the following :

- Assess upgradation of infrastructure
- Arrange for tools and spares
- Carry out change and monitor post change
- Report and document the status

## Elements and Performance Criteria

### *Assess upgradation of infrastructure*

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

- PC1.** receive change requests from the relevant teams (NOC, change management, network planning team)
- PC2.** identify activity type to be performed – hardware upgrade, software upgrade, capacity augmentation, antenna re-alignment, microwave back-up
- PC3.** analyse criticality of the issue and timelines for the resolution before carrying out the changes
- PC4.** prepare a work plan and identify dependencies, if any
- PC5.** assess the potential impact of the proposed activity and plan for possible outage condition or deferral of the activity
- PC6.** inform the Network Operation Centre (NOC) prior to undertake the upgradation activity

### *Arrange for tools and spares*

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

- PC7.** ensure that login cables, latest version of equipment specific software and spare hardware equipment like TRX cards are timely available
- PC8.** generate request for spares, in case any spare parts required for change management is not available
- PC9.** perform change management in accordance to organisational process such that faulty equipment/part is sent to the logistics team for repair and/or replacement

### *Carry out change and monitor post change*

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

- PC10.** implement ways to ensure that changes are carried as per the change request
- PC11.** monitor continuously and notify the problems if any to the change requestor
- PC12.** develop a contingency plan in case change management do not occur within the anticipated time to ensure minimum service disruption
- PC13.** comply with the defined Service Level Agreement (SLA) for carrying out changes

## Qualification Pack

### *Report and document the status*

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

- PC14.** complete all administrative tasks post change management like site clearance, return of test equipment etc.
- PC15.** confirm effectiveness of the maintenance process, by monitoring site's alarm status in co-ordination with the NOC team
- PC16.** notify all relevant parties (including Field Management (FM) Engineer, NOC team, supervisors) of the results of the maintenance result and obtain the sign-off from relevant personnel
- PC17.** identify documents to be updated and to be made available for inspection
- PC18.** complete routine maintenance logs, activity logs and spare tracker within stipulated timeline

### **Knowledge and Understanding (KU)**

The individual on the job needs to know and understand:

- KU1.** upgradation activities that need to be carried out
- KU2.** login cables (RJ-45, RS-232, and Hi-Speed USB) for different site equipment
- KU3.** spare management and repair and return process for faulty equipment
- KU4.** functionality of site active equipment like microwave, BTS (indoor and outdoor), feeder cables etc.
- KU5.** risks and impact of not following defined procedures/work instructions
- KU6.** types of documentation in the organisation and importance of the same
- KU7.** records to be maintained and implications of non-maintenance of the same

### **Generic Skills (GS)**

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

- GS1.** interpret reports, readings and numerical data
- GS2.** prioritize and execute tasks in a high-pressure environment
- GS3.** communicate with stakeholders

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Assess upgradation of infrastructure</i>	<b>9</b>	<b>21</b>	-	<b>3</b>
<b>PC1.</b> receive change requests from the relevant teams (NOC, change management, network planning team)	2	4	-	1
<b>PC2.</b> identify activity type to be performed - hardware upgrade, software upgrade, capacity augmentation, antenna re-alignment, microwave back-up	2	4	-	-
<b>PC3.</b> analyse criticality of the issue and timelines for the resolution before carrying out the changes	2	4	-	1
<b>PC4.</b> prepare a work plan and identify dependencies, if any	1	3	-	-
<b>PC5.</b> assess the potential impact of the proposed activity and plan for possible outage condition or deferral of the activity	1	3	-	1
<b>PC6.</b> inform the Network Operation Centre (NOC) prior to undertake the upgradation activity	1	3	-	-
<i>Arrange for tools and spares</i>	<b>4</b>	<b>6</b>	-	<b>3</b>
<b>PC7.</b> ensure that login cables, latest version of equipment specific software and spare hardware equipment like TRX cards are timely available	1	2	-	1
<b>PC8.</b> generate request for spares, in case any spare parts required for change management is not available	2	2	-	1
<b>PC9.</b> perform change management in accordance to organisational process such that faulty equipment/part is sent to the logistics team for repair and/or replacement	1	2	-	1
<i>Carry out change and monitor post change</i>	<b>11</b>	<b>15</b>	-	<b>3</b>
<b>PC10.</b> implement ways to ensure that changes are carried as per the change request	3	4	-	-

### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC11.</b> monitor continuously and notify the problems if any to the change requestor	2	3	-	1
<b>PC12.</b> develop a contingency plan in case change management do not occur within the anticipated time to ensure minimum service disruption	2	4	-	1
<b>PC13.</b> comply with the defined Service Level Agreement (SLA) for carrying out changes	4	4	-	1
<i>Report and document the status</i>	<b>9</b>	<b>15</b>	-	<b>1</b>
<b>PC14.</b> complete all administrative tasks post change management like site clearance, return of test equipment etc.	3	4	-	1
<b>PC15.</b> confirm effectiveness of the maintenance process, by monitoring site's alarm status in co-ordination with the NOC team	1	2	-	-
<b>PC16.</b> notify all relevant parties (including Field Management (FM) Engineer, NOC team, supervisors) of the results of the maintenance result and obtain the sign-off from relevant personnel	1	2	-	-
<b>PC17.</b> identify documents to be updated and to be made available for inspection	2	4	-	-
<b>PC18.</b> complete routine maintenance logs, activity logs and spare tracker within stipulated timeline	2	3	-	-
<b>NOS Total</b>	<b>33</b>	<b>57</b>	-	<b>10</b>

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	TEL/N6210
<b>NOS Name</b>	Perform Change Management at Radio Locations
<b>Sector</b>	Telecom
<b>Sub-Sector</b>	Network Managed Services
<b>Occupation</b>	Network Operation and Maintenance
<b>NSQF Level</b>	5
<b>Credits</b>	2
<b>Version</b>	4.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	26/05/2025
<b>NSQF Clearance Date</b>	26/05/2022

## Qualification Pack

### TEL/N6310: Assist in the Installation of Telecom Equipment

#### Description

This OS unit is about carrying out various activities to assist in the installation of telecom equipment on tower structures - Ground Base Towers (GBT), Roof Top Towers (RTT), monopoles etc. using rigging and other installation related skills keeping all the safety related equipment handy.

