

**THE REPUBLIC OF KENYA**

**NATIONAL OCCUPATIONAL STANDARDS**

**FOR**

**ELECTRICAL WORKER**

**KNQF LEVEL 4**

**OCCUPATIONAL STANDARD ISCED CODE:** **0713 354A**

# ACRONYMS

BOQ Bill of Quantities

EHS Environment, Health and Safety

IET Institute of Electrical and electronics Engineers

KP Kenya Power

SOP Standard operating procedure

NCA National Construction Authority

OSHA Occupational Safety and Health Act

PPE Personal Protective Equipment

PV Photo Voltaic

TVET Technical and Vocational Education and Training

# KEY TO UNIT CODE



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# OVERVIEW

This course is designed to equip an Electrical worker Level 4 with the competencies required to perform single-phase electrical installation work, install stand-alone solar pv systems and perform bell and alarm installation.

Electrical worker is a person who will carry out electrical work using a given design and customer’s requirements. This work demands the worker to, read and interpret electrical drawings so that the worker can install the system according to the national and international standards. Moreover, the size and quantity of all materials, cables, control equipment and accessories and speciﬁcations for the items necessary to install the electrical systems will largely be determined by the project owner and electrical technician. Therefore, an electrical worker is a well-trained person who can carry out these responsibilities

**SUMMARY OF UNITS OF COMPETENCY**

**CORE UNITS OF COMPETENCY**

|  |  |
| --- | --- |
| **Unit Code** | **Unit Title** |
| 0713 251 23A | Install PVC Sheathed Cable System |
| 0713 251 24A | Install Trunking System |
| 0713 251 25A | Install Conduit System |
| 0713 351 26A | Install Stand-Alone Solar PV Systems |
| 0713 351 27A | Perform Bell and Alarm Installation |
| 0713 351 28A | Wind Electrical Machine |

# CORE UNITS OF COMPETENCY

**INSTALL PVC SHEATHED CABLE SYSTEM**

**UNIT CODE:** **0713 251 01A**

**UNIT DESCRIPTION**

This unit specifies competences required for installing PVC sheathed cable system. The competences include identifying electrical cables and accessories, making cable joints, interpreting electrical symbols, fixing electrical accessories and perform test and inspection.

**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. Identify cables and accessories | * 1. Safety measures are applied as per OSHA and EHS standards.   2. Electrical cable colour code is identified as per IEC standards.   3. Electrical ***cable sizes*** are identified as per IEC standards   4. ***Electrical accessories*** are identified as per IEC standards. | |
| 1. Make cable joints | * 1. Safety measures are applied as per OSHA and EHS standards.   2. Electrical tools and equipment are selected as per work requirement.   3. ***Electrical cable joints*** are prepared as per IEC standards.   4. ***Housekeeping activities*** are performed as per the work requirement. | |
| 1. Interpret electrical symbols | * 1. Electrical symbols are sketched as per established standards.   2. Wiring diagrams are drawn as per the work requirement   3. Electrical components are identified as per the drawing | |
| 1. Fix electrical accessories | * 1. Safety measures are applied as per OSHA and EHS standards.   2. Electrical single-phase intake point is installed as per IET regulation.   3. ***Electrical final circuits*** are installed as per design requirement.   4. ***Housekeeping activities*** are performed as per the work requirement. | |
| 1. Perform Test and Inspection | * 1. Visual inspection is performed as per the installed designs.   2. Testing methods are performed as per the installed designs. | |

**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. Electrical cable joints include but is not limited to: | * Britannia * Married * Tee * Straight twist * Scarf |
| 1. Electrical accessories and fittings include but is not limited to: | * Sockets * Switches * Lamp holders * Junction boxes * Pattress * Couplers * Circuit breakers * Plugs |
| 1. Cable sizes may include but not limited to: | * 1.0mm2 * 1.5 mm2 * 2.5 mm2 * 4.0 mm2 * 6.0 mm2 |
| 1. Electrical final circuits may include but is not limited to: | * Lighting * Power |
| 1. Housekeeping activities may include but not limited to: | * General cleanliness * Tools and equipment storage |

