REPUBLIC OF KENYA

NATIONAL OCCUPATIONAL STANDARDS

FOR

ELECTRICAL ENGINEERING TECHNICIAN (POWER OPTION)

KNQF LEVEL: 6

ISCED OCCUPATIONAL STANDARD CODE: 0713 554B

TVET CDACC
P.O BOX 15745-00100
NAIROBI

INSTALL ELECTRICAL POWER LINES

UNIT CODE: ENG/OS/PO/CR/02/6/B

UNIT DESCRIPTION

This unit covers the competencies required to install Electrical power lines and cables: The competencies includes; Design transmission lines, erect transmission lines, mount transmission cables, terminate conductors and finally test and inspect electrical installation.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***(Bold and italicised terms are elaborated in the Range)***
1. Design transmission lines	1.1 Transmission lines are designed as per the ***topography*** of the installation site. 1.2 Design type is established as per the scope of the load. 1.3 Design is performed as per location of the ***installation***. 1.4 ***Span length*** is determined as per the weight of the conductor, height and type of the support. 1.5 Transmission line is design as per the type of the materials to be used in line installation 1.6 Transmission line is designed as per the environmental condition of the location 1.7 Transmission line is designed in line with the ***national and international standards*** 1.8 Design is performed as per the type of transmission. 1.9 Transmission line is designed in line with the ***regulations and legislative requirements***
2. Erect transmission lines support	2.1 Supports are erected as per the location's soil profile. 2.2 Supports are erected as per the weight of the conductor. 2.3 Supports are erected as per established procedures and standards 2.4 Supports are erected as per the conductors' voltage.

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3. Mount transmission lines	3.1 Transmission lines are mounted in consideration of the balance between tension and sag of the conductors 3.2 Spacing between conductors is determined as per line voltage 3.3 Transmission line are mounted as per the type of the conductors 3.4 Tension of transmission line is performed as per fluctuations of the weather condition. 3.5 Cross arms are mounted in line with the spacing between conductors. 3.6 Conductors are mounted as per the types of insulators used. 3.7 Transmission system is earthed as per the established procedures and standards 3.8 Lightening arrestors are mounted on the power lines as per the ***established procedures*** and standards
4. Terminate conductors	4.1 Conductors are terminated as per the line voltage. 4.2 Transmission line is terminated as per the type of conductors 4.3 Different types of joint terminations are identified. 4.4 Transmission line is terminated as per the IEE regulation 4.5 Transmission line is terminated as per end point load. 4.6 Transmission line is terminated as per the type of transmission.
5. Test and inspect installation	1.1 Type of tests are identified 1.2 Test is performed as per the IEE regulations 1.3 Firmness of the transmission line established 1.4 Continuity test is performed 1.5 Short circuit test is performed 1.6 Insulation test is performed as per the IEE regulations

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	1.7 Earth continuity test is performed as per the IEE regulations

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Installation may include but is not limited to:	• Transmission line installation • Transformer installation • Commercial installation • Industrial Installation • Power Generator • Security • Power transmission and distribution • IBMS (integrated building Management system)
2. Topography may include but is not limited to:	• Land terrain i.e. • Hilly • Rocky • Swampy • Flat
3. Established Procedures may include but is not limited to:	• Company rules • Procedures mentioned in contract
4. Design may include but is not limited to:	• Electrical design for transmission line • Electrical design for switchgear • Electrical design for alarm systems
5. National and International standards	• IEE standard • British Standard

Variable	Range
may include but is not limited to:	• KEBS standard
6. IEE regulations	• 17th Edition
7. Specifications may include but is not limited to:	• Tolerance/ range • Make / model • Size • Class
8. Regulations and legislative requirements may include but is not limited to:	• KPLC procedures • County bylaws • Energy Act, 2006 • National Construction Authority Act • OSHA
9. Work schedule may include but is not limited to:	• Gantt chart • Block

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

- The manufacturer's warranty requirements relating to electrical installation systems and related components.
- The legal requirements relating to electrical installations
- Kenyan legislation and workplace procedures relevant to:
    - Health and safety;
    - Environment (including waste disposal);
    - Appropriate personal protective equipment (PPE).
- Work place communication;
- Time management

- Materials managementThe importance of documentation and keeping records
- The relationship between time and costs
- The importance of using the correct sources of technical information.
    - . Interpreting circuits, drawings, specifications and instructions
    - Preparing work plans in accordance with legislative and regulatory requirements and standard operating procedures and health and safety requirements
    - Importance of contractual agreements
    - Necessary insurance and policies including security bonds, performance bonds, contractors all risks
    - Insurance of contractors work
    - Keeping records of income
    - Financial statements

FOUNDATION SKILLS

- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Problem solving;
- Negotiation
- Decision making;
- First aid;
- Report writing;
- Planning**;**

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Transmission line design reflected the site topography 1.2 Transmission line was designed as per the load requirement 1.3 Span length was determined as per the weight of the conductor, height and type of the support 1.4 Supports were erected in line with the conductors voltage 1.5 Balance between tension and sag of the conductors was performed 1.6 Lightening arrestors were mounted on the power line 1.7 Transmission line was earthed 1.8 Continuity, short circuit and insulation test performed after line construction.
2. Resource Implications	The following resources must be provided: Resources same as that of workplace are advised to be applied including conductors, supports, transformers, cross arms calculator, stationery
3. Methods of Assessment	Competency may be assessed through: 3.1 Observation 3.2 Oral questioning 3.3 Practical demonstration
4. Context of Assessment	Competency may be assessed 4.1 On job 4.2 Off job 4.3 During Industrial Attachment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.