#### Scope

The scope covers the following :

- Determine the scope of work
- Prepare for the installation of telecom equipment
- Assist in the installation of tower equipment
- Assist in performing Line-of-Sight (LOS) check
- Assist in the shelter room installations
- Assist in completing documentation

#### Elements and Performance Criteria

##### *Determine the scope of work*

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

- PC1.** determine the scope of installation work by coordinating with the supervisor and commissioning engineers
- PC2.** analyse the relevant blueprints, schematics and as-built site plan to determine the work requirements
- PC3.** assist the supervisor/field manager by providing appropriate inputs and feedback as required to help achieve the scope of work

##### *Prepare for the installation of telecom equipment*

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

- PC4.** check the availability of required installation material, tools and equipment, and Personal Protection Equipment (PPE)
- PC5.** examine the installation material, tools and equipment, and PPE to ensure they are not faulty/damaged, and co-ordinate with the supervisor to get them replaced
- PC6.** assist in preparing Radio Frequency (RF) connector and jumper and assembling the relevant telecom equipment for installation, following the supervisor's instructions

##### *Assist in the installation of tower equipment*

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

- PC7.** carry out antenna assembly, waveguide, and coaxial connector assembly and crimping as per the supervisor's instructions
- PC8.** assist in erecting and securing telecom structures, such as steel towers, monopoles, masts and cable tray installations to facilitate the installation of telecom equipment
- PC9.** assist in the installation of antennas, feeders, microwave dishes, mast head amplifiers and ancillary equipment on steel structures/monopoles/towers, using the appropriate safety equipment to ensure safety at heights

## Qualification Pack

- PC10.** carry out the installation of all necessary transmission equipment components including antenna mounts, surge arrestors, eNodeB, gNodeB, transmission lines, connectors or Tower Mounted Amplifiers (TMAs), Call Distribution Unit (CDU) as per the supervisor's instructions
- PC11.** ensure the correct azimuth, elevation, angle and alignment of the transmission equipment, such as antennas, amplifiers, microwave dishes, etc.
- PC12.** carry out the installation of feeder cables, coaxial cables, and high jumpers on steel lattice towers, guyed towers, masts, rooftop and building antennas/aerial systems
- PC13.** assist in the installation of Radio Frequency (RF) antenna system and external RF hardware, such as Remote Radio Units (RRUs), Tower Mounted Amplifier (TMAs), combiners, microwave dishes, etc.
- PC14.** assist in the installation of microwave antennas, such as parabolic 1 to 15 foot, Very High Frequency (VHF), Ultra High Frequency (UHF) antennas
- PC15.** install, connect or test underground or above ground grounding systems as per the supervisor instructions
- PC16.** use coaxial connectors and coaxial preparatory tools appropriately as per the manufacturer's instructions
- PC17.** measure the alignment in azimuth, tilt, roll, and height of antennas using the antenna alignment tool and change the settings as per the instructions given by the RF engineer
- PC18.** carry out bird-proofing and water-proofing of connectors
- PC19.** assist in installing, terminating, earthing, labelling, and testing different types of cables, such as coaxial, Ethernet, feeder and optical fibre cables for the wireless telecom system
- PC20.** assist in installing and testing Outdoor Unit (ODUs), splitters, and Customer Premises Equipment (CPE) as per the supervisor's instructions
- PC21.** assist in ensuring the 3G/4G/5G wireless system is built as per the approved drawing and is operational as per the design
- PC22.** use the compass, Global Positioning System (GPS) receiver, Range Finder and other relevant equipment as per the requirement
- PC23.** assist in carrying out labelling, grounding and sweep testing
- PC24.** carry out Passive Intermodulation (PIM) and sweep testing, following the supervisor's instructions
- PC25.** assist the technicians and Instrumentation & Control (I&C) engineers in undertaking installation rectification for all the equipment installed

### *Assist in performing LOS check*

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

- PC26.** assist in performing Line of Sight (LOS) check to ensure signal drop or termination is not experienced
- PC27.** assist in identifying the reason for drop/termination of signal, such as bad cable connection, incorrect network configuration, faulty network device, etc.
- PC28.** follow the appropriate measures to correct the LOS and remove the sources causing obstructions, such as networks and radio noise from other electronic and mechanical equipment around wireless gateways

### *Assist in the shelter room installations*

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

- PC29.** perform the shelter room installations as per the supervisor's instructions

## Qualification Pack

**PC30.** carry out cabling and relevant tests on the shelter room equipment to ensure their correct functioning

**PC31.** carry out troubleshooting for any malfunctioning equipment, as required

*Assist in completing documentation*

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

**PC32.** assist the supervisor in collecting the relevant information concerning the equipment on towers

**PC33.** assist in completing the relevant survey reports and documentation for client handover

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the importance of adhering to the applicable safety guidelines during rigging operations
- KU2.** the importance and process of working safely at high elevations, and the use of appropriate safety equipment
- KU3.** different support mechanisms and techniques used to climb and work on different types of towers, such as guyed towers, lattice towers, monopole towers, stealth towers, etc.
- KU4.** the common defects found in various telecom equipment
- KU5.** the importance of identifying and documenting Job Hazard Assessment (JHA) requirements
- KU6.** the benefits of following checklists and Standard Operating Procedures (SOPs), such as efficiency and consistency in work
- KU7.** the importance of determining the client requirements by studying blueprints and carrying out work accordingly
- KU8.** the process of expanding and upgrading a cellular carrier network, involving civil work at existing cellular network sites and change of telecom equipment
- KU9.** the importance and process of carrying out pre and post-work site audits
- KU10.** the benefits and process of upgrading legacy cable plants from coaxial cable to fibre
- KU11.** the importance and process of determining the scope of work and client's requirements
- KU12.** the relevant installation material, tools and equipment, and PPE required for telecom rigging
- KU13.** the process of erecting and securing telecom structures, such as steel towers, monopoles, masts and cable tray installations to facilitate the installation of telecom equipment
- KU14.** the process of preparing Radio Frequency (RF) connector and jumper, and assembling the relevant telecom equipment for installation
- KU15.** the process of installing antennas, feeders, microwave dishes, mast head amplifiers and ancillary equipment on steel structures/ monopoles/ towers
- KU16.** the process of installing feeder cables, high jumpers, Tower Mounted Amplifier (TMA), Call Distribution Unit (CDU), etc.
- KU17.** the process of installing an RF antenna system and external RF hardware, such as RRUs, Tower Mounted Amplifier (TMAs), Combiners, microwave dishes, etc
- KU18.** the process of undertaking installation rectification for all equipment deployed during the project rollout
- KU19.** the process of installing and testing copper and hybrid feeder system
- KU20.** the process of microwave transmission installation and link panning