**REQUIRED KNOWLEDGE**

The individual needs to demonstrate knowledge of:

* Units of measurement and abbreviations
* Work sequence
* Electrical materials
* Tools and equipment

**REQUIRED SKILLS**

* Communication skills
* Negotiation skills
* Digital literacy
* Waste disposal
* Occupational safety and health practices

**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. Identified electrical cable colour code as per IEC standards. 2. Identified electrical cable sizes as per IEC standards 3. Identified electrical accessories as per IEC standards 4. Applied safety measures as per OSHA and EHS standards. 5. Selected electrical tools and equipment as per work requirement. 6. Drew Wiring diagrams as per the work requirement 7. Prepared electrical cable joints as per IEC standards. 8. Installed electrical single-phase intake point as per IET regulation. 9. Installed electrical final circuits as per design requirement. |
| 1. Resource Implications | The following resources should be provided:  2.1 Appropriately simulated environment where assessment can take place.  2.2 Access to relevant work environments.  2.3 Resources relevant to the proposed activities or task |
| 1. Methods of Assessment | Competency may be assessed through:  3.1 Practical  3.2 Projects  3.3 Written tests  3.4 Oral questions  3.5 Portfolio of evidence  3.6 Third party evidence |
| 1. Context of Assessment | * + 1. Competency may be assessed in a work place or a simulated work place. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

**INSTALL TRUNKING SYSTEM**

**UNIT CODE:** **0713 251 02A**

**UNIT DESCRIPTION**

This unit covers competences required in installing trunking system. The competences include identifying trunking accessories, preparing trunking work pieces, mounting trunking work pieces, installing electrical cables and accessories and perform test and inspection.

**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. Identify trunking accessories | * 1. ***Trunking types*** are identified as per IEC standards.   2. ***Trunking sizes*** are identified as per IEC standards.   3. Trunking accessories are identified as per IEC standards |
| 1. Prepare trunking work pieces | * 1. Safety measures are applied as per OSHA and EHS standards   2. ***Electrical tools*** ***and equipment*** are selected as per work requirement   3. Measurements are taken as per work requirement.   4. Trunking work pieces are cut as per the measurements.   5. ***Housekeeping activities*** are performed as per the work requirement. |
| 1. Mount trunking work pieces | * 1. Safety measures are applied as per OSHA and EHS standards.   2. Mounting points are marked out as per IEC standards   3. Trunking work pieces are mounted as per the IEC standards.   4. ***Housekeeping activities*** are performed as per the work requirement. |
| 1. Install electrical cables and accessories | * 1. Safety measures are applied as per OSHA and EHS standards.   2. Electrical cable colour code is identified as per IEC standards.   3. Electrical ***cable sizes*** are identified as per IEC standards.   4. Cables are laid as per the IEC standards.   5. Accessories are fixed as per IEC standards.   6. ***Housekeeping activities*** are performed as per the work requirement. |
| 1. Perform Tests and Inspection | * 1. Visual inspection is performed as per work requirements   2. Continuity test is performed as per IEC standards   3. Polarity test is performed as per IEC standards |

**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. Trunking types may include but not limited to: | * PVC * Metallic * Galvanized iron |
| 1. Trunking sizes may include but not limited to: | * 16mm x 16mm * 25mm x 16mm * 25mm x 25mm * 40mm x 25mm |
| 1. Electrical tools and equipment may include but is not limited to: | * Cutting tools * Fastening tools * Measuring tools * Marking tools * Measuring instruments |
| 1. Cable sizes may include but not limited to: | * 1.0mm2 * 1.5 mm2 * 2.5 mm2 * 4.0 mm2 * 6.0 mm2 |
| 1. Housekeeping activities may include but not limited to: | * General cleanliness * Tools and equipment storage |

**REQUIRED KNOWLEDGE**

The individual needs to demonstrate knowledge of:

