## Contents



### What are Occupational Standards(OS)?

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

Contact Us:
2ndFloor,PLOT: 105,Sector-44, GURGAON-122003
T: -4148029 -0124
E-mail:
tssc@ tsscindia.com

# Introduction

## Qualifications Pack- Outside Plant Fiber Installation, Testing and Commissioning Supervisor

**SECTOR:** TELECOM

**SUB-SECTOR:** Passive Infrastructure

**OCCUPATION:** Operations & Maintenance

**REFERENCE ID:** TEL/Q4107

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

**Brief Job Description:** OSP Installation, testing and commissioning supervisor is responsible for on-site optical fiber installation activities adhering to the best practices for optical splicing, testing and safety compliances/measures on the field. The supervisor, typically manages a team of splicers and technicians to achieve work completion within stipulated timelines and quality of service.

**Personal Attributes:** Good analytical skills, on-site problem-solving skills, attention to details and fair communication skills to interact with team members and higher-ups are required for the role.

Job Details

| | | | |
|---|---|---|---|
| **Qualifications Pack Code** | **TEL/Q4107** | | |
| **Job Role** | **Outside plant fiber installation, testing and commissioning supervisor** | | |
| **Credits(NSQF)** | **TBD** | **Version number** | **1.0** |
| **Sector** | **Telecom** | **Drafted on** | **27/06/2017** |
| **Sub-sector** | **Network Managed** | **Last reviewed on** | **10/11/2017** |
| **Occupation** | **Operation & Maintenance - Optical** | **Next review date** | **10/11/2021** |
| **NSQC Clearance on** | **DD/MM/YYYY** | | |

| **Job Role** | **Outside plant fiber installation, testing and commissioning supervisor** |
|---|---|
| **Role Description** | OSP Installation, testing and commissioning supervisor is responsible for on-site optical fiber installation activities and is expected to adhere to the best practices for optical splicing, testing and safety compliances/measures on the field. |
| **NSQF level** | 5 |
| **Minimum Educational Qualifications*** | 10+2 or OFT (Optical Fiber Technician) QP certified with one-year experience. |
| **Maximum Educational Qualifications*** | NA |
| **Training** (Suggested but not mandatory) | Nil |
| **Experience** | Nil for 10+2<br>01-year for OFT (Optical Fiber Technician) Certified |
| **Minimum entry Job Age** | 18 Years |
| **Experience** | NIL |
| **Applicable National Occupational Standards (NOS)** | **Compulsory:**<br>1. TEL/N4126(Handling Fiber constructs, performance and selection criteria)<br>2. TEL/N4127 (Fiber connectorisation, splicing and first level checks)<br>3. TEL/N4128 (Outside plant cable installation procedures and practices)<br>4. TEL/N4129 (Preparing cables for termination and splicing<br>5. TEL/N4130 (Outside plant fiber testing and troubleshooting)<br>6. TEL/N4131 (Work safety practices with fiber optics) |
| **Performance Criteria** | As described in the relevant OS units |

## Definitions

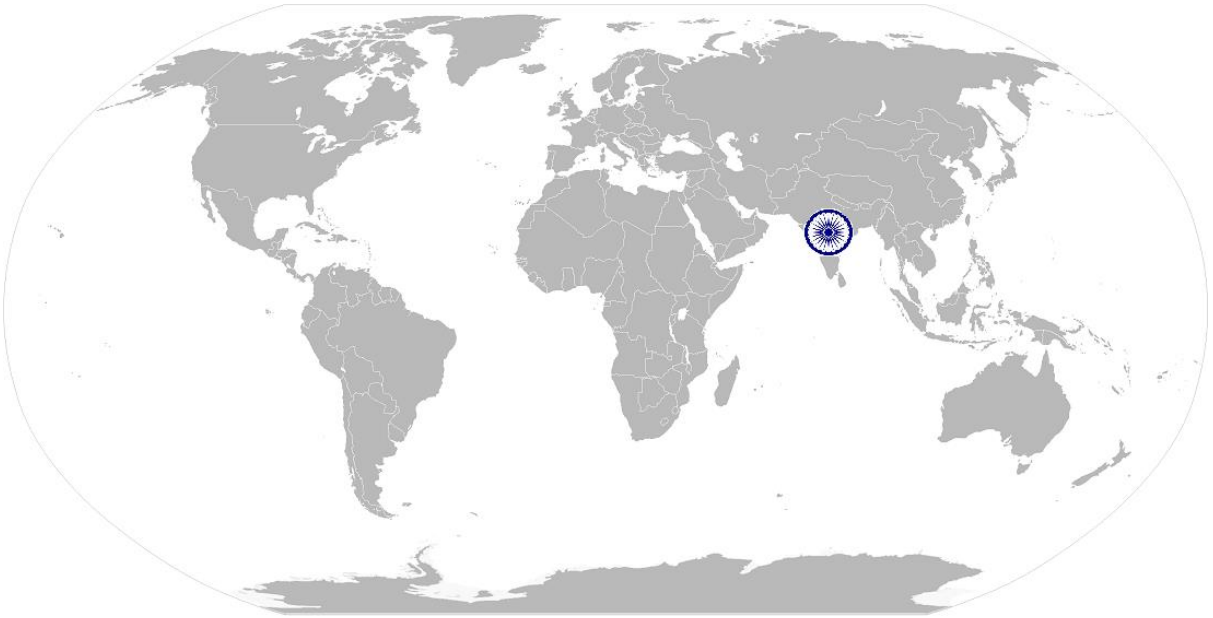
| Keywords /Terms | Description |
|---|---|
| Sector | Sector is a conglomeration of different business operations having similar businesses and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests. |
| Sub-sector | Sub-sector is derived from a further breakdown based on the characteristics and interests of its components. |
| Occupation | Occupation is a set of job roles, which perform similar/related set of functions in an industry. |
| Function | Function is an activity necessary for achieving the key purpose of the sector, occupation, or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of OS. |
| Job Role | Job role defines a unique set of functions that together form a unique employment opportunity in an organization. |
| OS | OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the knowledge and understanding they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts. |
| Performance Criteria | Performance Criteria are statements that together specify the standard of performance required when carrying out a task. |
| NOS | NOS are Occupational Standards which apply uniquely in the Indian context. |
| Qualifications Pack Code | Qualifications Pack Code is a unique reference code that identifies a qualifications pack. |
| Qualifications Pack | Qualifications Pack comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A Qualifications Pack is assigned a unique qualification pack code. |
| Unit Code | Unit Code is a unique identifier for an Occupational Standard, which is denoted by an 'N'. |
| Unit Title | Unit Title gives a clear overall statement about what the incumbent should be able to do. |
| Description | Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for. |
| Knowledge and Understanding | Knowledge and Understanding are statements which together specify the technical, generic, professional and organizational specific knowledge that an individual need in order to perform to the required standard. |
| Organizational Context | Organizational Context includes the way the organization is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility. |
| Technical Knowledge | Technical Knowledge is the specific knowledge needed to accomplish specific designated responsibilities. |
| Core Skills or Generic Skills | Core Skills or Generic Skills are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles. |

*Outside plant fiber installation, testing and commissioning supervisor*

## Acronyms

| Keywords/Terms | Description |
|---|---|
| OSP | Outside Plant |
| OTDR | Optical Time Domain Reflectometer |
| OLTS | Optical Loss Test Set |
| VLF | Visual Fault Locator |
| SM | Single Mode |
| MM | Multi-Mode |
| DFR | Duct Fill Ratio |
| ITU | International Telecommunication Union |
| MSDS | Material Safety Data Sheet |
| SHE | Safety Health & Environment |
| OHS | Occupational Health & Safety |

# National Occupational Standard



## Overview

**This unit is about handling, identifying and working with various fiber types, understanding specifications (construction & optical) and cable selection criteria to comply with the use/deployment parameters.**

**TEL/N4126 Handling Fiber constructs, performance and selection criteria**

National Occupational Standard

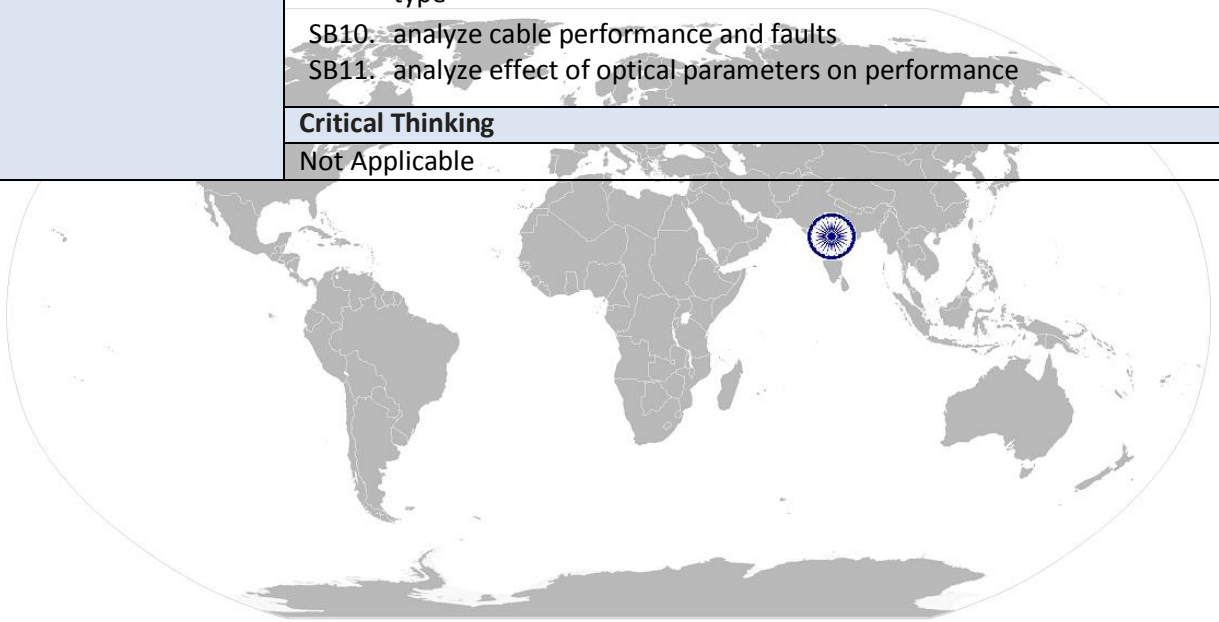
| | |
|---|---|
| **Unit Code** | **TEL/N4126** |
| **Unit Title (Task)** | **Handling fiber constructs, types, performance and selection criteria** |
| **Description** | This unit is about handling, identifying and working with various fiber types, understanding specifications & cable selection criteria to comply with use/ deployment parameters. |
| **Scope** | This unit/task covers the following:<br>• Understanding Optical Fiber construction & transmission basics<br>• Understanding fiber performance parameters<br>• Fiber types and identifiers |
| **Performance Criteria(PC) w.r.t. the Scope** | |
| **Element** | **Performance Criteria** |
| **Understanding optical fiber construction & transmission basics** | To be competent, the user/individual on the job must be able to:<br>PC1. identify fiber cable construct (core, clad, buffer coating)<br>PC2. identify various cable components (fibers, strength members, jackets)<br>PC3. identify and work with strengthening members, rip cords and armored fibers<br>PC4. understand transmission principle for various types of fiber (multi mode, single mode) |
| **Understanding fiber performance parameters** | To be competent, the user/individual on the job must be able to:<br>PC5. identify key performance parameters for an optical fiber (attenuation, fiber size and bandwidth)<br>PC6. gauge performance by reading characteristic chart/parameters<br>PC7. identify causes of attenuation (scattering, absorption)<br>PC8. understand cause and effect of reflection and dispersion (modal, chromatic, polarization)<br>PC9. differentiate between speed and bandwidth<br>PC10. co-relate between attenuation and wavelength<br>PC11. understand relevance of cut-off wavelength |
| **Fiber types and identifiers** | To be competent, the user/individual on the job must be able to:<br>PC12. identify and differentiate various fiber types as per their construction (zip cord, distribution, loose tube, breakout)<br>PC13. identify and differentiate various fiber types as per use (armored, aerial,<br>PC14. direct burial, underwater)<br>PC15. deploy suitable fiber type based on deployment and its characteristics<br>PC16. identify cables as per the standard colour codes |

