

2.1 Cables, conductors and terminations

2.1.1 Cable protection and support

Evidence shall show an understanding of cable protection and support method and accessories to an extent indicated by the following aspects:

a) Requirements to protect and support cables adequately

Note:

Examples of protection are protection against mechanical damage, protection from adverse temperatures and corrosion and protection from magnetic field that may affect the performance of the cable.

b) Cable support and protection devices, accessories and typical applications

Note:

Examples include metallic and non-metallic conduits, duct and trunking, cable ladder and tray, cable clips and ties and related accessories.

c) Installation techniques encompassing:

- Cable installation equipment
- Cable drawing and hauling techniques

2.1.2 Cable types and applications

Evidence shall show an understanding of the types of cables used in the electrotechnology industry and their application to an extent indicated by the following aspects:

a) Structural components of cables and their purpose

Note:

Components include conductors and conductor material; insulation; sheathings and servings.

b) Application of various cables types

c) Cable variates

Note:

Cable varieties include single cables, flexible cables, flexible cords, shielded cables, armoured cables, ribbon cables, other similar and like cables

d) Typical characteristics and use of power circuit cables and control circuit cables

2.1.3 Cables in buildings, structures and premises

Evidence shall show an understanding of installing cables in buildings, structures and premises to an extent indicated by the following aspects:

a) Building construction method and construction sequence.

b) Typical cable routes through buildings, structures and premises.

c) Building codes affecting the installation of cables in buildings, structures and premises

Note:

Building codes include limitation on penetration structural elements and maintenance of fire protection interiority

d) Cable segregation requirements

2.1.4 Basic cable and conductor terminations

Evidence shall show an understanding of basic cable and conductor terminations to an extent indicated by the following aspects:

a) Insulation removal and replacement

b) Conductor handling and cable terminations encompassing:

- General aspects and soldering involving pins on electronic components and stranded conductors carrying current up to 25 amperes.
- Application of connecting devices for conductors and terminals
- Continuity through connections and insulation resistance testing
- Stress release on cables/conductors.

2.1.5.1 Power cable and conductor terminations

Evidence shall show an understanding of power cable and conductor terminations to an extent indicated by the following aspects:

a) Types of cable glands and their application

Note:

Types include glands for circular sheathed cables; steel wire armoured (SWA) cables and mineral-insulated metal-sheathed (MIMS) cables.

- Cable termination techniques

b) Terminal types and applications

c) Conductor termination techniques encompassing:

- Need for sound termination
- Consequences of poor conductor termination
- Conductor and terminal preparation

Note:

Conductors include copper and aluminium

2.1.5.2 Bus bar techniques

Evidence shall show an understanding of bus bar techniques to an extent indicated by the following aspects:

a) Materials and applications

b) Shaping techniques

c) Terminations and connections

2.1.6.1 Telecommunication cable and conductor terminations

Evidence shall show an understanding of telecommunication cable and conductor terminations to an extent indicated by the following aspects:

a) Approved termination devices and sockets.

b) Special termination tools and their use.

c) Cable colour coding up to 100 pair indoor and outdoor cable

d) End to end testing

e) Methods of terminating cables encompassing:

- Cables less than twenty pair
- Twenty pair cable and greater

f) Cable labelling devices

g) Colour coding of cables, sockets and termination modules and standard connectors used with twisted pair, optical fibre and coaxial cables

2.1.6.2 Telecommunication aerial cabling

Evidence shall show an understanding of telecommunication aerial cabling to an extent indicated by the following aspects:

- a) Hazard and control measures in aerial cabling working environment
- b) Soundness of pole for aerial cabling
- c) Aerial safety equipment
- d) Procedure to applying pole top rescue
- e) Aerial construction methods and regulations
- f) Joining of an aerial cables

2.1.6.3 Telecommunication below ground cabling

Evidence shall show an understanding of telecommunication below ground to an extent indicated by the following aspects:

- a) Hazard and control measures in underground cabling working environment
- b) Types and purposes of mechanical and manual aids.
- c) Purpose, location, and capacity of man holes and pits.
- d) Types of underground cable
- e) Procedure for the excavation of a site for the installation of a man hole, pit, pipe and conduit

2.1.6.4 Voice and data cabinet cabling terminations

Evidence shall show an understanding of voice and data cabinet cabling terminations, to an extent indicated by the following aspects.

- a) Communication cable and conductor terminations encompassing:
 - approved termination devices and sockets
 - special termination tools and their use
 - cable colour coding up to 100 pair indoor and outdoor cable
- b) Methods of terminating cables encompassing:
 - cables less than twenty pair
 - twenty pair cable and greater
 - structured cables
 - coaxial cables
 - optical fibre cables
 - termination safety practices
- c) Cable labelling devices

2.1.7.1 Performance (copper) data cable installation and terminations

Evidence shall show an understanding of performance data cabling and conductor installation and terminations to an extent indicated by the following aspects:

- a) High performance cable types encompassing:
 - High performance transmission parameters

- Electrical characteristics
 - Structure of UTP, FTP, and STP higher performance cables
- b) High performance cabling installation and termination encompassing:
- Separation and segregation requirements and techniques
 - Requirements for connecting hardware as defined in current Standards
 - Installation requirements and techniques applicable to high performance cable

2.1.7.2 Coaxial cable installation and terminations

Evidence shall show an understanding of coaxial cabling installation and terminations to an extent indicated by the following aspects:

- a) Coaxial cable types encompassing:
- Structure of qualshield and trishield coaxial cables armour plated coaxial cable
 - Typical applications
- b) Coaxial cabling installation and termination encompassing:
- Separation and segregation requirements and techniques.
 - Coaxial cable connectors compatible with the cable type and the environment
 - Installation requirements and techniques applicable to coaxial cables
 - Coaxial cable connectors and termination techniques

2.1.7.3 Optical fibre cabling installation and terminations

Evidence shall show an understanding of optical fibre cabling installation and terminations to an extent indicated by the following aspects:

- a) Operating principles of optical fibre transmission encompassing:
- Types of optical fibre types available for telecommunications voice and data transmission.
 - Difference between multimode and single mode transmission.
 - Advantages of optical fibre cable compared to other cables.
 - Applications of optical fibre cables.
 - Requirements of optical fibre cables as specified in current Standards
 - Hazards associated with working with optical fibre.
- b) Installation techniques encompassing:
- Purpose and procedures for pre-testing optical fibre cable prior to installation.
 - Regulations, standards and codes applicable to optical fibre installation
 - Bending radii and hauling requirements.
 - Cable support and securing mechanisms
 - Safety precautions
- c) Termination and splicing techniques
- Risk control measures applied in the preparation of fibre for termination.
 - Termination devices and method
 - Preparation and splicing techniques.
 - Devices used to protect terminations and splices against mechanical damage and prevent contamination.

2.1.7.4 Specialist audio/video cabling installation and termination

Evidence shall show an understanding of specialist audio/video cabling installation and terminations to an extent indicated by the following aspects:

- a) Features of high performance audio and video cables and interconnects
- b) High performance audio and video cables and interconnects encompassing:
 - Installation methods and limitations
 - Terminations techniques as specified by cable manufacturers

2.1.8 Electronic cable and conductor terminations

Evidence shall show an understanding of terminating cable and conductor used in electronic equipment to an extent indicated by the following aspects:

- a) Cable and conductor types and characteristics encompassing:
 - Insulated wire
 - Harness wiring,
 - High performance cables

Note.

 1. Examples of characteristics are transmission performance parameters and electrical characteristics
 2. Types include UTP, FTP, and STP
- b) Coaxial cables types and characteristics
 - Note.
 - Types include qualshield, trishield coaxial are armour plated coaxial cables
- c) Cable anchoring and support methods
- d) Termination methods

2.1.9 Winding wire types and connections

Evidence shall show knowledge and skills of winding wires and connections to an extent indicated by the following aspects:

- a) Winding wires and their applications.
- b) Winding wire connection methods encompassing:
 - Conductor preparation
 - Connection mediums
 - Insulation methods

2.1.10 High voltage motor winding, conductors, connections methods and insulation

Evidence shall show knowledge and skills of high voltage winding conductors, connections and insulation to an extent indicated by the following aspects:

- a) HV winding conductors and their applications.
- b) HV winding wire connection methods encompassing:
 - Conductor handling
 - Conductor preparation
 - Connection mediums

c) Insulation types and methods

2.1.11 Integrated cabling arrangements

Evidence shall show knowledge and skills of integrated cabling arrangements to an extent indicated by the following aspects:

- a) Types of service that use integrated cabling arrangements, e.g. “Smart wiring” concept.
- b) ELV communication and control cabling selection methods encompassing:
 - Limitations imposed by equipment
 - Limitations imposed by route length
 - Communication rates
- c) Cable schedules and planning
- d) Cable identification methods