* Units of measurement and abbreviations
* Work sequence
* Electrical materials
* Tools and equipment

**REQUIRED SKILLS**

**•** Communication skills

• Negotiation skills

• Digital literacy

• Waste disposal

• Occupational safety and health practices

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Identified trunking types as per IEC standards. 2. Applied safety measures as per OSHA and EHS standards 3. Cut trunking work pieces as per the measurements. 4. Mounted trunking work pieces as per the IEC standards. 5. Laid cables as per the IEC standards. 6. Fixed accessories as per IEC standards. 7. Performed Continuity test as per IEC standards 8. Code of conduct is observed as per the workplace requirement. |
| 1. Resource Implications | The following resources should be provided:  2.1 Appropriately simulated environment where assessment can take place.   * 1. Access to relevant work environments.   2.3 Resources relevant to the proposed activities or task. |
| 1. Methods of Assessment | Competency may be assessed through:   1. Practical 2. Projects 3. Written tests 4. Oral questions 5. Portfolio of evidence 6. Third party evidence |
| 1. Context of Assessment | Competency may be assessed in a work place or a simulated work place. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

**INSTALL CONDUIT SYSTEM**

**UNIT CODE:** **0713 251 03A**

**UNIT DESCRIPTION**

This unit covers competences required in installing conduit system. The competences include identifying conduit accessories, preparing conduit work pieces, mounting conduit work pieces, installing electrical cables and accessories and performing test and inspection.

**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. Identify conduit accessories | * 1. ***Conduit types*** are identified as per IEC standards.   2. ***Conduit sizes*** are identified as per IEC standards.   3. Conduit accessories are identified as per IEC standards |
| 1. Prepare conduit work pieces | * 1. Safety measures are applied as per OSHA and EHS standards   2. ***Electrical tools and equipment*** are selected as per work requirement   3. Measurements are taken as per work requirement.   4. Conduit work pieces are cut as per the measurements.   5. ***Housekeeping activities*** are performed as per the work requirement. |
| 1. Mount conduit work pieces | * 1. Safety measures are applied as per OSHA and EHS standards.   2. Mounting points are marked out as per IEC standards.   3. Conduit work pieces are mounted as per the IEC standards.   4. ***Housekeeping activities*** are performed as per the work requirement. |
| 1. Install electrical cables and accessories | * 1. Safety measures are applied as per OSHA and EHS standards.   2. Electrical cable colour code is identified as per IEC standards.   3. Electrical ***cable sizes*** are identified as per IEC standards.   4. Cables are drawn as per the IEC standards.   5. Accessories are fixed as per IEC standards.   6. ***Housekeeping activities*** are performed as per the work requirement. | |
| 1. Perform Tests and Inspection | * 1. Visual inspection is performed as per work requirements   2. Continuity test is performed as per IEC standards   3. Polarity test is performed as per IEC standards | |

**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. Conduit types may include but not limited to: | * Metallic * PVC |
| 1. Conduit sizes may include but not limited to: | * 20mm2 * 25mm2 * 32mm2 |
| 1. Electrical tools and equipment may include but is not limited to: | * Cutting tools * Fastening tools * Measuring tools * Marking tools * Measuring instruments |
| 1. Cable sizes may include but not limited to: | * 1.0mm2 * 1.5 mm2 * 2.5 mm2 * 4.0 mm2 * 6.0 mm2 |
| 1. Housekeeping activities may include but not limited to: | * General cleanliness * Tools and equipment storage |

**REQUIRED KNOWLEDGE**

* The individual needs to demonstrate knowledge of:
* Units of measurement and abbreviations
* Work sequence
* Electrical materials
* Tools and equipment