**TEL/N4126 Handling Fiber constructs, performance and selection criteria**

| | |
|---|---|
| **Cable selection criteria** | To be competent, the user/individual on the job must be able to:<br>PC17. select the appropriate cable as per the situation (pulling strength, water protection, rodent penetration)<br>PC18. demonstrate grounding & bonding for armored cables |
| **Knowledge and Understanding (K)** | |
| **A. Organizational Context** (Knowledge of the company / organization and its processes) | The user/individual on the job needs to know and understand:<br>KA1. project management concepts and applications<br>KA2. risk and impact of not following defined procedures/work instructions<br>KA3. escalation matrix for reporting identified incidents, trouble sand/ or emergencies, e.g. system failures, fire and power failures<br>KA4. SHE and OHS guidelines and regulations as per company's norms |
| **B. Technical Knowledge** | The user/individual on the job needs to know and understand:<br>KB1. optical fiber as communication medium<br>KB2. basics of optical fiber manufacturing and construction<br>KB3. optical fiber light transmission basics<br>KB4. multi-mode and single mode fibers<br>KB5. optical fiber performance parameters and selection criteria<br>KB6. optical fiber specifications |
| **Skills (S) [Optional]** | |
| **A. Core Skills/ Generic Skills** | **Writing Skills** |
| | The user/individual on the job needs to know and understand how to:<br>SA1. write system concepts and flows<br>SA2. maintain records and process document |
| | **Reading Skills** |
| | The user/individual on the job needs to know and understand how to:<br>SA3. read technical literature/parameters/performance graphs<br>SA4. read and understand manuals, requirement documents, health and safety<br>SA5. instructions, memos, reports etc. |
| | **Oral Communication (Listening and speaking skills)** |
| | The user/individual on the job needs to know and understand how to:<br>SA6. communicate with colleagues, peers and customers/stakeholders<br>SA7. liaising and coordination skills |
| **B. Professional Skills** | **Decision making** |
| | Not applicable |
| | **Plan and Organize** |
| | The user/individual on the job needs to know and understand how to:<br>SB1. plan and organize the work to achieve compliances and results |
| | **Customer Centricity** |

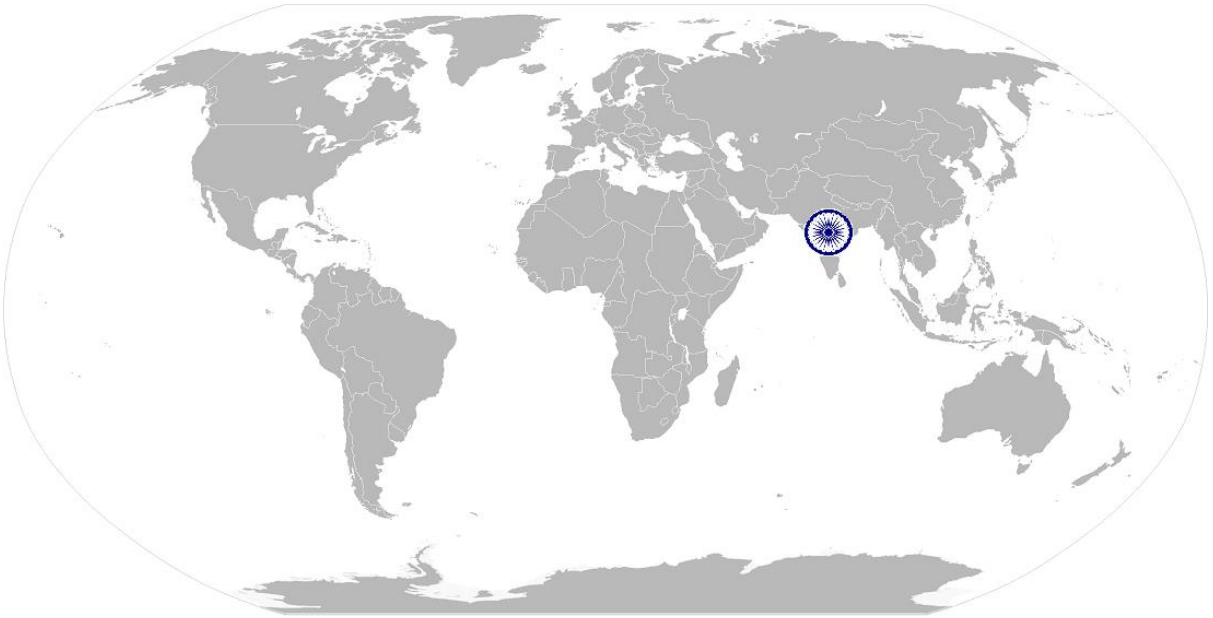
**TEL/N4126 Handling Fiber constructs, performance and selection criteria**

| | |
|---|---|
| | The user/individual on the job needs to know and understand:<br>SB2. customer requirements<br>SB3. understand customer interaction protocol<br>SB4. understand basics of work ethics and behavior when interacting with customer |
| | **Problem Solving** |
| | The user/individual on the job needs to know and understand how to:<br>SB5. work on selection of most suitable fiber cable for a particular requirement<br>SB6. work out cable loss and other parameters and account for these losses<br>SB7. identify faults due to incorrect splicing, incorrect fiber combinations etc.<br>SB8. isolate and rectify faults due to improper grounding & bonding |
| | **Analytical Thinking** |
| | The user/individual on the job needs to know and understand how to:<br>SB9. analyze the deployment requirement and suggest most suitable cable type<br>SB10. analyze cable performance and faults<br>SB11. analyze effect of optical parameters on performance |
| | **Critical Thinking** |
| | Not Applicable |

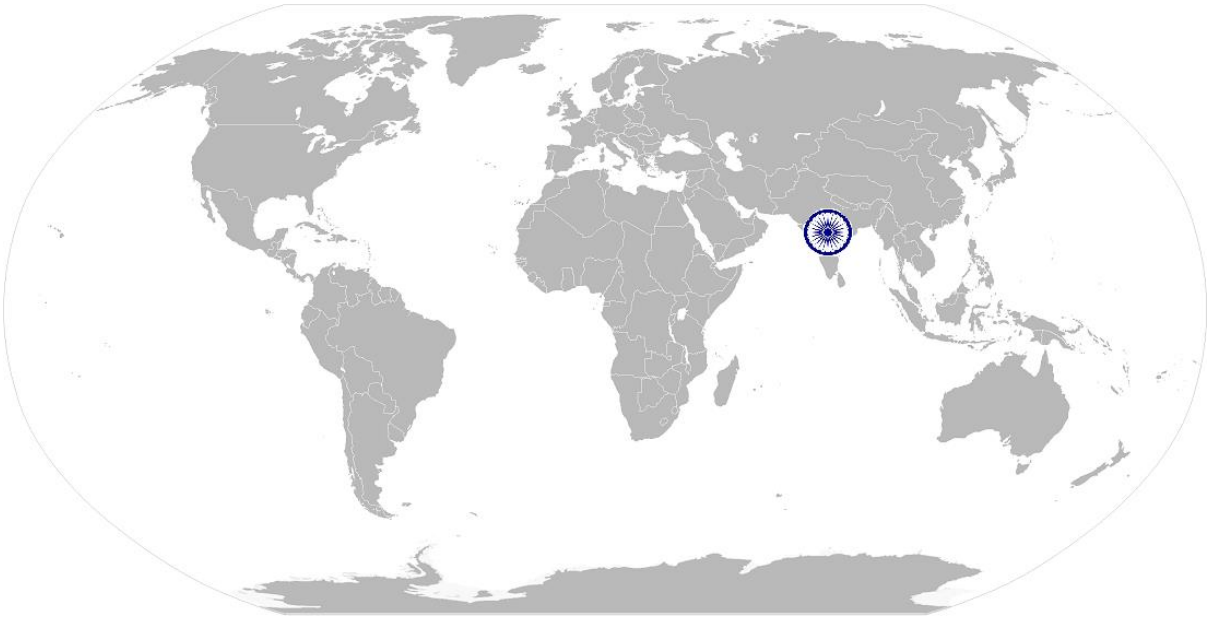


# NOS Version Control

| NOS Code | TEL/N4126 | | |
|---|---|---|---|
| Credits (NSQF) | TBD | Version number | 1.0 |
| Industry | Telecom | Drafted on | 27/06/2017 |
| Industry Sub-sector | Network Managed | Last reviewed on | 10/11/2017 |
| Occupation | Operation & Maintenance - Optical | Next review date | 10/11/2021 |



# National Occupational Standard



## Overview

**This unit is about carrying out fiber end connections/connectorization and splicing (mechanical, fusion, ribbon) and undertaking first level/immediate performance checks.**