## Qualification Pack

- KU21.** the process of panning/ re-panning antennas
- KU22.** the use of a cable and antenna analyzer for VHF, broadcasting, cellular, PCS/GSM, 3G/4G/5G, Wireless Local Area Network (WLAN) and Wireless Local Loop (WLL) applications
- KU23.** the process of carrying out labelling, grounding and sweep testing
- KU24.** the importance and process of measuring the alignment, azimuth, tilt, roll, and height of antennas using the antenna alignment tool
- KU25.** the process of installing and testing copper and hybrid feeder system
- KU26.** the process of microwave transmission installation and link panning
- KU27.** the process of installing and terminating telecom cables of various types and sizes, as per the requirement
- KU28.** the process of installing, earthing, labelling, and testing of feeder and optical fibre cables
- KU29.** the process of installing and testing Outdoor Units (ODUs), splitters, and Customer Premises Equipment (CPE)
- KU30.** the process of installing mobile/broadcast antenna systems, panel antennas, head frames, hybriflex cables, feeder cables, earthing, cable trays, Remote Radio Units (RRUs), etc.
- KU31.** the process of installing mobile/broadcast antenna systems, panel antennas, head frames, hybriflex cables, feeder cables, earthing, cable trays, Remote Radio Units (RRUs), etc.
- KU32.** the process of carrying out PIM and sweep testing
- KU33.** the importance of ensuring the 3G/ 4G/ 5G wireless system is built as per the approved drawing and is operational as per the design
- KU34.** the process of commissioning and integrating wireless technologies
- KU35.** the process of installing, terminating and testing different types of cables, such as coaxial, Ethernet, and optical fibre cables for the wireless telecom system
- KU36.** the use of compass, GPS receiver, Range Finder and other relevant equipment
- KU37.** the recommended safety practices to be followed while working at heights on a range of telecom structures, including poles, towers and masts
- KU38.** the relevant documentation to be completed for client handover

## Generic Skills (GS)

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

- GS1.** maintain work related notes and records
- GS2.** read the relevant literature to get the latest updates about the field of work
- GS3.** listen attentively to understand the information/instructions being shared
- GS4.** communicate politely and professionally
- GS5.** plan and prioritise tasks to ensure timely completion
- GS6.** co-ordinate with the coworkers to achieve the work objectives
- GS7.** evaluate all possible solutions to a problem to select the best one
- GS8.** take quick decisions to deal with workplace emergencies/accidents

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Determine the scope of work</i>	<b>1</b>	<b>3</b>	-	<b>3</b>
<b>PC1.</b> determine the scope of installation work by coordinating with the supervisor and commissioning engineers	1	1	-	1
<b>PC2.</b> analyse the relevant blueprints, schematics and as-built site plan to determine the work requirements	-	1	-	1
<b>PC3.</b> assist the supervisor/field manager by providing appropriate inputs and feedback as required to help achieve the scope of work	-	1	-	1
<i>Prepare for the installation of telecom equipment</i>	<b>1</b>	<b>3</b>	-	<b>3</b>
<b>PC4.</b> check the availability of required installation material, tools and equipment, and Personal Protection Equipment (PPE)	-	1	-	1
<b>PC5.</b> examine the installation material, tools and equipment, and PPE to ensure they are not faulty/damaged, and co-ordinate with the supervisor to get them replaced	-	1	-	1
<b>PC6.</b> assist in preparing Radio Frequency (RF) connector and jumper and assembling the relevant telecom equipment for installation, following the supervisor's instructions	1	1	-	1
<i>Assist in the installation of tower equipment</i>	<b>16</b>	<b>25</b>	-	<b>17</b>
<b>PC7.</b> carry out antenna assembly, waveguide, and coaxial connector assembly and crimping as per the supervisor's instructions	1	1	-	1
<b>PC8.</b> assist in erecting and securing telecom structures, such as steel towers, monopoles, masts and cable tray installations to facilitate the installation of telecom equipment	-	1	-	1
<b>PC9.</b> assist in the installation of antennas, feeders, microwave dishes, mast head amplifiers and ancillary equipment on steel structures/monopoles/towers, using the appropriate safety equipment to ensure safety at heights	1	1	-	1

### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC10.</b> carry out the installation of all necessary transmission equipment components including antenna mounts, surge arrestors, eNodeB, gNodeB, transmission lines, connectors or Tower Mounted Amplifiers (TMAs), Call Distribution Unit (CDU) as per the supervisor's instructions	1	1	-	1
<b>PC11.</b> ensure the correct azimuth, elevation, angle and alignment of the transmission equipment, such as antennas, amplifiers, microwave dishes, etc.	1	1	-	1
<b>PC12.</b> carry out the installation of feeder cables, coaxial cables, and high jumpers on steel lattice towers, guyed towers, masts, rooftop and building antennas/aerial systems	1	1	-	1
<b>PC13.</b> assist in the installation of Radio Frequency (RF) antenna system and external RF hardware, such as Remote Radio Units (RRUs), Tower Mounted Amplifier (TMAs), combiners, microwave dishes, etc.	1	1	-	1
<b>PC14.</b> assist in the installation of microwave antennas, such as parabolic 1 to 15 foot, Very High Frequency (VHF), Ultra High Frequency (UHF) antennas	1	1	-	1
<b>PC15.</b> install, connect or test underground or above ground grounding systems as per the supervisor instructions	1	1	-	1
<b>PC16.</b> use coaxial connectors and coaxial preparatory tools appropriately as per the manufacturer's instructions	1	2	-	-
<b>PC17.</b> measure the alignment in azimuth, tilt, roll, and height of antennas using the antenna alignment tool and change the settings as per the instructions given by the RF engineer	2	1	-	1
<b>PC18.</b> carry out bird-proofing and water-proofing of connectors	1	1	-	1
<b>PC19.</b> assist in installing, terminating, earthing, labelling, and testing different types of cables, such as coaxial, Ethernet, feeder and optical fibre cables for the wireless telecom system	1	3	-	1

### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC20.</b> assist in installing and testing Outdoor Unit (ODUs), splitters, and Customer Premises Equipment (CPE) as per the supervisor's instructions	-	2	-	-
<b>PC21.</b> assist in ensuring the 3G/4G/5G wireless system is built as per the approved drawing and is operational as per the design	-	1	-	1
<b>PC22.</b> use the compass, Global Positioning System (GPS) receiver, Range Finder and other relevant equipment as per the requirement	1	2	-	1
<b>PC23.</b> assist in carrying out labelling, grounding and sweep testing	-	1	-	1
<b>PC24.</b> carry out Passive Intermodulation (PIM) and sweep testing, following the supervisor's instructions	1	1	-	1
<b>PC25.</b> assist the technicians and Instrumentation & Control (I&C) engineers in undertaking installation rectification for all the equipment installed	1	2	-	1
<i>Assist in performing LOS check</i>	<b>3</b>	<b>3</b>	-	<b>3</b>
<b>PC26.</b> assist in performing Line of Sight (LOS) check to ensure signal drop or termination is not experienced	1	1	-	1
<b>PC27.</b> assist in identifying the reason for drop/termination of signal, such as bad cable connection, incorrect network configuration, faulty network device, etc.	1	1	-	1
<b>PC28.</b> follow the appropriate measures to correct the LOS and remove the sources causing obstructions, such as networks and radio noise from other electronic and mechanical equipment around wireless gateways	1	1	-	1
<i>Assist in the shelter room installations</i>	<b>2</b>	<b>7</b>	-	<b>2</b>
<b>PC29.</b> perform the shelter room installations as per the supervisor's instructions	1	2	-	1
<b>PC30.</b> carry out cabling and relevant tests on the shelter room equipment to ensure their correct functioning	-	2	-	-

### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC31.</b> carry out troubleshooting for any malfunctioning equipment, as required	1	3	-	1
<i>Assist in completing documentation</i>	2	4	-	2
<b>PC32.</b> assist the supervisor in collecting the relevant information concerning the equipment on towers	1	2	-	1
<b>PC33.</b> assist in completing the relevant survey reports and documentation for client handover	1	2	-	1
<b>NOS Total</b>	<b>25</b>	<b>45</b>	<b>-</b>	<b>30</b>

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	TEL/N6310
<b>NOS Name</b>	Assist in the Installation of Telecom Equipment
<b>Sector</b>	Telecom
<b>Sub-Sector</b>	Network Managed Services
<b>Occupation</b>	Project Engineering
<b>NSQF Level</b>	3
<b>Credits</b>	1
<b>Version</b>	2.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	26/05/2025
<b>NSQC Clearance Date</b>	26/05/2022

## Qualification Pack

# TEL/N6311: Install RFID Tags on Pre-Stressed Concrete (PSC) Sleepers

## Description

This OS unit is about installing Radio Frequency Identification (RFID) tags on Pre-Stressed Concrete (PSC) sleepers for track identification, correction of train location and identification of train direction.

## Scope

The scope covers the following :

- Prepare for the installation of RFID tags
- Carry out the programming of RFID tags
- Install the RFID tags on PSC sleepers
- Carry out documentation and review

## Elements and Performance Criteria

### *Prepare for the installation of RFID tags*

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

- PC1.** determine the scope of work by studying the relevant documents or co-ordinating with the supervisor
- PC2.** arrange the relevant Personal Protective Equipment (PPE) and installation material, such as RFID tags, RFID Fixing Arrangement, and relevant tools and equipment by co-ordinating with the supervisor
- PC3.** examine the installation material to ensure it is not defective or damaged, and get the defective/ damaged material replaced
- PC4.** check the RFID tags have the appropriate information marked on them, such as RFID number and type, and absolute location
- PC5.** carry out the relevant tests on RFID tags to ensure they are functioning correctly

### *Carry out the programming of RFID tags*

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

- PC6.** prepare the RFID tag data using the relevant software
- PC7.** use the portable RFID reader to read the RFID data and carry out programming of RFID tags using the ShowTags software tool

### *Install the RFID tags on PSC sleepers*

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

- PC8.** identify PSC sleepers for the installation of RFID tags at the recommended distance on railway tracks
- PC9.** ensure the selected PSC sleepers are not at locations susceptible to water accumulation, and ballast accumulation at the centre of PSC sleeper
- PC10.** install RFID tags at the centre of PSC sleepers using clamps, fasteners and fixing arrangements, ensuring not to drill any holes in PSC sleepers or cause them any damage
- PC11.** follow the recommended measures to protect the RFID tags fixtures from getting submerged in water during the installation

## Qualification Pack

- PC12.** ensure the RFID fixing arrangement on PSC sleepers adhere to the recommended dimensions, such as width and height and are safe from any sabotage and damage
- PC13.** conduct the relevant tests after the installation to ensure RFID tags are readable and able to emit RF signals when the corresponding type of RFID antenna is in the vicinity
- PC14.** carry out troubleshooting as per the manufacturer's instructions to resolve any issues experienced with RFID tags or replace them, as appropriate
- PC15.** co-ordinate with the supervisor to resolve any issues out of own limits of authority

### *Carry out documentation and review*

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

- PC16.** carry out relevant documentation concerning the work completed, any issues experienced, and the remedial action taken
- PC17.** identify any recurring issues by reviewing the documentation and co-ordinate with the relevant personnel to find their permanent solution

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the importance, functioning and various features of the indigenous Automatic Train Protection System (iATP) - Kavach
- KU2.** the effectiveness of iATP in preventing Signal Passing at Danger (SPAD) cases, and unsafe situations arising due to over speeding of trains and train collisions
- KU3.** the importance of ensuring high speed and low-latency communication between trains and protection systems for real-time tracking and management of trains
- KU4.** the functions of key system components of iATP, i.e. Loco iATP OCIP, Brake Interface Unit, RFID Reader, Station iATP, Radio Tower, Station Master - OCIP (Owner Controlled Insurance Program)
- KU5.** the functioning of relevant signalling and telecommunications equipment used by railways
- KU6.** the communication process between Stationary iATP and Loco iATP
- KU7.** the process through which Loco iATP units installed in the locomotive determine the location of trains by reading pre-programmed RFID Tag data using the RFID reader
- KU8.** the importance of ensuring the RFID fixing arrangement is strong enough to withstand impact during normal ballast unloading
- KU9.** the importance of testing the RFID tags for correct functioning before installation
- KU10.** the process of preparing the RFID data and programming RFID tags using the relevant software
- KU11.** the use of an RFID reader to read the RFID data
- KU12.** the criteria for selecting PSCs for the installation of RFID tags
- KU13.** the process of installing RFID tags and fixing arrangements on PSC sleepers
- KU14.** use of relevant tools and equipment spanner set and fasteners and RFID Programming Kit
- KU15.** the importance of ensuring the RFID fixing arrangement on PSC sleepers adhere to the recommended dimensions
- KU16.** the relevant tests to be conducted to ensure the correct functioning of RFID tags