**REQUIRED SKILLS**

• Communication skills

• Waste disposal

• Occupational safety and health practices

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Identified conduit types as per IEC standards. 2. Identified conduit accessories as per IEC standards. 3. Applied safety measures as per OSHA and EHS standards. 4. Cut conduit work pieces as per the measurement. 5. Mounted conduit work pieces as per the IEC standards. 6. Drawn cables as per the IEC standards. 7. Fixed accessories as per IEC standards 8. Performed Continuity test as per IEC standards 9. Identified Sources of personal and business funds as per financial procedures and standards |
| 1. Resource Implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place. 2. Access to relevant work environments. 3. Resources relevant to the proposed activities or task |
| 1. Methods of Assessment | Competency may be assessed through:  3.1 Practical  3.2 Projects  3.3 Written tests  3.4 Oral questions  3.5 Portfolio of evidence  3.6 Third party evidence |
| 1. Context of Assessment | Competency may be assessed in a work place or a simulated work place. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## INSTALL STAND-ALONE SOLAR PV SYSTEMS

**UNIT CODE:** **0713 351 04A**

**UNIT DESCRIPTION**

This unit covers competences required in installing stand-alone solar PV system. Competences include Applying basic electrical concepts, interpreting stand-alone solar PV Installation drawings, installing stand-alone Solar PV components, installing electrical wiring system, testing stand-alone solar PV system installation and maintaining stand-alone Solar PV system

**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. Apply basic electrical concepts | | * 1. Basic SI units in Electrical are identified based on scope of work.   2. Quantities of Charge, force, work and power are identified as per IEC standards.   3. Calculations involving Ohm’s law i.e. Current, Resistance and voltage are performed as per IEC standards.   4. Calculations involving various electrical quantities are performed based on IEC standards. | |
| 1. Interpret stand-alone Solar PV Installation drawings | | * 1. Electrical symbols are identified as per IEC standards.   2. Wiring system is mapped as per design.   3. Final circuits drawing is interpreted as per design requirement. | |
| 1. Install stand-alone Solar PV Components | | * 1. Safety measures are applied as per work requirement.   2. Electrical tools and equipment are selected as per work requirement.   3. ***Solar PV system components*** are identified as per design requirement.   4. Solar PV system components are mounted as per design requirement. | |
| 1. Install electrical wiring system | | * 1. ***Electrical cable joints*** and termination are prepared as per design requirement.   2. ***Electrical accessories and fittings*** are identified as per design requirement.   3. ***Cable management systems*** are installed as per design requirement.   4. ***Electrical final circuits*** are installed as per design requirement.   5. Solar PV system components are terminated as per design requirement. | |
| 1. Test stand-alone solar PV system installation | | * 1. Solar PV system conditions are visually inspected as per IET regulations.   2. Continuity test is carried out as per IET regulation.   3. Insulation resistance test is carried out as per IET regulations.   4. Polarity test is carried out as per IET regulations.   5. Earth resistance tests are carried out as per IET regulations. | |
| 1. Maintain stand-alone Solar PV system | | * 1. Solar PV system is inspected as per IET regulations.   2. Maintenance materials and tools are prepared as per the maintenance strategy requirement.   3. ***Solar pv system maintenance activities*** are carried out as per IEC standards.   4. Solar PV system tests are carried out as per IEC standards.   5. Maintenance records are updated as per maintenance strategy. | |

**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. ***Solar PV system components*** may include but not limited to: | * PV module * Charge controller * Solar batteries * Solar inverters |
| 1. ***Electrical cable joints*** may include but not limited to: | * Britannia * Married * Tee * Straight twist * scarf |
| 1. **Electrical accessories and fittings** may include but not limited to: | * Sockets * Switches * Lamp holders * Junction boxes * Pattress * Couplers * Circuit breakers * Plugs |
| 1. ***Cable management systems*** may include but not limited to: | * Cable trays * Cable duct * Bus-bars * Sheath/surface * Conduits * Trunking |
| 1. ***Electrical final circuits*** may include but not limited to: | * Lighting * Power |
| 1. ***Solar pv system maintenance activities*** may include but not limited to | * Cleaning * Topping up batteries * Loose connections |

**REQUIRED KNOWLEDGE**

The individual needs to demonstrate knowledge of:

* Technical drawing
* Workshop technology
* IEE regulations
* Electrical Technology
* Renewable energy
* Building codes

**FOUNDATION SKILLS**

* Environmental literacy
* Occupational safety and health practices
* Interpret electrical drawing
* Identification and proper use of electrical tools

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Performed Calculations involving various electrical quantities based on IEC standards. 2. Interpreted final circuits drawing as per design. 3. Applied Safety measures as per work requirement. 4. Mounted solar PV system components as per design requirement. 5. Installed Cable management system as per design requirement. 6. InstalledElectrical final circuitsas per design requirement. 7. Terminated solar PV system components as per design requirement. 8. Installed Earthing and protection systems as per acceptable standards. 9. Carried out electrical installation testing as per IET regulations. 10. Carried out Maintenance activities as per IET regulations. |
| 1. Resource Implications | The following resources should be provided:  2.1 Appropriately simulated environment where assessment can take place.  2.2 Access to relevant work environments.  2.3 Resources relevant to the proposed activities or task |
| 1. Methods of Assessment | Competency may be assessed through:   1. Practical demonstration 2. Projects 3. Written tests 4. Oral test |
| 1. Context of Assessment | Competency may be assessed in a work place or a simulated work place. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## PERFORM BELL AND ALARM INSTALLATION

**UNIT CODE:** **0714 351 05A**

**UNIT DESCRIPTION**

This unit covers the competencies required in perform bell and alarm installation. Competencies include interpreting bell and alarm installation drawings, installing bell and alarm wiring system, installing bell and alarm components, testing bell and alarm installation and maintaining bell and alarm 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. Interpret Bell and alarm Installation drawings | | 1. Bell and alarm symbols are identified as per IEC standards. 2. Wiring system is mapped as per design. 3. Bell and alarm circuits drawing is interpreted as per design requirement. |
| 1. Install bell and alarm wiring system | | * 1. Safety measures are applied as per work requirements.   2. Electrical tools and equipment are selected as per work requirement.   3. ***Electrical cable joints*** and termination are prepared as per design requirement.   4. ***Bell and alarm accessories and fittings*** are identified as per design requirement.   5. ***Cable management system*** is installed as per design requirement.   6. Bell and alarm systems are installed as per design requirement. |
| 1. Install Bell and Alarm Components | | 1. ***Bell and alarm components*** are identified as per design requirement. 2. Electrical power supply is installed as per design requirement. 3. Bell and alarm components are installed as per design requirement. |
| 1. Test Bell and Alarm installation | | * 1. Bell and alarm system conditions are visually inspected as per IET regulations.   2. Continuity test is carried out as per IET regulation.   3. Insulation resistance test is carried out as per IET regulations.   4. Polarity test is carried out as per IET regulations.   5. Earth resistance tests are carried out as per IET regulations. | |
| 1. Maintain Bell and Alarm installation | | * 1. Bell and alarm systems are inspected as per IET regulations.   2. Maintenance materials and tools are prepared as per the maintenance strategy requirement.   3. ***Bell and alarm system Maintenance activities*** are carried out as per IET regulations.   4. System tests are carried out as per IET regulations.   5. Maintenance records are updated as per maintenance strategy. | |

**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. ***Electrical cable joints*** may include but not limited to: | * Britannia * Married * Tee * Straight twist * scarf |
| 1. ***Bell and alarm components*** may include but not limited to: | * Bell transformers * Indicator board * Bell bushes * Bell relays * Control panel * Sounders * Buzzers * Bell * Hooters * Sirens |
| 1. ***Bell and alarm accessories and fittings*** may include but not limited to: | * Switches * Junction boxes * Pattress * Couplers * Circuit breakers * Plugs |
| 1. ***Cable management systems*** may include but not limited to: | * Cable trays * Cable duct * Bus-bars * Sheath/surface * Conduits * Trunking |
| 1. ***Bell and alarm system Maintenance activities*** may include but not limited to: | * Cleaning * Loose connections |