National Occupational Standard

| Unit Code | TEL/N4127 |
|---|---|
| Unit Title (Task) | Fiber connectorisation, splicing & first level checks |
| Description | This unit is about carrying out fiber end connections/connectorisation and splicing using various splicing techniques (mechanical, fusion, ribbon) and undertaking first level/immediate performance checks. |
| Scope | This unit/task covers the following:<br>• understanding connector types and there use<br>• mechanical splicing<br>• fusion splicing<br>• ribbon splicing<br>• first level/immediate performance checks<br>• report & record |

| Performance Criteria(PC) w.r.t. the Scope | |
|---|---|
| **Element** | **Performance Criteria** |
| Understanding connector types and there use | To be competent, the user/individual on the job must be able to :<br>PC1. identify connectors on basis of colour code (TIA 568)<br>PC2. select a particular type of connector (ST, SC, FC/PC, MT, LC) for a given use<br>PC3. understand the effect of polish type (Flat, PC, UPC, APC) on the connector performance<br>PC4. perform connector termination on field environment (use of termination tools, cable tools & test equipment) including connector inspection and cleaning |
| Mechanical splicing | To be competent, the user/individual on the job must be able to:<br>PC5. demonstrate fiber preparation for splicing (strip jacket, dressing buffer tubes & fibers, strength members, removal of buffer coating)<br>PC6. demonstrate fiber cleaning<br>PC7. demonstrate fiber cleaving<br>PC8. demonstrate mechanical splicing (Elastomeric) |
| Fusion splicing | To be competent, the user/individual on the job must be able to:<br>PC9. demonstrate fiber preparation for fusion splicing (as per PC 5,6,7 above)<br>PC10. demonstrate use of splicing equipment, selection of correct splicing program, arc calibration, dust check and cleaning of clamp/grooves<br>PC11. demonstrate fusion splicing |
| Ribbon splicing | To be competent, the user/individual on the job must be able to:<br>PC12. demonstrate fiber preparation for ribbon splicing (use of ribbon jacket stripper)<br>PC13. demonstrate ribbon cleaving (using ribbon cleaver)<br>PC14. demonstrate ribbon splicing |

| | |
|---|---|
| **first level/immediate performance checks** | To be competent, the user/individual on the job must be able to:<br>PC15. demonstrate first level/immediate (post splicing) checks {using VFL, OTDR)<br>PC16. demonstrate splice evaluation (white line, offset, diameter difference, bubble, bulge etc.<br>PC17. identify common problems and likely causes, for an improper splicing |
| **Report & records** | To be competent, the user/individual on the job must be able to:<br>PC18. comprehend the data recording and reporting formats<br>PC19. perform basic documentation process like recording test results, performance parameters, cable & drum markings etc<br>PC20. submit the records & documents to appropriate authorities to inspect. |

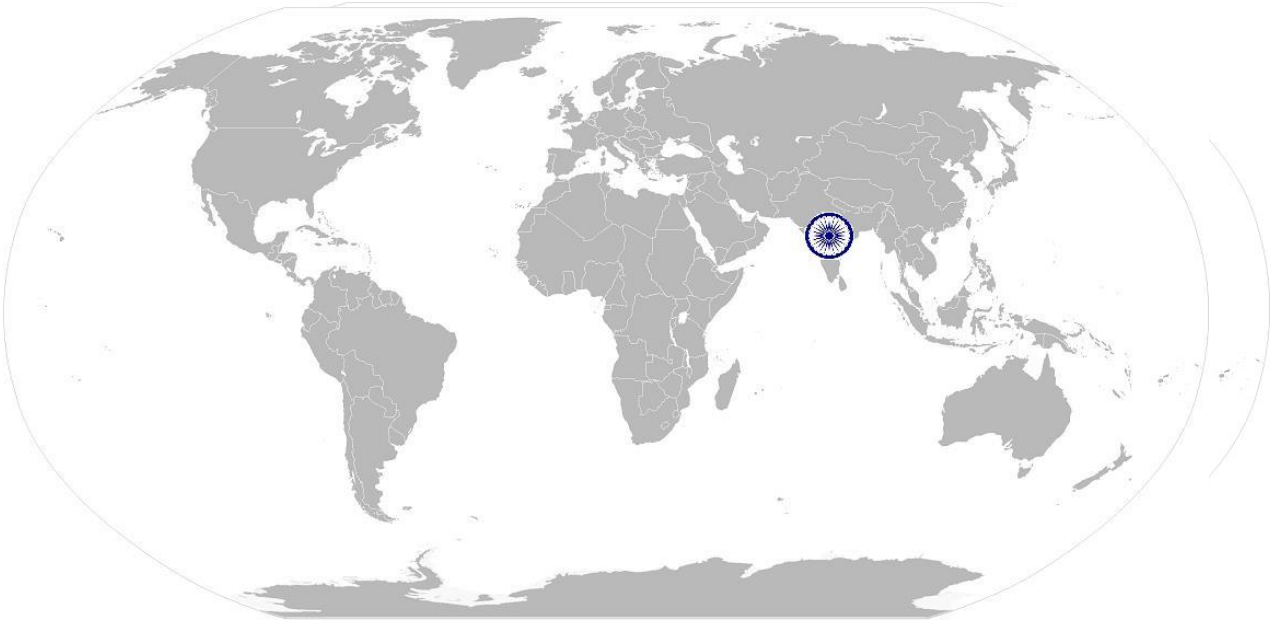
| **Knowledge and Understanding (K)** | |
|---|---|
| **A. Organizational Context** (Knowledge of the company / organization and its processes) | The user/individual on the job needs to know and understand:<br>KA1. organizational policies and processes related to area of work<br>KA2. risk and impact of not following defined procedures/work instructions<br>KA3. escalation matrix for reporting issues/incidents/concerns<br>KA4. records and reports<br>KA5. SHE & OHS guidelines and regulations |
| **B. Technical Knowledge** | The user/individual on the job needs to know and understand:<br>KB1. types of cable connectors<br>KB2. losses and attenuations (dB/dBm)<br>KB3. optical loss limiting techniques and processes<br>KB4. functioning of stripping, cleaving and splicers<br>KB5. performance measurement techniques and corrective actions<br>KB6. splicing Do's and Don'ts |
| **Skills (S) [Optional]** | |
| **A. Core Skills/ Generic Skills** | **Writing Skills**<br>The user/individual on the job needs to know and understand how to:<br>SA1. record performance parameters<br>SA2. fill up appropriate technical forms, activity logs in required format of the company |
| | **Reading Skills**<br>The user/individual on the job needs to know and understand how to<br>SA3. reading of technical literature/requirements and parameters<br>SA4. read and understand user/technical manuals, work orders, health and safety instructions, reports, equipment specifications |
| | **Oral Communication (Listening & Speaking Skills)**<br>The user/individual on the job needs to know and understand how to:<br>SA5. communicating with colleagues, peers, management and stakeholders<br>SA6. liasioning and coordination skills |

| | |
|---|---|
| **B. Professional Skills** | **Decision Making** |
| | The user/individual on the job needs to know and understand how to<br>SB1. managing onsite work and environment<br>SB2. proficient provisioning of all tools and equipment<br>SB3. accounting of on-site environment whilst undertaking work |
| | **Plan and Organize** |
| | The user/individual on the job needs to know and understand how to:<br>SB4. proficient planning of activities including provisioning and availability of consumables/spares<br>SB5. organize the equipment, tools and test equipment for effective conduct of task |
| | **Customer Centricity** |
| | The user/individual on the job needs to know and understand how to:<br>SB6. adhere to customer interaction protocol and guidelines<br>SB7. effective and courteous communication/interaction with customer<br>SB8. basics of work ethics and norms<br>SB9. adhere to defined SLA's |
| | **Problem Solving** |
| | The user/individual on the job needs to know and understand how to:<br>SB10. configure the tools/equipment to avoid on-site delays<br>SB11. proficiently use tools/equipment to negate errors due to improper use<br>SB12. instill best work practices for the team members to follow<br>SB13. undertake work parameter checks and corrective actions as required |
| | **Analytical Thinking** |
| | The user/individual on the job needs to know and understand how to:<br>SB14. analyze defects/performance issues and troubleshoot |
| | **Critical Thinking** |
| | Not applicable |

# NOS Version Control

| NOS Code | TEL/N4127 | | |
|---|---|---|---|
| Credits (NSQF) | TBD | Version number | 1.0 |
| Industry | Telecom | Drafted on | 27/06/2017 |
| Industry Sub-sector | Network Managed | Last reviewed on | 10/11/2017 |
| Occupation | Operation & Maintenance - optics | Next review date | 10/11/2021 |

# National Occupational Standard



## Overview

**This unit is about outside plant installation procedures and practices for optical fiber cables.**

**TEL/N4128 Out-side plant cable installation procedures & practices**

National Occupational Standard

| Unit Code | TEL/N4128 |
|---|---|
| Unit Title (Task) | Outside plant cable installation procedures and practices |
| **Description** | This unit is about outside plant installation procedures and practices for optical fiber cables. |
| **Scope** | This unit/task covers the following:<br>• pre-installation checks and processes<br>• direct buried installation<br>• underground (duct) installation<br>• aerial installation |

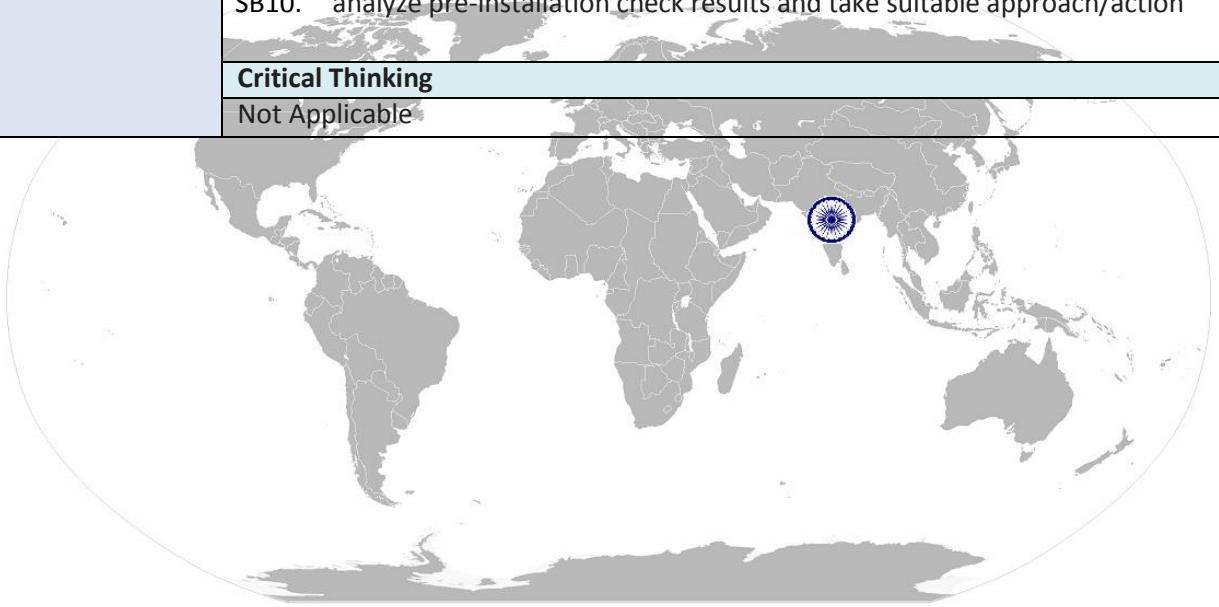
| Performance Criteria(PC) w.r.t. the Scope | |
|---|---|
| **Element** | **Performance Criteria** |
| **Pre-installation checks and processes** | To be competent, the user/individual on the job must be able to:<br>PC1. carry out pre-construction survey of the cable placing route and identify all probable pit-falls and account for them<br>PC2. perform Pre test of optical cable using a OTDR<br>PC3. undertake pre-installation cable inspection to identify any visible damage or non-compliances<br>PC4. confirm basic parameters like max pulling tension, max bending radius, total cable length, splicing length required at termination points<br>PC5. demonstrate duct rodding, testing and cleaning process/procedure |
| **Direct buried installation** | To be competent, the user/individual on the job must be able to:<br>PC6. select appropriate cable for direct buried (single jacket, dual jacket) as per the sight requirements<br>PC7. demonstrate armor bonding and grounding<br>PC8. handle cable while bending and placing tension<br>PC9. perform cable laying and trench compacting practices and placement of markers<br>PC10. carry out reinstatements |
| **Underground (duct) installation** | To be competent, the user/individual on the job must be able to:<br>PC11. understand best practices in duct cable pulling using proper tools and accessories (pulling rope, cable pulling grip, breakaway swivel)<br>PC12. demonstrate cable reel positioning and pulling<br>PC13. demonstrate “figure 8” winding/storing of cable<br>PC14. understand cable blowing process (wing compressed air)<br>PC15. understand practices on duct integrity testing, duct fill ratio, co-efficient of friction and their effect on cable laying/longevity |

**TEL/N4128 Out-side plant cable installation procedures & practices**

| | |
|---|---|
| **Aerial installation** | To be competent, the user/individual on the job must be able to:<br>PC16. understand specific construction of aerial cables making them suitable for such deployment<br>PC17. demonstrate cable handling practices for aerial cables (bending radius, placing tension)<br>PC18. demonstrate use and uniqueness of messenger strand<br>PC19. demonstrate deployment and use of self-supporting cables<br>PC20. demonstrate deployment process for aerial cable |
| **Knowledge and Understanding (K)** | |
| **A. Organizational Context** (Knowledge of the company / organization and its processes) | The user/individual on the job needs to know and understand:<br>KA1. organizational processes and procedures for undertaking site activities<br>KA2. risk and impact of not following defined procedures/work instructions<br>KA3. escalation matrix<br>KA4. records to be maintained<br>KA5. SHE and OHS guidelines and regulations as per company's norms |
| **B. Technical Knowledge** | The user/individual on the job needs to know and understand:<br>KB1. various types of optical fiber cable constructs<br>KB2. suitability of deployment of optical fiber cables given a specific requirement<br>KB3. importance of safe/correct handling and negative effects on exceeding parameters like bend radius etc<br>KB4. handling of key equipment and their characteristics (blowing equipment, cable pulling tools etc)<br>KB5. need for proper trenching, ducting, aerial messages/supports and best practices |
| **Skills (S) [Optional]** | |
| **A. Core Skills/ Generic Skills** | **Writing Skills**<br>The user/individual on the job needs to know and understand how to<br>SA1. record performance/test results<br>SA2. document cable installation paths, position of markers, bends etc |
| | **Reading Skills**<br>The user/individual on the job needs to know and understand how to:<br>SA3. read and understand technical documentation and specifications |
| | **Oral Communication (Listening and Speaking Skills)**<br>The user/individual on the job needs to know and understand how to:<br>SA4. communicate with stakeholders<br>SA5. liaison and coordination amongst the team members |
| **B. Professional Skills** | **Decision making**<br>Not applicable |
| | **Plan and Organize**<br>The user/individual on the job needs to know and understand how to:<br>SB1. plan and organize the work<br>SB2. time management<br>SB3. multi-tasking |

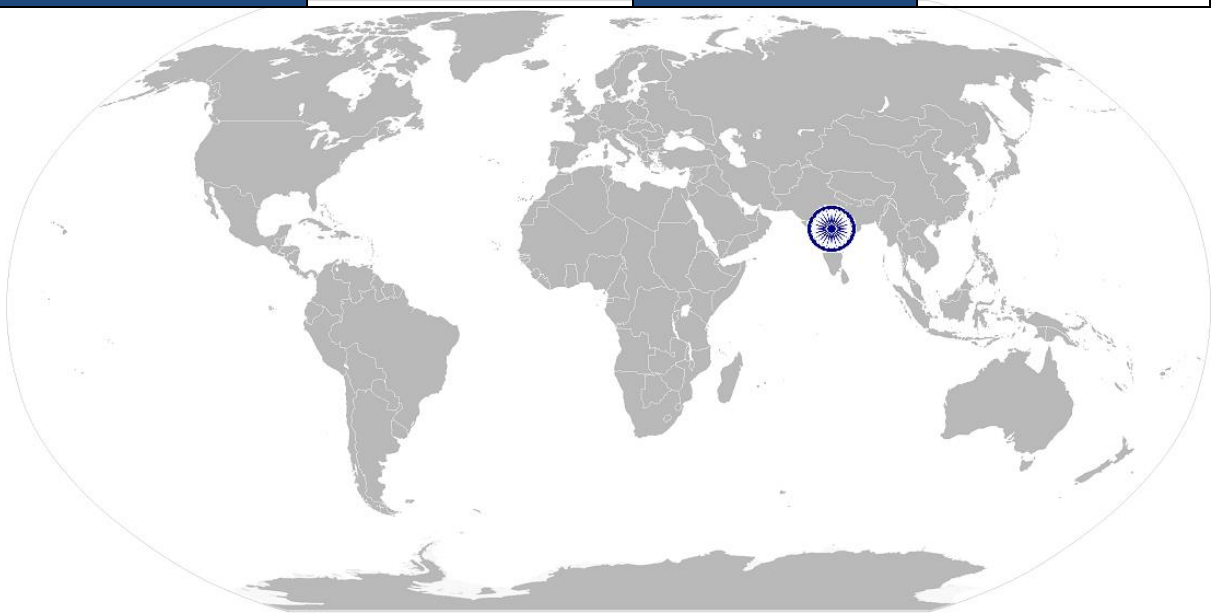
**TEL/N4128 Out-side plant cable installation procedures & practices**

| | |
|---|---|
| | **Customer Centricity** |
| | The user/individual on the job needs to know and understand how to:<br>SB4. work effectively in customer facing environment<br>SB5. build and maintain a positive environment |
| | **Problem Solving** |
| | The user/individual on the job needs to know and understand how to :<br>SB6. approach towards problem solving<br>SB7. check points and problem isolation basics<br>SB8. use tools/techniques to address the problem |
| | **Analytical Thinking** |
| | The user/individual on the job needs to know and understand how to:<br>SB9. analyze any onsite issue (related to cable path selection, trenching, soil fill, terrain etc.) and take remedial action<br>SB10. analyze pre-installation check results and take suitable approach/action |
| | **Critical Thinking** |
| | Not Applicable |

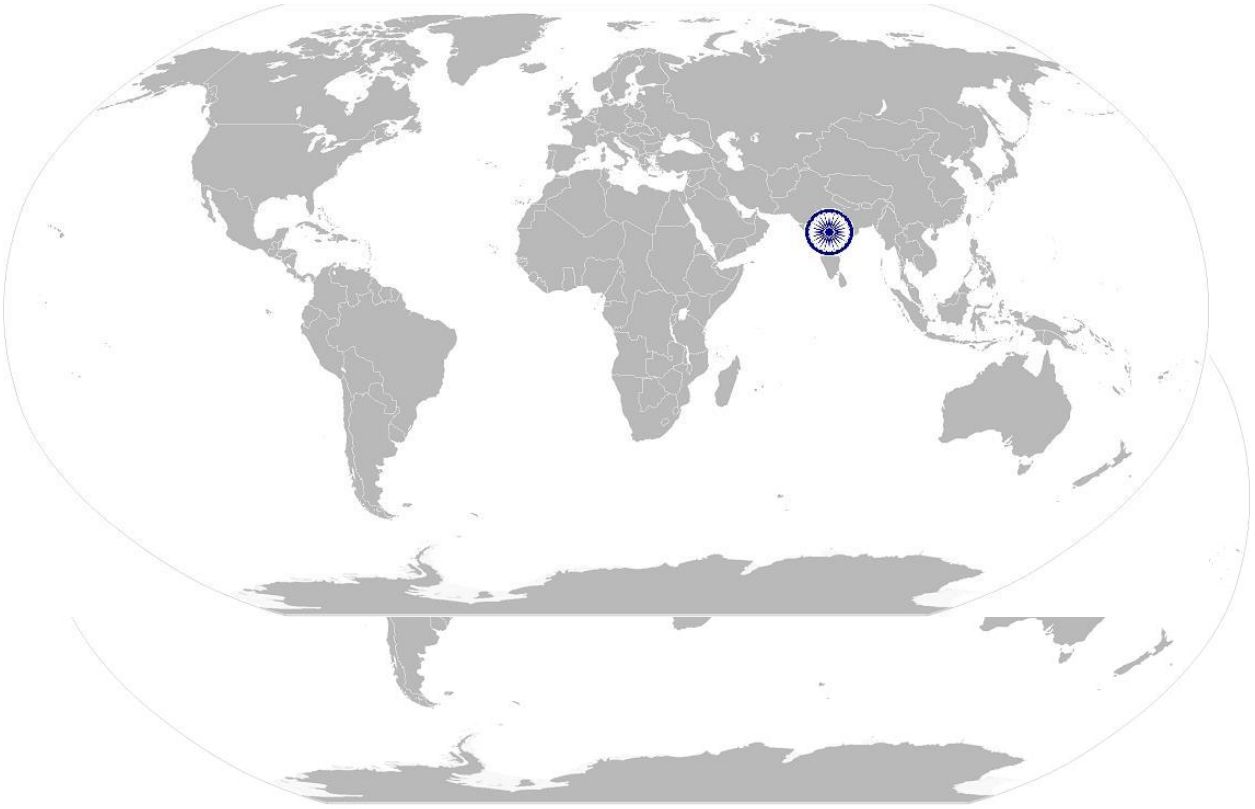


# NOS Version Control

| NOS Code | TEL/N4128 | | |
|---|---|---|---|
| Credits (NSQF) | TBD | Version number | 1.0 |
| Industry | Telecom | Drafted on | 27/06/2017 |
| Industry Sub-sector | Network Managed | Last reviewed on | 10/11/2017 |
| Occupation | Operation & Maintenance - Optical | Next review date | 10/11/2021 |



# National Occupational Standard



## Overview

**This unit is about preparing cables for termination and splicing.**

**TEL/N4129** **Preparing cables for termination and splicing**

National Occupational Standard

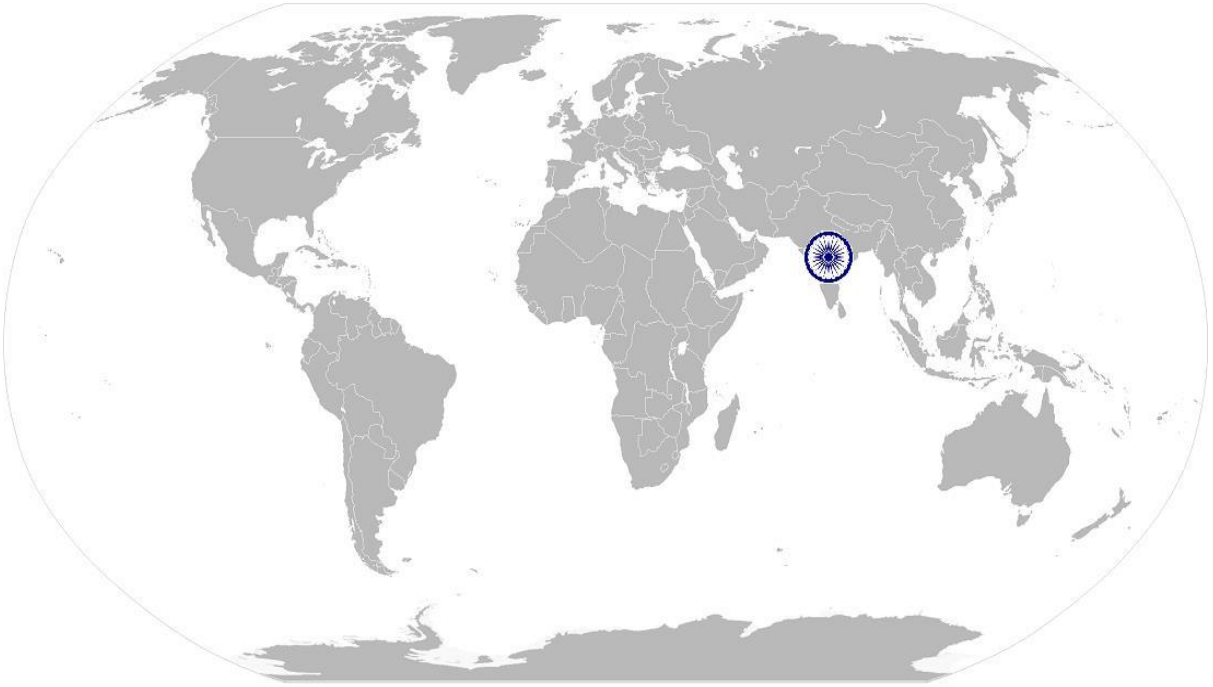
| | |
|---|---|
| **Unit Code** | **TEL/N4129** |
| **Unit Title (Task)** | **Preparing cables for termination and splicing** |
| **Description** | This unit is about outside plant installation procedures and practices for optical fiber cables. |
| **Scope** | This unit/task covers following:<br>• fiber optic cable preparation<br>• fiber optic cable handling<br>• cable slack management |
| **Performance Criteria(PC) w.r.t. the Scope** | |
| **Element** | **Performance Criteria** |
| **Fiber optic cable preparation** | To be competent, the user/individual on the job must be able to:<br>PC1. demonstrate cable preparation (removal of outer jacket, use of rip-cord, identifying and dressing strength member)<br>PC2. demonstrate use of Kellum's grip and armored cable cutter<br>PC3. demonstrate use of armored cable cutter |
| **Fiber optic cable handling** | To be competent, the user/individual on the job must be able to:<br>PC4. demonstrate correct cable drum position for pulling fiber cable<br>PC5. understand cable handling procedure/process whilst lifting drums, shifting cables, handling with fork-lifts and placed in correct position<br>PC6. demonstrate correct positioning and rolling of drums<br>PC7. unloading and store the cable drums |
| **Cable slack management** | To be competent, the user/individual on the job must be able to:<br>PC8. calculate the slack requirement as per standard practices and securing the slack in slack bracket<br>PC9. demonstrate securing of slack is slack brackets |
| **Knowledge and Understanding (K)** | |
| **A. Organizational Context** (Knowledge of the company / organization and its processes) | The user/individual on the job needs to know and understand:<br>KA1. organizational processes and procedures for cable handling, termination and splicing<br>KA2. risk and impact of not following defined procedures/work instructions<br>KA3. escalation matrix<br>KA4. organizational norms on record keeping and accounting<br>KA5. SHE and OHS guidelines and regulations as per company's norms |
| **B. Technical Knowledge** | The user/individual on the job needs to know and understand:<br>KB1. effect of cable parameters on performance<br>KB2. relevance of proper slack management<br>KB3. cable handling practices (drum handling, fork-lifts loading/unloading of drums)<br>KB4. effect of cable laying practices on performance |
| **Skills (S) [Optional]** | |
| **A. Core Skills/ Generic Skills** | **Writing Skills** |

**TEL/N4129** **Preparing cables for termination and splicing**

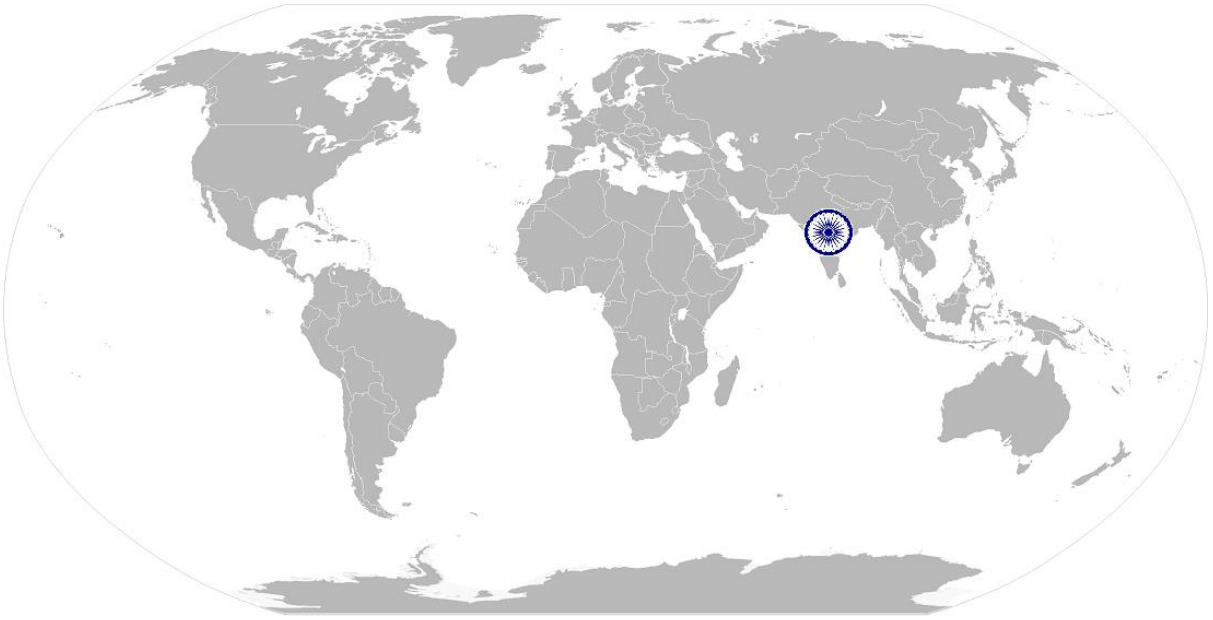
| | |
|---|---|
| | The user/individual on the job needs to know and understand how to<br>SA1. record performance/test results<br>SA2. document cable handling parameters |
| | **Reading Skills** |
| | The user/individual on the job needs to know and understand how to:<br>SA3. read and understand technical documentation and specification |
| | **Oral Communication (Listening and Speaking Skills)** |
| | The user/individual on the job needs to know and understand how to:<br>SA4. communicate with stakeholders<br>SA5. liaison and coordination amongst the team members |
| **B. Professional Skills** | **Decision making** |
| | Not applicable |
| | **Plan and Organize** |
| | The user/individual on the job needs to know and understand how to:<br>SB1. plan and organize the work<br>SB2. time management<br>SB3. multi- tasking |
| | **Customer Centricity** |
| | The user/individual on the job needs to know and understand how to:<br>SB4. work effectively in customer facing environment<br>SB5. build and maintain a positive environment |
| | **Problem Solving** |
| | The user/individual on the job needs to know and understand how to:<br>SB6. approach towards problem solving<br>SB7. check points and problem isolation basics<br>SB8. use tools/techniques to address the problem |
| | **Analytical Thinking** |
| | The individual on the job needs to know and understand how to:<br>SB9. analyze onsite requirements w.r.t cable handling<br>SB10. assess efficacy of carrying out onsite activity with the given constraints (equipment, resources, time) |
| | **Critical Thinking** |
| | Not Applicable |

# NOS Version Control

| NOS Code | TEL/N4129 | | |
|---|---|---|---|
| Credits (NSQF) | TBD | Version number | 1.0 |
| Industry | Telecom | Drafted on | 27/06/2017 |
| Industry Sub-sector | Network Managed | Last reviewed on | 10/11/2017 |
| Occupation | Operation & Maintenance - Optical | Next review date | 10/11/2021 |



# National Occupational Standard



## Overview

**This unit is about outside plant fiber testing and troubleshooting. This includes use of all associated test equipment.**

# TEL/N4130 Outside plant fiber testing and troubleshooting

National Occupational Standard

| | |
|---|---|
| **Unit Code** | **TEL/N4130** |
| **Unit Title (Task)** | **Outside plant fiber testing and troubleshooting** |
| **Description** | This unit is about outside plant fiber testing and troubleshooting including use of all associated test equipment |
| **Scope** | This unit/task covers the following:<br>• fiber test parameters<br>• test equipment (OTDR, Optic Power Meter, OLTS kit, VFL, fiber tracer)<br>• Report & Record |

| **Performance Criteria(PC) w.r.t. the Scope** | |
|---|---|
| **Element** | **Performance Criteria** |
| **Testing parameters** | To be competent, the user/individual on the job must be able to:<br>PC1. demonstrate measurement of optical parameters (optical power, attenuation (at fiber, cables, connectors), fault location<br>PC2. perform optical power and power loss measurement of an optical cable |
| **Test equipment** | To be competent, the user/individual on the job must be able to:<br>PC3. demonstrate use of various devices (OTDR, optical power meter, visual cable fault locator, OLTS, visual inspection test (use of fiber tracer))<br>PC4. perform visual inspection test of connectors using a microscope<br>PC5. understand and demonstrate "two cables" and "three cable" tests for loss measurement<br>PC6. understand and demonstrate insertion loss measurement using "patch cord test" and "double ended loss" technique |
| **Report & Record** | To be competent, the user/individual on the job must be able to:<br>PC7. record cable performance and test parameters like power, attenuation etc<br>PC8. record cable inspection parameters as per the company policy/format provided<br>PC9. ensure that documents are available to all appropriate authorities to inspect. |

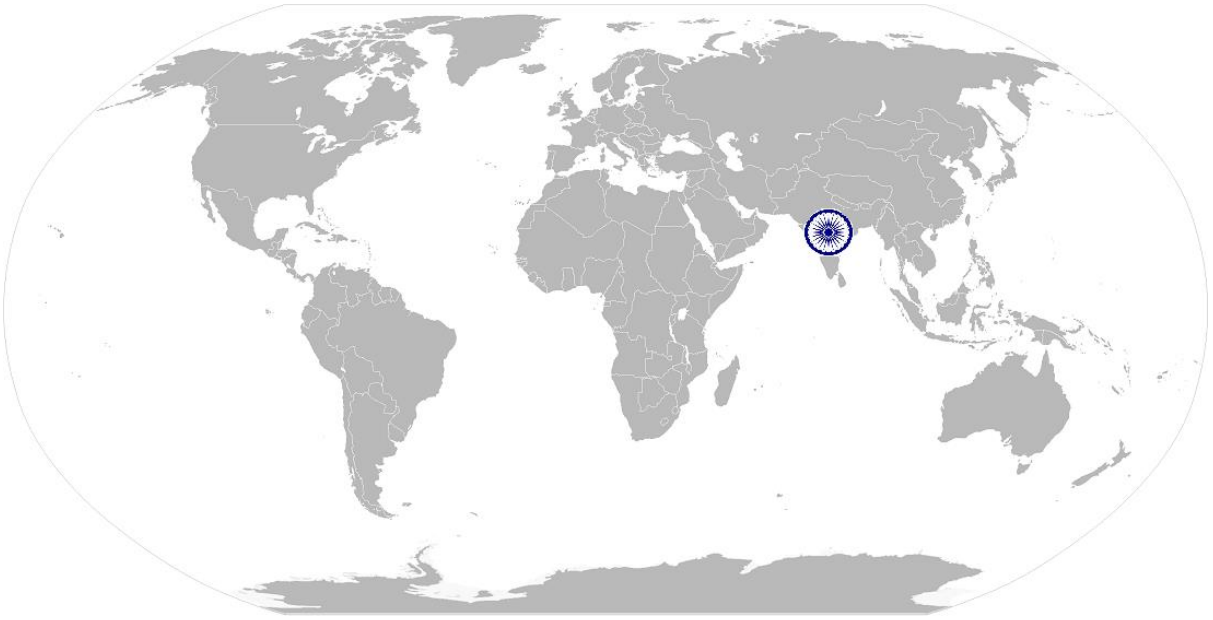
| **Knowledge and Understanding (K)** | |
|---|---|
| **A. Organizational Context** (Knowledge of the company / organization and its processes) | The user/individual on the job needs to know and understand:<br>KA1. organizational processes and procedures for undertaking tests and troubleshooting<br>KA2. risk and impact of not following defined procedures/work instructions<br>KA3. escalation matrix<br>KA4. organizational norms and guidelines on the subject<br>KA5. SHE and OHS guidelines and regulations as per company's norms |

**TEL/N4130 Outside plant fiber testing and troubleshooting**

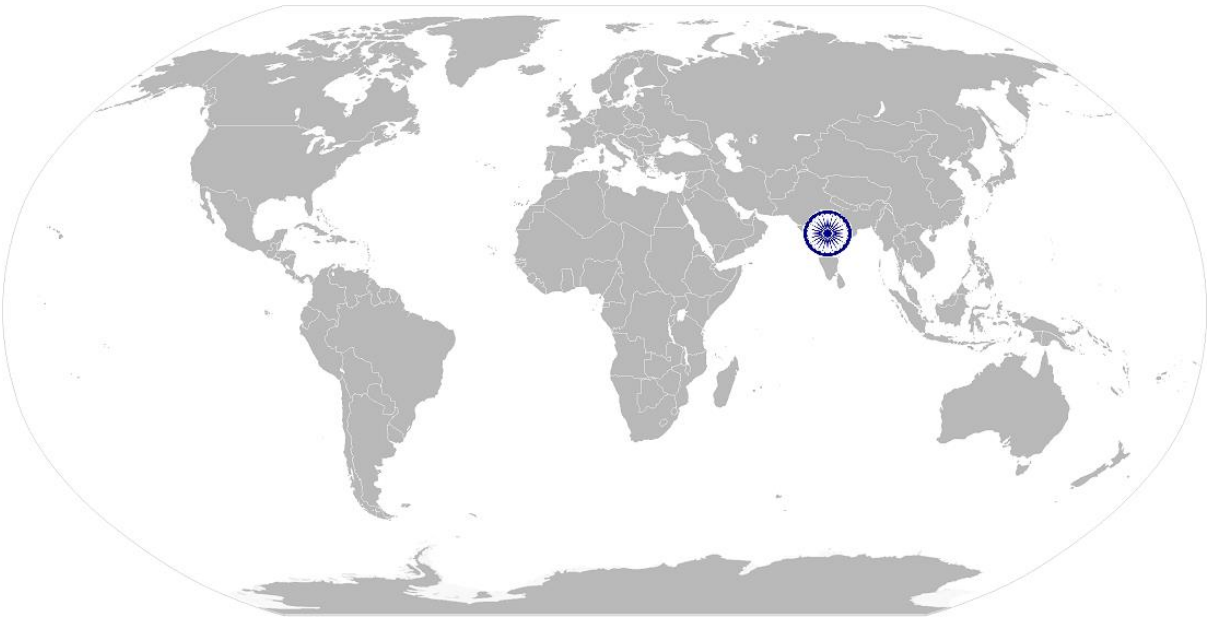
| | |
|---|---|
| **B. Technical Knowledge** | The user/individual on the job needs to know and understand:<br>KB1. optical power and power loss, visual cable fault locator, OLTS, visual inspection test (use of fiber tracer)<br>KB2. measurement units (db & dbm) and decibel to power conversions<br>KB3. optical fiber power meters and test sources<br>KB4. effect of cable laying practices on performance<br>KB5. loss measurement references and measuring techniques |
| **Skills (S) [Optional]** | |
| **A. Core Skills/ Generic Skills** | **Writing Skills** |
| | The user/individual on the job needs to know and understand how to<br>SA1. record performance/test results<br>SA2. record reference sets against each measurement |
| | **Reading Skills** |
| | The user/individual on the job needs to know and understand how to:<br>SA3. read and understand technical documentation, parameters and specifications |
| | **Oral Communication (Listening and Speaking Skills)** |
| | The user/individual on the job needs to know and understand how to:<br>SA4. communicate with stakeholders<br>SA5. liaison and coordination amongst the team members |
| **B. Professional Skills** | **Decision making** |
| | Not applicable |
| | **Plan and Organize** |
| | The user/individual on the job needs to know and understand how to:<br>SB1. plan and organize the work<br>SB2. time management<br>SB3. multi-tasking |
| | **Customer Centricity** |
| | The user/individual on the job needs to know and understand how to:<br>SB4. work effectively in customer facing environment<br>SB5. build and maintain a positive environment |
| | **Problem Solving** |
| | The user/individual on the job needs to know and understand how to :<br>SB6. approach towards problem solving<br>SB7. check points and problem isolation basics<br>SB8. use tools/techniques to address the problem |
| | **Analytical Thinking** |
| | The user/individual on the job needs to know and understand how to:<br>SB9. analyze test results<br>SB10. analyze effect of results on performance and work out remedial measures<br>SB11. analyze any abrupt test results and look into the possible cause |
| | **Critical Thinking** |
| | Not Applicable |

## NOS Version Control

| NOS Code | TEL/N4130 | | |
|---|---|---|---|
| Credits (NSQF) | TBD | Version number | 1.0 |
| Industry | Telecom | Drafted on | 27/06/2017 |
| Industry Sub-sector | Network Managed | Last reviewed on | 10/11/2017 |
| Occupation | Operation & Maintenance - Optical | Next review date | 10/11/2021 |



# National Occupational Standard



## Overview

**This unit is about work safety practices whilst working with fiber optics.**

National Occupational Standard

| Unit Code | TEL/N4131 |
|---|---|
| Unit Title(Task) | Work safety practices whilst working with fiber optics |
| Description | This unit is about work safety practices whilst working with fiber optics. |
| Scope | This unit/task covers the following:<br>Work safety practices whilst working with fiber optics |

| Performance Criteria(PC) w.r.t. the Scope | |
|---|---|
| **Element** | **Performance Criteria** |
| **Work Safety practices whilst working with fiber optics** | To be competent, the user/individual on the job must be able to:<br>PC1. demonstrate eye-safety measures whilst at work<br>PC2. demonstrate safe handling of bare fiber (broken ends of fiber and scraps)<br>PC3. read and comprehend manufacturer supplied MSDS for safe handling of fiber<br>PC4. demonstrate fire safety practices (whilst working with high voltage arc in fusion splicers)<br>PC5. demonstrate electrical safety norms where fiber is placed along with electrical cables<br>PC6. adhere to laser safety rules<br>PC7. demonstrate use of safety gloves and boots, in required situations<br>PC8. complete any health and safety records legibly and accurately |

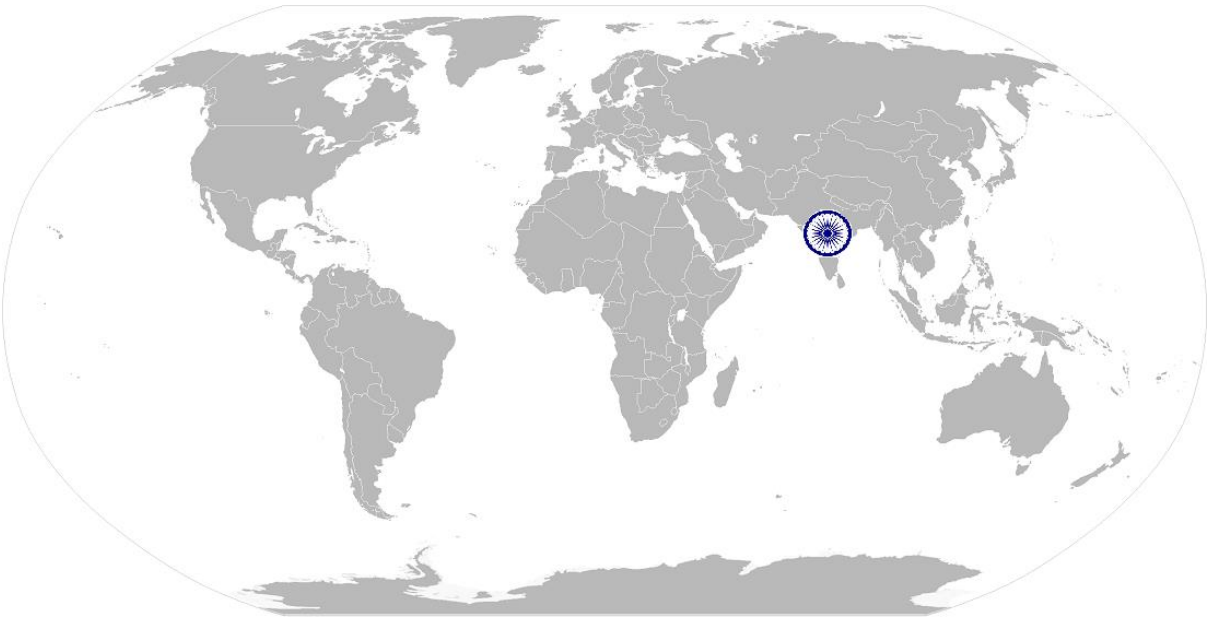
| Knowledge and Understanding (K) | |
|---|---|
| **A. Organizational Context** (Knowledge of the company / organization and its processes) | The user/individual on the job needs to know and understand:<br>KA1. legislative requirements and organizations procedures for health, safety and security and role and responsibilities<br>KA2. what is meant by hazard, including the different types of health and safety hazards that can be found in the workplace<br>KA3. how and when to report hazards<br>KA4. limits of your responsibility for dealing with hazards<br>KA5. your organization's emergency procedures for different emergency situations and the importance of following these<br>KA6. the importance of maintaining high standards of health, safety and security<br>KA7. implications that any non – compliance with health, safety and security may have on individuals and the organization |
| **B. Technical Knowledge** | The user/individual on the job needs to know and understand:<br>KB1. construction of the fiber and how to take precaution from getting it damaged<br>KB2. safety features of protective equipment and gear<br>KB3. limitations of safety gear<br>KB4. government agencies in the area of safety, health and security and their norms and services along with their contact detail.<br>KB5. layout of associated services in the work area (gas pipeline, electrical cables, sewage lines, water pipeline etc.) so as to avoid consequential damage. |

**TEL/N4131** **Work safety practices with fiber optics**

| Skills (S) [Optional] | |
|---|---|
| **A. Core Skills/ Generic Skills** | **Writing Skills** |
| | Not applicable |
| | **Reading Skills** |
| | The user/individual on the job needs to know and understand how to:<br>SA1. read safety instructions and guidelines |
| | **Oral Communication (Listening and Speaking Skills)** |
| | The user/individual on the job needs to know and understand how to:<br>SA2. listen effectively and orally communicate information accurately |
| **B. Professional Skills** | **Decision Making** |
| | The user/individual on the job needs to know and understand how to:<br>SB1. use appropriate safety gear in a given situation/environment |
| | **Plan and Organize** |
| | The user/individual on the job needs to know and understand how to:<br>SB2. plan and organize the safety gear before commencement of work |
| | **Customer Centricity** |
| | Not applicable |
| | **Problem Solving** |
| | Not applicable |
| | **Analytical Thinking** |
| | Not applicable |
| | **Critical Thinking** |
| | Not applicable |

## NOS Version Control

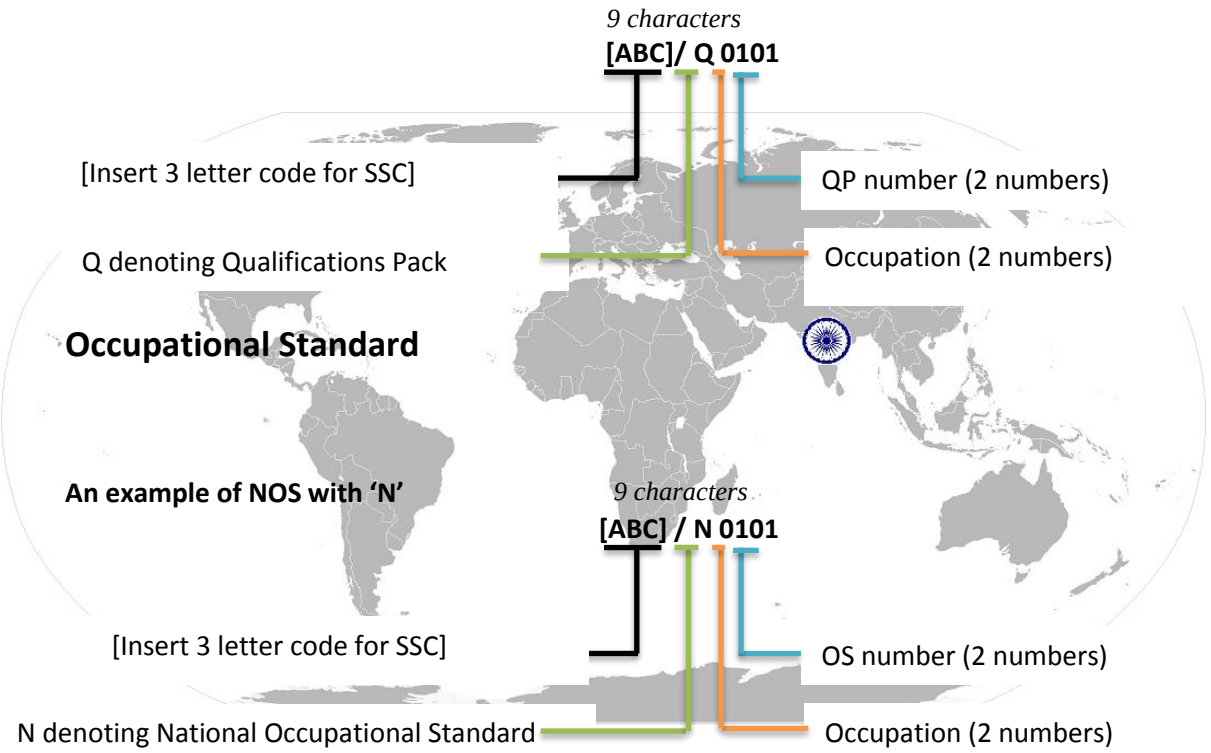
| NOS Code | TEL/N4131 | | |
|---|---|---|---|
| Credits (NSQF) | TBD | Version number | 1.0 |
| Industry | Telecom | Drafted on | 27/06/2017 |
| Industry Sub-sector | Network Managed | Last reviewed on | 10/11/2017 |
| Occupation | Operation & Maintenance - Optical | Next review date | 10/11/2021 |



# Annexure

## Nomenclature for QP and NOS

### Qualifications Pack TEL/Q4107

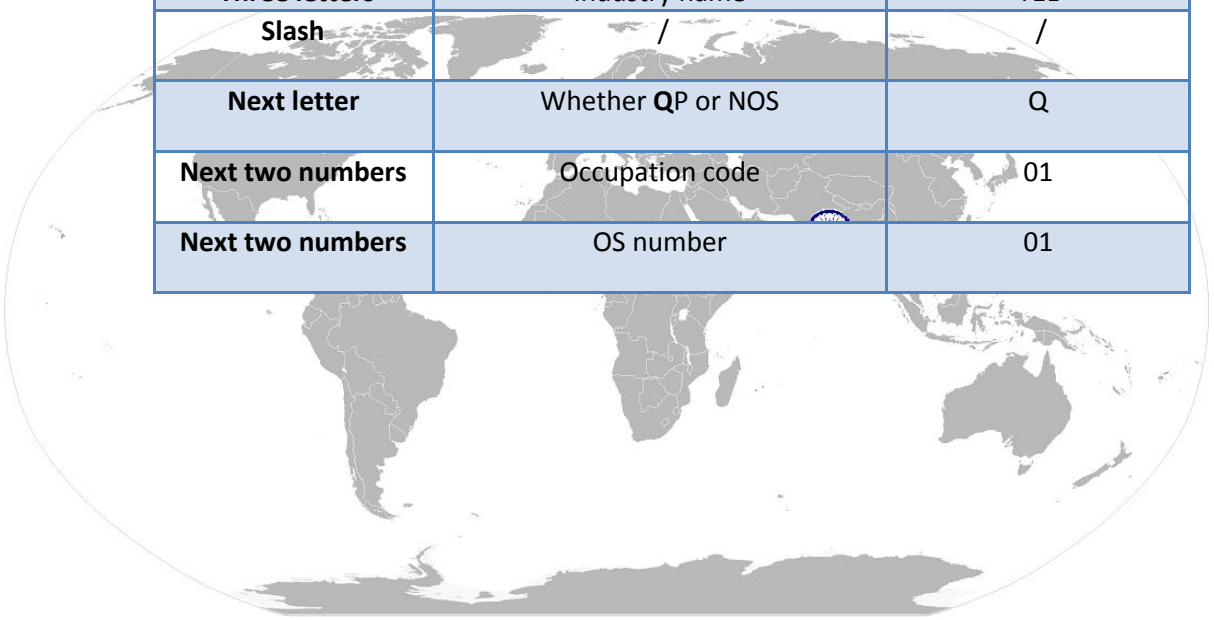



Back to top…

The following acronyms/codes have been used in the nomenclature above:

| Sub-sector | Range of Occupation numbers |
|---|---|
| **Service** | 01- 20 |
| **Handset** | 21 – 40 |
| **Passive Infra** | 41 – 60 |
| **Network managed** | 61 – 80 |

| Sequence | Description | Example |
|---|---|---|
| **Three letters** | Industry name | TEL |
| **Slash** | / | / |
| **Next letter** | Whether **Q**P or NOS | Q |
| **Next two numbers** | Occupation code | 01 |
| **Next two numbers** | OS number | 01 |



## CRITERIA FOR ASSESSMENT OF TRAINEES

**Job Role** **OSP Installation, Testing and Commissioning Supervisor**

**Qualification Pack** **TEL/Q4107**

**Sector Skill Council** **Telecom**

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory and skill practical part for each candidate at each examination/ training center.
5. To pass the Qualification Pack, every trainee should score a minimum 70% of aggregate marks to successfully clear the assessment.
6. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

| Compulsory NOS Total Marks : 600 | | | Marks Allocation | | |
|---|---|---|---|---|---|
| **Assessment Outcomes** | **Assessment Criteria** | **Total Marks** | **Out Of** | **Theory** | **Skills Practical** |
| **TEL/N4126 Understanding optical fiber construction & transmission basics** | PC1. identify fiber cable construct (core, clad, buffer coating) | 100 | 5 | 2 | 3 |
| | PC2. identify various cable components (fibers, strength members, jackets) | | 5 | 2 | 3 |
| | PC3. identify and work with strengthening members, rip cords and armored fibers | | 5 | 1 | 4 |
| | PC4. understand transmission principle for various types of fiber (multi mode, single mode) | | 7 | 7 | 0 |
| **Understanding fiber performance parameters** | PC5.identify key performance parameters for an optical fiber (attenuation, fiber size and bandwidth) | | 6 | 0 | 6 |
| | PC6.gauge performance by reading characteristic chart/parameters | | 6 | 0 | 6 |
| | PC7.identify causes of attenuation (scattering, absorption) | | 3 | 0 | 3 |
| | PC8.understand cause and effect of reflection and dispersion (modal, chromatic, polarization) | | 3 | 1 | 2 |
| | PC9.differentiate between speed and bandwidth | | 5 | 5 | 0 |
| | PC10. co-relate between attenuation and wavelength understand relevance of cut-off wavelength | | 5 | 4 | 1 |
| **Fiber types and identifiers** | PC11.identify and differentiate various fiber types as per their construction (zip cord, distribution, loose tube, breakout) | | 7 | 3 | 4 |
| | PC12.identify and differentiate various fiber types as per use (armored, aerial, | | 8 | 6 | 2 |
| | PC13.direct burial, underwater) | | 7 | 4 | 3 |

| | | | | | |
|---|---|---|---|---|---|
| | PC14.deploy suitable fiber type based on deployment and its characteristics identify cables as per the standard colour codes | | 8 | 5 | 3 |
| **Cable selection criteria** | PC15.select the appropriate cable as per the situation (pulling strength, water protection, rodent penetration) | | 10 | 5 | 5 |
| | PC16.demonstrate grounding & bonding for armored cables | | 10 | 4 | 6 |
| **TOTAL** | | | **100** | **49** | **51** |
| **TEL/N4127 understanding connector types and use** | PC1.identify connectors on basis of colour code (TIA 568) | 100 | 5 | 4 | 1 |
| | PC2.select a particular type of connector (ST, SC, FC/PC, MT, LC) for a given use | | 3 | 1 | 2 |
| | PC3.understand the effect of polish type (Flat, PC, UPC, APC) on the connector performance | | 5 | 5 | 0 |
| | PC4.perform connector termination on field environment (use of termination tools, cable tools & test equipment) including connector inspection and cleaning | | 6 | 2 | 4 |
| **Mechanical Splicing** | PC5.demonstrate fiber preparation for splicing (strip jacket, dressing buffer tubes & fibers, strength members, removal of buffer coating) | | 3 | 0 | 3 |
| | PC6.demonstrate fiber cleaning | | 3 | 0 | 3 |
| | PC7.demonstrate fiber cleaving | | 3 | 0 | 3 |
| | PC8. demonstrate mechanical splicing (Elastomeric) | | 4 | 0 | 4 |
| **Fusion Splicing** | PC9.demonstrate fiber preparation for fusion splicing (as per PC 5,6,7 above) | | 5 | 0 | 5 |
| | PC10.demonstrate use of splicing equipment, selection of correct splicing program, arc calibration, dust check and cleaning of clamp/groove | | 5 | 0 | 5 |
| | PC11.demonstrate fusion splicing | | 6 | 0 | 6 |
| **Ribbon splicing** | PC12.demonstrate fiber preparation for ribbon splicing (use of ribbon jacket stripper) | | 6 | 0 | 6 |
| | PC13.demonstrate ribbon cleaving (using ribbon cleaver) | | 5 | 0 | 5 |
| | PC14. demonstrate ribbon splicing | | 4 | 0 | 4 |
| **first level/immediate performance checks** | PC15.demonstrate first level/immediate (post splicing) checks {using VFL, OTDR) | | 4 | 0 | 4 |
| | PC16.demonstrate splice evaluation (white line, offset, diameter difference, bubble, bulge etc. | | 10 | 2 | 8 |
| | PC17. identify common problems and likely causes, for an improper splicing | | 10 | 5 | 5 |
| **Report & Records** | PC18.comprehend the data recording and reporting formats | | 5 | 3 | 2 |
| | PC19.perform basic documentation process like recording test results, performance parameters, cable & drum markings etc | | 4 | 4 | 0 |
| | PC20.submit the records & documents to appropriate authorities to inspect. | | 4 | 2 | 2 |
| **TOTAL** | | | **100** | **28** | **72** |

| | | | | | |
|---|---|---|---|---|---|
| **TEL/N4128 Pre-installation checks and processes** | PC1.carry out pre-construction survey of the cable placing route and identify all probable pit-falls and account for them | 100 | 4 | 2 | 2 |
| | PC2.perform Pre test of optical cable using a OTDR | | 6 | 2 | 4 |
| | PC3.undertake pre-installation cable inspection to identify any visible damage or non-compliances | | 6 | 0 | 6 |
| | PC4.confirm basic parameters like max pulling tension, max bending radius, total cable length, splicing length required at termination points demonstrate duct rodding, testing and cleaning process/procedure | | 5 | 2 | 3 |
| **Direct buried installation** | PC5.select appropriate cable for direct buried (single jacket, dual jacket) as per the sight requirements | | 6 | 3 | 3 |
| | PC6.demonstrate armor bonding and grounding | | 4 | 1 | 3 |
| | PC7.handle cable while bending and placing tension | | 6 | 0 | 6 |
| | PC8.perform cable laying and trench compacting practices and placement of markers carry out reinstatements | | 8 | 2 | 6 |
| **Underground (duct) installation** | PC9.understand best practices in duct cable pulling using proper tools and accessories (pulling rope, cable pulling grip, breakaway swivel) | | 4 | 0 | 4 |
| | PC10.demonstrate cable reel positioning and pulling | | 7 | 2 | 5 |
| | PC11.demonstrate “figure 8” winding/storing of cable | | 5 | 0 | 5 |
| | PC12.understand cable blowing process (wing compressed air) | | 6 | 0 | 6 |
| | PC13.understand practices on duct integrity testing, duct fill ratio, co-efficient of friction and their effect on cable laying/longevity | | 5 | 2 | 3 |
| **Aerial installation** | PC14.understand specific construction of aerial cables making them suitable for such deployment | | 10 | 4 | 6 |
| | PC15.demonstrate cable handling practices for aerial cables (bending radius, placing tension) | | 7 | 3 | 4 |
| | PC16.demonstrate use and uniqueness of messenger strand | | 6 | 3 | 3 |
| | PC17.demonstrate deployment and use of self-supporting cables<br>demonstrate deployment process for aerial cable | | 5 | 2 | 3 |
| **TOTAL** | | | **100** | **28** | **72** |
| **TEL.N4129 Fiber optic cable preparation** | PC1.demonstrate cable preparation (removal of outer jacket, use of rip-cord, identifying and dressing strength member) | | 11 | 4 | 7 |
| | PC2.demonstrate use of Kellum’s grip and armored cable cutter | | 12 | 6 | 6 |
| | PC3. demonstrate use of armored cable cutter | | 10 | 4 | 6 |
| **Fiber optic cable handling** | PC4.demonstrate correct cable drum position for pulling fiber cable | | 10 | 4 | 6 |

| | | | | | |
|---|---|---|---|---|---|
| **Cable slack management** | PC5.understand cable handling procedure/process whilst lifting drums, shifting cables, handling with fork-lifts and placed in correct position | | 15 | 7 | 8 |
| | PC6.demonstrate correct positioning and rolling of drums unloading and store the cable drums | | 12 | 3 | 9 |
| | PC7.calculate the slack requirement as per standard practices and securing the slack in slack bracket | | 10 | 6 | 4 |
| | PC8.demonstrate securing of slack is slack brackets | | 10 | 4 | 6 |
| **TOTAL** | | | **100** | **40** | **60** |
| **TEL/N4130 Testing parameters** | PC1.demonstrate measurement of optical parameters (optical power, attenuation (at fiber, cables, connectors), fault location | | 10 | 4 | 6 |
| | PC2. perform optical power and power loss measurement of an optical cable | | 10 | 4 | 6 |
| **Test equipment** | PC3.demonstrate use of various devices (OTDR, optical power meter, visual cable fault locator, OLTS, visual inspection test (use of fiber tracer)) | | 8 | 5 | 3 |
| | PC4.perform visual inspection test of connectors using a microscope | | 8 | 4 | 4 |
| | PC5.understand and demonstrate “two cables” and “three cables” tests for loss measurement | | 12 | 4 | 8 |
| | PC6.understand and demonstrate insertion loss measurement using “patch cord test” and “double ended loss” technique | | 17 | 6 | 11 |
| **Report & Record** | PC7.record cable performance and test parameters like power, attenuation etc | | 11 | 5 | 6 |
| | PC8.record cable inspection parameters as per the company policy/format provided | | 9 | 4 | 5 |
| | PC9. ensure that documents are available to all appropriate authorities to inspect | | 15 | 8 | 7 |
| **TOTAL** | | | 100 | 44 | 56 |
| **TEL/N4131 Work Safety practices whilst working with fiber optics** | PC1. demonstrate eye-safety measures whilst at work | 100 | 12 | 4 | 8 |
| | PC2. demonstrate safe handling of bare fiber (broken ends of fiber and scraps) | | 14 | 6 | 8 |
| | PC3. read and comprehend manufacturer supplied MSDS for safe handling of fiber | | 12 | 4 | 8 |
| | PC4. Demonstrate fire safety practices (whilst working with high voltage arc in fusion splicers) | | 12 | 4 | 8 |
| | PC5. Demonstrate electrical safety norms where fiber is placed along with electrical cables | | 12 | 6 | 6 |
| | PC6. Show awareness of laser safety rules | | 12 | 8 | 4 |
| | PC7. Demonstrate use of safety gloves and boots, in required situations | | 12 | 6 | 6 |
| | PC8. complete any health and safety records legibly and accurately | | 14 | 6 | 8 |
| **TOTAL** | | | **100** | 44 | 56 |