## Qualification Pack

- KU17.** the appropriate troubleshooting to be carried out for common issues experienced with RFID tags
- KU18.** the relevant documentation requirements
- KU19.** the importance of identifying and resolving the recurring issues

### Generic Skills (GS)

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

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

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for the installation of RFID tags</i>	<b>9</b>	<b>14</b>	-	<b>6</b>
<b>PC1.</b> determine the scope of work by studying the relevant documents or co-ordinating with the supervisor	2	2	-	1
<b>PC2.</b> arrange the relevant Personal Protective Equipment (PPE) and installation material, such as RFID tags, RFID Fixing Arrangement, and relevant tools and equipment by co-ordinating with the supervisor	2	4	-	1
<b>PC3.</b> examine the installation material to ensure it is not defective or damaged, and get the defective/ damaged material replaced	2	3	-	1
<b>PC4.</b> check the RFID tags have the appropriate information marked on them, such as RFID number and type, and absolute location	2	3	-	2
<b>PC5.</b> carry out the relevant tests on RFID tags to ensure they are functioning correctly	1	2	-	1
<i>Carry out the programming of RFID tags</i>	<b>2</b>	<b>5</b>	-	<b>2</b>
<b>PC6.</b> prepare the RFID tag data using the relevant software	1	2	-	1
<b>PC7.</b> use the portable RFID reader to read the RFID data and carry out programming of RFID tags using the ShowTags software tool	1	3	-	1
<i>Install the RFID tags on PSC sleepers</i>	<b>10</b>	<b>29</b>	-	<b>9</b>
<b>PC8.</b> identify PSC sleepers for the installation of RFID tags at the recommended distance on railway tracks	1	3	-	1
<b>PC9.</b> ensure the selected PSC sleepers are not at locations susceptible to water accumulation, and ballast accumulation at the centre of PSC sleeper	1	3	-	1

### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC10.</b> install RFID tags at the centre of PSC sleepers using clamps, fasteners and fixing arrangements, ensuring not to drill any holes in PSC sleepers or cause them any damage	1	5	-	1
<b>PC11.</b> follow the recommended measures to protect the RFID tags fixtures from getting submerged in water during the installation	1	3	-	1
<b>PC12.</b> ensure the RFID fixing arrangement on PSC sleepers adhere to the recommended dimensions, such as width and height and are safe from any sabotage and damage	1	4	-	2
<b>PC13.</b> conduct the relevant tests after the installation to ensure RFID tags are readable and able to emit RF signals when the corresponding type of RFID antenna is in the vicinity	2	4	-	1
<b>PC14.</b> carry out troubleshooting as per the manufacturer's instructions to resolve any issues experienced with RFID tags or replace them, as appropriate	2	4	-	1
<b>PC15.</b> co-ordinate with the supervisor to resolve any issues out of own limits of authority	1	3	-	1
<i>Carry out documentation and review</i>	<b>4</b>	<b>7</b>	-	<b>3</b>
<b>PC16.</b> carry out relevant documentation concerning the work completed, any issues experienced, and the remedial action taken	2	4	-	1
<b>PC17.</b> identify any recurring issues by reviewing the documentation and co-ordinate with the relevant personnel to find their permanent solution	2	3	-	2
<b>NOS Total</b>	<b>25</b>	<b>55</b>	-	<b>20</b>

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	TEL/N6311
<b>NOS Name</b>	Install RFID Tags on Pre-Stressed Concrete (PSC) Sleepers
<b>Sector</b>	Telecom
<b>Sub-Sector</b>	Network Managed Services
<b>Occupation</b>	Project Engineering
<b>NSQF Level</b>	4
<b>Credits</b>	1
<b>Version</b>	2.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	26/05/2025
<b>NSQC Clearance Date</b>	26/05/2022

## Qualification Pack

### TEL/N6300: Install SDH, DWDM, L2 and L3 Equipment

#### Description

This OS unit is about carrying out installation of SDH, DWDM, L2 and L3 equipment for the sites proposed by the planning team.

#### Scope

The scope covers the following :

- Prepare for installation
- Connect power and traffic cable to the equipment
- Record and report installation status

#### Elements and Performance Criteria

##### *Prepare for installation*

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

- PC1.** verify availability of all line items required for installation and match with Bill of Material (BOM)
- PC2.** check availability of installation kit/racks required for the installation as mentioned in the installation guide
- PC3.** access installation plan from the planning team, interpret it and recommend any modifications in the plan
- PC4.** determine if any additional equipment, accessories are needed for installation
- PC5.** ensure proper order and sequence of equipment in the rack
- PC6.** maintain adequate space between equipment in the rack and for cable routing

##### *Connect power and traffic cable to the equipment*

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

- PC7.** identify appropriate MCBs to be used at the rack for the installation as per power consumption of the equipment
- PC8.** verify that the MCB has -48V DC and Ground connectivity with the equipment
- PC9.** identify appropriate optical patch cords and electrical cables to be used
- PC10.** perform connection and routing of power cable and traffic cable properly
- PC11.** mark traffic cables with appropriate printed stickers
- PC12.** follow precautions to avoid damage to cables and connectors during connecting and disconnecting
- PC13.** communicate installation progress to the Project Manager

##### *Record and report installation status*

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

- PC14.** prepare installation report in specified format with all relevant information
- PC15.** obtain signature on the installation report from the appropriate authority
- PC16.** ensure that all required documents are timely updated after completion of a job/task

## Qualification Pack

**PC17.** ensure documents are available to all appropriate authorities

### Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** basic equipment category
- KU2.** site installation checklist and critical punch points
- KU3.** risk and impact of not following defined procedures/work instructions
- KU4.** equipment dimension from installation guide
- KU5.** usage of cable connectors, cable ties and cable tray
- KU6.** types of login cables (RJ45, RS232, High Speed USB) required to login on the core nodes
- KU7.** need, requirement and process of earthing the equipment.
- KU8.** mechanism to maintain the earthing pit to absolute zero
- KU9.** types of documentation in organization and importance of the same

### Generic Skills (GS)

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

- GS1.** read and interpret necessary documents
- GS2.** liaise and coordinate with third party vendors/other stakeholders
- GS3.** use and maintain resources efficiently and effectively
- GS4.** multitask by handling multiple tasks and completing them successfully with due timeline
- GS5.** prioritize and execute tasks in a high-pressure environment
- GS6.** maintain proper records as per given format

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for installation</i>	<b>12</b>	<b>23</b>	-	<b>4</b>
<b>PC1.</b> verify availability of all line items required for installation and match with Bill of Material (BOM)	2	4	-	1
<b>PC2.</b> check availability of installation kit/racks required for the installation as mentioned in the installation guide	1	5	-	1
<b>PC3.</b> access installation plan from the planning team, interpret it and recommend any modifications in the plan	1	3	-	1
<b>PC4.</b> determine if any additional equipment, accessories are needed for installation	3	4	-	-
<b>PC5.</b> ensure proper order and sequence of equipment in the rack	2	3	-	-
<b>PC6.</b> maintain adequate space between equipment in the rack and for cable routing	3	4	-	1
<i>Connect power and traffic cable to the equipment</i>	<b>13</b>	<b>24</b>	-	<b>3</b>
<b>PC7.</b> identify appropriate MCBs to be used at the rack for the installation as per power consumption of the equipment	2	3	-	1
<b>PC8.</b> verify that the MCB has -48V DC and Ground connectivity with the equipment	2	2	-	-
<b>PC9.</b> identify appropriate optical patch cords and electrical cables to be used	2	3	-	1
<b>PC10.</b> perform connection and routing of power cable and traffic cable properly	2	4	-	-
<b>PC11.</b> mark traffic cables with appropriate printed stickers	1	4	-	-
<b>PC12.</b> follow precautions to avoid damage to cables and connectors during connecting and disconnecting	1	4	-	1

### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC13.</b> communicate installation progress to the Project Manager	3	4	-	-
<i>Record and report installation status</i>	<b>5</b>	<b>13</b>	-	<b>3</b>
<b>PC14.</b> prepare installation report in specified format with all relevant information	2	4	-	1
<b>PC15.</b> obtain signature on the installation report from the appropriate authority	1	3	-	1
<b>PC16.</b> ensure that all required documents are timely updated after completion of a job/task	1	3	-	-
<b>PC17.</b> ensure documents are available to all appropriate authorities	1	3	-	1
<b>NOS Total</b>	<b>30</b>	<b>60</b>	-	<b>10</b>

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	TEL/N6300
<b>NOS Name</b>	Install SDH, DWDM, L2 and L3 Equipment
<b>Sector</b>	Telecom
<b>Sub-Sector</b>	Network Managed Services
<b>Occupation</b>	Project Engineering
<b>NSQF Level</b>	5
<b>Credits</b>	1
<b>Version</b>	4.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	26/05/2025
<b>NSQC Clearance Date</b>	26/05/2022

## Qualification Pack

# TEL/N6302: Perform Commissioning of SDH, DWDM, L2 and L3 Equipment

## Description

This OS unit is about carrying out commissioning of SDH and DWDM equipment for the sites where equipment installation and site acceptance testing has been successfully completed

## Scope

The scope covers the following :

- Assess network topology to develop commissioning plan and test procedure
- Configure and test the equipment, and record test details

## Elements and Performance Criteria

### *Assess network topology to develop commissioning plan and test procedure*

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

- PC1.** interpret SDH/DWDM/LAN/WAN network topology, basic features and working functionality of the equipment
- PC2.** analyse ways to provision equipment as per the requirements and specifications
- PC3.** prepare step-by-step commissioning plan for the equipment and record the guidelines in specified format
- PC4.** develop a test procedure for the commissioned equipment and document the same
- PC5.** verify power cable connectivity with the equipment and switch it on

### *Configure and test the equipment, and record test details*

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

- PC6.** configure the equipment as per commissioning guide
- PC7.** verify the configuration checklist as per commissioning guide
- PC8.** test the commissioned equipment with the help of SDH and PDH test cases
- PC9.** update the test report timely for the commissioned equipment as per the test result
- PC10.** ensure completion of administrative jobs like site clearance, return of test equipment after successful commissioning
- PC11.** ensure commissioning and test documents are timely updated
- PC12.** ensure that the updated commissioning and test documents are available to all appropriate authorities for further inspection

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** OSI, LAN, WAN and MAN architecture and protocols
- KU2.** basic equipment design and application
- KU3.** Internet and IP protocol and VLAN concepts



## Qualification Pack

- KU4.** Ethernet networking, media and connector functioning
- KU5.** types of documentation in organization and importance of the same
- KU6.** records to be maintained and implication of non-maintenance of the same

### Generic Skills (GS)

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

- GS1.** read and comprehend different types of information
- GS2.** write as per pre-defined format
- GS3.** interpret test results and undertake appropriate steps
- GS4.** prioritize and execute tasks in high pressure environment
- GS5.** utilize appropriate communication channels to escalate unresolved problems

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Assess network topology to develop commissioning plan and test procedure</i>	<b>25</b>	<b>19</b>	-	<b>5</b>
<b>PC1.</b> interpret SDH/DWDM/LAN/WAN network topology, basic features and working functionality of the equipment	5	4	-	1
<b>PC2.</b> analyse ways to provision equipment as per the requirements and specifications	5	4	-	1
<b>PC3.</b> prepare step-by-step commissioning plan for the equipment and record the guidelines in specified format	5	4	-	1
<b>PC4.</b> develop a test procedure for the commissioned equipment and document the same	5	3	-	1
<b>PC5.</b> verify power cable connectivity with the equipment and switch it on	5	4	-	1
<i>Configure and test the equipment, and record test details</i>	<b>15</b>	<b>31</b>	-	<b>5</b>
<b>PC6.</b> configure the equipment as per commissioning guide	5	5	-	1
<b>PC7.</b> verify the configuration checklist as per commissioning guide	3	5	-	1
<b>PC8.</b> test the commissioned equipment with the help of SDH and PDH test cases	2	6	-	1
<b>PC9.</b> update the test report timely for the commissioned equipment as per the test result	2	4	-	-
<b>PC10.</b> ensure completion of administrative jobs like site clearance, return of test equipment after successful commissioning	1	3	-	-
<b>PC11.</b> ensure commissioning and test documents are timely updated	1	4	-	1
<b>PC12.</b> ensure that the updated commissioning and test documents are available to all appropriate authorities for further inspection	1	4	-	1

## Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>NOS Total</b>	<b>40</b>	<b>50</b>	<b>-</b>	<b>10</b>

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	TEL/N6302
<b>NOS Name</b>	Perform Commissioning of SDH, DWDM, L2 and L3 Equipment
<b>Sector</b>	Telecom
<b>Sub-Sector</b>	Network Managed Services
<b>Occupation</b>	Project Engineering
<b>NSQF Level</b>	5
<b>Credits</b>	1
<b>Version</b>	4.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	26/05/2025
<b>NSQF Clearance Date</b>	26/05/2022

## Qualification Pack

### DGT/VSQ/N0102: Employability Skills (60 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
- Career Development & Goal Setting
- 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.** identify employability skills required for jobs in various industries
- PC2.** identify and explore learning and employability portals

##### *Constitutional values - Citizenship*

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

- PC3.** recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.
- PC4.** follow environmentally sustainable practices

##### *Becoming a Professional in the 21st Century*

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

- PC5.** recognize the significance of 21st Century Skills for employment
- PC6.** practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life

##### *Basic English Skills*

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

## Qualification Pack

- PC7.** use basic English for everyday conversation in different contexts, in person and over the telephone
- PC8.** read and understand routine information, notes, instructions, mails, letters etc. written in English
- PC9.** write short messages, notes, letters, e-mails etc. in English

### *Career Development & Goal Setting*

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

- PC10.** understand the difference between job and career
- PC11.** prepare a career development plan with short- and long-term goals, based on aptitude

### *Communication Skills*

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

- PC12.** follow verbal and non-verbal communication etiquette and active listening techniques in various settings
- PC13.** work collaboratively with others in a team

### *Diversity & Inclusion*

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

- PC14.** communicate and behave appropriately with all genders and PwD
- PC15.** escalate any issues related to sexual harassment at workplace according to POSH Act

### *Financial and Legal Literacy*

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

- PC16.** select financial institutions, products and services as per requirement
- PC17.** carry out offline and online financial transactions, safely and securely
- PC18.** identify common components of salary and compute income, expenses, taxes, investments etc
- PC19.** identify relevant rights and laws and use legal aids to fight against legal exploitation

### *Essential Digital Skills*

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

- PC20.** operate digital devices and carry out basic internet operations securely and safely
- PC21.** use e-mail and social media platforms and virtual collaboration tools to work effectively
- PC22.** use basic features of word processor, spreadsheets, and presentations

### *Entrepreneurship*

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

- PC23.** identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research
- PC24.** develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion
- PC25.** identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity

### *Customer Service*

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

- PC26.** identify different types of customers
- PC27.** identify and respond to customer requests and needs in a professional manner.

## Qualification Pack

**PC28.** follow appropriate hygiene and grooming standards

*Getting ready for apprenticeship & Jobs*

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

**PC29.** create a professional Curriculum vitae (Résumé)

**PC30.** search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively

**PC31.** apply to identified job openings using offline /online methods as per requirement

**PC32.** answer questions politely, with clarity and confidence, during recruitment and selection

**PC33.** identify apprenticeship opportunities and register for it as per guidelines and requirements

## Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

**KU1.** need for employability skills and different learning and employability related portals

**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 English language for effective verbal (face to face and telephonic) and written communication in formal and informal set up

**KU6.** importance of career development and setting long- and short-term goals

**KU7.** about effective communication

**KU8.** POSH Act

**KU9.** Gender sensitivity and inclusivity

**KU10.** different types of financial institutes, products, and services

**KU11.** how to compute income and expenditure

**KU12.** importance of maintaining safety and security in offline and online financial transactions

**KU13.** different legal rights and laws

**KU14.** different types of digital devices and the procedure to operate them safely and securely

**KU15.** how to create and operate an e- mail account and use applications such as word processors, spreadsheets etc.

**KU16.** how to identify business opportunities

**KU17.** types and needs of customers

**KU18.** how to apply for a job and prepare for an interview

**KU19.** apprenticeship scheme and the process of registering on apprenticeship portal

## Generic Skills (GS)

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

**GS1.** read and write different types of documents/instructions/correspondence

**GS2.** communicate effectively using appropriate language in formal and informal settings



## Qualification Pack

- GS3.** behave politely and appropriately with all
- GS4.** how to work in a virtual mode
- GS5.** perform calculations efficiently
- GS6.** solve problems effectively
- GS7.** pay attention to details
- GS8.** manage time efficiently
- GS9.** maintain hygiene and sanitization to avoid infection

## Qualification Pack

### Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Introduction to Employability Skills</i>	<b>1</b>	<b>1</b>	-	-
<b>PC1.</b> identify employability skills required for jobs in various industries	-	-	-	-
<b>PC2.</b> identify and explore learning and employability portals	-	-	-	-
<i>Constitutional values - Citizenship</i>	<b>1</b>	<b>1</b>	-	-
<b>PC3.</b> recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
<b>PC4.</b> follow environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	<b>2</b>	<b>4</b>	-	-
<b>PC5.</b> recognize the significance of 21st Century Skills for employment	-	-	-	-
<b>PC6.</b> practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
<i>Basic English Skills</i>	<b>2</b>	<b>3</b>	-	-
<b>PC7.</b> use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
<b>PC8.</b> read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
<b>PC9.</b> write short messages, notes, letters, e-mails etc. in English	-	-	-	-
<i>Career Development &amp; Goal Setting</i>	<b>1</b>	<b>2</b>	-	-

### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC10.</b> understand the difference between job and career	-	-	-	-
<b>PC11.</b> prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
<i>Communication Skills</i>	<b>2</b>	<b>2</b>	-	-
<b>PC12.</b> follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
<b>PC13.</b> work collaboratively with others in a team	-	-	-	-
<i>Diversity &amp; Inclusion</i>	<b>1</b>	<b>2</b>	-	-
<b>PC14.</b> communicate and behave appropriately with all genders and PwD	-	-	-	-
<b>PC15.</b> escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
<i>Financial and Legal Literacy</i>	<b>2</b>	<b>3</b>	-	-
<b>PC16.</b> select financial institutions, products and services as per requirement	-	-	-	-
<b>PC17.</b> carry out offline and online financial transactions, safely and securely	-	-	-	-
<b>PC18.</b> identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
<b>PC19.</b> identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
<i>Essential Digital Skills</i>	<b>3</b>	<b>4</b>	-	-
<b>PC20.</b> operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
<b>PC21.</b> use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
<b>PC22.</b> use basic features of word processor, spreadsheets, and presentations	-	-	-	-

### Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Entrepreneurship</i>	<b>2</b>	<b>3</b>	-	-
<b>PC23.</b> identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
<b>PC24.</b> develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
<b>PC25.</b> identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
<i>Customer Service</i>	<b>1</b>	<b>2</b>	-	-
<b>PC26.</b> identify different types of customers	-	-	-	-
<b>PC27.</b> identify and respond to customer requests and needs in a professional manner.	-	-	-	-
<b>PC28.</b> follow appropriate hygiene and grooming standards	-	-	-	-
<i>Getting ready for apprenticeship &amp; Jobs</i>	<b>2</b>	<b>3</b>	-	-
<b>PC29.</b> create a professional Curriculum vitae (Résumé)	-	-	-	-
<b>PC30.</b> search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
<b>PC31.</b> apply to identified job openings using offline /online methods as per requirement	-	-	-	-
<b>PC32.</b> answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
<b>PC33.</b> identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
<b>NOS Total</b>	<b>20</b>	<b>30</b>	-	-

## Qualification Pack

### National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	DGT/VSQ/N0102
<b>NOS Name</b>	Employability Skills (60 Hours)
<b>Sector</b>	Cross Sectoral
<b>Sub-Sector</b>	Professional Skills
<b>Occupation</b>	Employability
<b>NSQF Level</b>	4
<b>Credits</b>	2
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	27/05/2024
<b>NSQC Clearance Date</b>	27/05/2021

## 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 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.

## 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/N2500.High density hand soldering of components on telecom boards	25	55	-	20	100	10
TEL/N4126.Handle fiber Constructs, Performance and Selection Criteria	30	50	-	20	100	10
TEL/N4200.Installation of passive FTTH/X components	35	55	-	10	100	10
TEL/N6400.Splice Optical Fiber	35	55	-	10	100	10
TEL/N0111.Lay cable/system wiring and install equipment at customer premises	40	50	-	10	100	10
TEL/N6210.Perform Change Management at Radio Locations	33	57	-	10	100	10
TEL/N6310.Assist in the Installation of Telecom Equipment	25	45	-	30	100	8
TEL/N6311.Install RFID Tags on Pre-Stressed Concrete (PSC) Sleepers	25	55	-	20	100	8
TEL/N6300.Install SDH, DWDM, L2 and L3 Equipment	30	60	-	10	100	8
TEL/N6302.Perform Commissioning of SDH, DWDM, L2 and L3 Equipment	40	50	-	10	100	8

### Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	8
<b>Total</b>	<b>338</b>	<b>562</b>	<b>-</b>	<b>150</b>	<b>1050</b>	<b>100</b>

## Qualification Pack

### Acronyms

<b>NOS</b>	National Occupational Standard(s)
<b>NSQF</b>	National Skills Qualifications Framework
<b>QP</b>	Qualifications Pack
<b>TVET</b>	Technical and Vocational Education and Training
<b>NOS</b>	National Occupational Standard(s)
<b>NSQF</b>	National Skills Qualifications Framework
<b>QP</b>	Qualifications Pack
<b>TVET</b>	Technical and Vocational Education and Training
<b>BTS---GNODE B</b>	Base Transceiver Station G NODE B
<b>FME</b>	Field Maintenance Engineer
<b>IF Cable</b>	Intermediate Cable
<b>MMU</b>	Man-Machine Unit
<b>OHS</b>	Organizational Health and Safety
<b>RF Cable</b>	Radio Frequency Cable
<b>SHE</b>	Safety Health and Environment
<b>IN</b>	Intelligent Network
<b>VAS</b>	Value Added Services
<b>BSC</b>	Base Station Controller
<b>MUX</b>	Multiplexer
<b>SDH</b>	Synchronous Digital Hierarchy
<b>PDH Packet Core Network IMS Co</b>	Plesiochronous Digital Hierarchy
<b>NOS</b>	National Occupational Standard(s)
<b>NSQF</b>	National Skills Qualifications Framework
<b>QP</b>	Qualifications Pack
<b>TVET</b>	Technical and Vocational Education and Training

## Qualification Pack

<b>BTS</b>	Base Transceiver Station
<b>FME</b>	Field Maintenance Engineer
<b>IF Cable</b>	Intermediate Cable
<b>MMU</b>	Man-Machine Unit
<b>OHS</b>	Organizational Health and Safety
<b>RF Cable</b>	Radio Frequency Cable
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<b>IN</b>	Intelligent Network
<b>VAS</b>	Value Added Services
<b>BSC</b>	Base Station Controller
<b>MUX</b>	Multiplexer
<b>SDH</b>	Synchronous Digital Hierarchy
<b>PDH</b>	Plesiochronous Digital Hierarchy

## Qualification Pack

### Glossary

<b>Sector</b>	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.
<b>Sub-sector</b>	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
<b>Occupation</b>	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
<b>Job role</b>	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
<b>Occupational Standards (OS)</b>	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.
<b>Performance Criteria (PC)</b>	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
<b>National Occupational Standards (NOS)</b>	NOS are occupational standards which apply uniquely in the Indian context.
<b>Qualifications Pack (QP)</b>	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.
<b>Unit Code</b>	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
<b>Unit Title</b>	Unit title gives a clear overall statement about what the incumbent should be able to do.
<b>Description</b>	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.
<b>Scope</b>	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.

## Qualification Pack

<b>Knowledge and Understanding (KU)</b>	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.
<b>Organisational Context</b>	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.
<b>Technical Knowledge</b>	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
<b>Core Skills/ Generic Skills (GS)</b>	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.
<b>Electives</b>	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.
<b>Options</b>	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.
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## Qualification Pack

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<b>Occupation</b>	Occupation is a set of job roles, which perform similar/related set of functions in an industry.
<b>Function</b>	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.
<b>Job Role</b>	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
<b>OS</b>	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.
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