**REQUIRED KNOWLEDGE**

The individual needs to demonstrate knowledge of:

* Technical drawing
* Workshop technology
* IEE regulations
* Electrical Technology
* Renewable energy
* Building codes

**FOUNDATION SKILLS**

* Environmental literacy
* Occupational safety and health practices
* Interpret electrical drawing
* Identification and proper use of electrical tools

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Interpreted Bell and alarm circuits drawing as per design requirement 2. Applied safety measures as per work requirement. 3. Installed cable management system as per design requirement. 4. Identified bell and alarm components as per design requirement. 5. Installed bell and alarm systemsas per design requirement. 6. Installed electrical power supply as per design requirement. 7. Installed bell and alarm componentsas per design requirement. 8. Carried out electrical installation testing as per IET regulations. 9. Carried out Maintenance activities as per IET regulations. |
| 1. Resource Implications | The following resources should be provided:  2.1 Appropriately simulated environment where assessment can take place.  2.2 Access to relevant work environments.  2.3 Resources relevant to the proposed activities or task |
| 1. Methods of Assessment | Competency may be assessed through:   1. Practical demonstration 2. Projects 3. Written tests 4. Oral test |
| 1. Context of Assessment | Competency may be assessed in a work place or a simulated work place. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

**WIND ELECTRICAL MACHINE**

**UNIT CODE:** **0713 351 06A**

**UNIT DESCRIPTION**

This unit specifies the competencies required for winding electrical machines. The competencies include; disassembling rotating electrical machines, Installing Machine winding, assembling rotating electrical machines and performing electrical machine testing

**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. Disassemble rotating electrical machine | * 1. Safety measures are applied as per work requirement.   2. Winding data is recorded as per machine design   3. ***Machine parts*** are disassembled as per work procedure. | |
| 1. Install machine winding | * 1. Safety measures are applied as per work requirement.   2. Rotating machine parts are cleaned as per work procedure.   3. Coil windings are prepared as per work requirement.   4. Coil windings are laid in stator slots as per work requirement.   5. Stator windings are***cured*** as per IEC standards. | |
| 1. Assemble rotating electrical machine | * 1. Rotor and stator are aligned as per machine design   2. Bolts and nuts are fastened as per the machine design   3. Bearings are fitted as per machine design   4. Bearing are lubricated as per work requirements | |
| 1. Perform electrical machine testing | * 1. Continuity test is performed as per IEC standards   2. Polarity test is performed as per IEC standards   3. Insulation resistance test is performed as per IEC standards   4. Voltage and current balance test is performed as per IEC standards   5. ***Housekeeping activities*** are carried as per work requirements | |

**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. Machine parts include but is not limited to: | * End caps * Fan * Rotor * Armature * Stator * Conductors * Bearings |
| 1. Cure include: | * Dry * Varnish * Bake |
| 1. Housekeeping activities may include but not limited to: | * General cleanliness * Tools and equipment storage |

**REQUIRED KNOWLEDGE**

The individual needs to demonstrate knowledge of:

* Units of measurement and abbreviations
* Work sequence
* Electrical materials
* Tools and equipment

**REQUIRED SKILLS**

• Waste disposal

• Occupational safety and health practices

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Applied safety measures as per work requirement. 2. Disassembled machine parts as per work procedure. 3. Cured static machine windings as per IEC standards 4. Laid Coil windings in stator slots as per work requirement. 5. Assembled rotating electrical machine 6. Performed electrical tests as per IEC standards. |
| 1. Resource Implications | The following resources should be provided:  2.1 Appropriately simulated environment where assessment can take place.  2.2 Access to relevant work environments.  2.3 Resources relevant to the proposed activities or task. |
| 1. Methods of Assessment | Competency in this unit may be assessed through:  3.1 Project  3.2 Practical  3.3 Portfolio of evidence  3.4 Third party report  3.5 Written assessment  3.6 Oral assessment |
| 1. Context of Assessment | Competency may be assessed in a work place or a simulated work place. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |