

# **SINGLE PHASE ELECTRICAL INSTALLATION AND MAINTENANCE**

**UNIT CODE: EE/CU/ET/CR/02/3**

## **Relationship to Occupational Standards**

This unit addresses the Unit of Competency: perform single phase electrical installation and maintenance.

**Duration of Unit:** 400 Hours

## **Unit Description**

This unit covers the competencies for installing lighting, power points, consumer's control unit and power intake point.

## **Summary of Learning Outcomes**

1. Apply workplace safety
2. Interpret electrical drawings
3. Select correct types and sizes of cables
4. Install cables for lighting and power points
5. Install power intake point
6. Install consumer's control unit
7. Inspect and test the complete installation
8. Repair and maintain the installation

## **Learning Outcomes, Content and Suggested Assessment Methods**

| <b>Learning Outcome</b> | <b>Content</b> | <b>Suggested Assessment Methods</b> |
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| <p>1. Apply workplace safety</p> | <ul style="list-style-type: none"> <li>• Meaning and purpose of PPE</li> <li>• Types of PPE</li> <li>• Safe and correct handling, use, maintenance and storage of different types of PPE</li> <li>• Organizational safety rules</li> <li>• Safety and environmental regulations</li> <li>• Occupational risks e.g. falling from heights, slippery floors, bites from insects, cuts</li> <li>• Types of hazards e.g. electric shock, arc flash, blast, burns, fire</li> <li>• Sources of hazards and ways of preventing them</li> </ul> | <ul style="list-style-type: none"> <li>• Direct observation □</li> <li>Oral questioning</li> <li>• Practical tests</li> <li>• Written tests</li> </ul> |
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| Learning Outcome | Content | Suggested Assessment Methods |
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|                                  | <ul style="list-style-type: none"> <li>• Types of fires and fire fighting</li> <li>• First aid <ul style="list-style-type: none"> <li>◦ Meaning of first aid</li> <li>◦ Procedure of rescuing a victim from electric shock</li> <li>◦ Remedies for burns, blisters and cuts</li> <li>◦ Methods of resuscitation</li> </ul> </li> </ul>                       |  |
| 2. Interpret electrical drawings | <ul style="list-style-type: none"> <li>• Identification of intake point equipment</li> <li>• Identification of installation equipment and accessories e.g. switches, lamp holders</li> <li>• Identification of electrical symbols and abbreviations</li> <li>• Types of drawings</li> <li>• Schematic/layout</li> <li>• Circuit</li> <li>• Wiring</li> </ul> | <ul style="list-style-type: none"> <li>• Direct observation <input type="checkbox"/></li> <li>• Oral questioning</li> <li>• Practical tests <input type="checkbox"/></li> <li>• Written tests</li> </ul> |

| <b>Learning Outcome</b>                                   | <b>Content</b>  | <b>Suggested Assessment Methods</b>  |
|---|---|--|
| 3. Select correct sub-circuits, types and sizes of cables | <ul style="list-style-type: none"> <li>• Meaning of insulators, conductors and cables</li> <li>• Types of conductors (e.g copper, aluminium) and their applications</li> <li>• Properties of conductors e.g. conductivity, temperature, weight, strength</li> <li>• Types of insulators (e.g. PVC, rubber, porcelain, fibre)</li> <li>• Properties of insulators e.g. resistivity</li> <li>• Factors to consider when selecting cables e.g. load, length</li> <li>• Identification of subcircuits</li> <li>• Types and sizes of cables</li> </ul> | <ul style="list-style-type: none"> <li>• Direct observation and oral questioning</li> <li>• Written tests</li> </ul> |

| Learning Outcome                          | Content  | Suggested Assessment Methods   |
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|   | <ul style="list-style-type: none"> <li>• Measurements and estimations of cable lengths and sizes</li> <li>• Relevant IEE regulations</li> </ul>  |  |
| 4. Perform cable jointing and termination | <ul style="list-style-type: none"> <li>• Meaning of cable joint and termination</li> <li>• Types of cable joints and termination</li> <li>• Purpose and application of cable joints and termination</li> <li>• Relevant IEE regulations</li> </ul> | <ul style="list-style-type: none"> <li>• Direct observation □</li> <li>• Oral questioning</li> <li>• Practical tests □</li> <li>• Written tests</li> </ul> |

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| <p>5. Install cables for lighting and power points</p> | <ul style="list-style-type: none"> <li>• Communication methods at site e.g. verbal, walkie-talkie, mobile phones</li> <li>• Use of safety harness and PPE</li> <li>• Identification of tools and equipment</li> <li>• Assembling of working tools and equipment</li> </ul> | <ul style="list-style-type: none"> <li>• Direct observation and oral questioning</li> <li>• Practical tests</li> <li>• Written tests</li> </ul> |
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| <b>Learning Outcome</b> | <b>Content</b> | <b>Suggested Assessment Methods</b> |
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|                               | <ul style="list-style-type: none"> <li>• Identification of lighting and power points</li> <li>• Preparation of cables e.g. stripping, pairing</li> <li>• Drawing in of cables</li> <li>• Cable joints</li> <li>• Labeling of circuits</li> <li>• Conducting final checks for workmanship, conformity with instructions and job requirements</li> <li>• Good housekeeping</li> <li>• Maintenance of tools</li> <li>• Storage of tools</li> <li>• Documentation and reporting</li> <li>• Relevant IEE regulations</li> </ul> |   |
| 6. Install power intake point | <ul style="list-style-type: none"> <li>• Meaning of power intake point</li> <li>• Identification of sequence of control equipment</li> </ul>   | <ul style="list-style-type: none"> <li>• Direct observation □</li> <li>• Oral questioning</li> <li>• Practical tests</li> </ul> |

| Learning Outcome | Content   | Suggested Assessment Methods           |
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|                  | <ul style="list-style-type: none"> <li>• Mounting of components</li> <li>• Wiring of intake point</li> <li>• Earth lead and earth electrode installation</li> <li>• Bonding of all metal parts</li> <li>• Provision of draw wire for power authority</li> <li>• Conducting final checks for workmanship, conformity with instructions and job requirements</li> <li>• Good housekeeping</li> <li>• Maintenance of tools</li> <li>• Storage of tools</li> <li>• Documentation and reporting</li> <li>• Relevant IEE regulations</li> </ul> | <input type="checkbox"/> Written tests |



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| 7. Inspect and test the complete installation | <ul style="list-style-type: none"> <li>• Meaning of inspection and testing</li> <li>• Sections of the installation to be</li> </ul> | <input type="checkbox"/> Direct observation<br><input type="checkbox"/> Oral questioning |
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| <b>Learning Outcome</b> | <b>Content</b> | <b>Suggested Assessment Methods</b> |
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|                         | <p>inspected</p> <ul style="list-style-type: none"> <li>• Types of visual and physical checks</li> <li>• Completion installation tests <ul style="list-style-type: none"> <li>○ Verification of polarity test</li> <li>○ Insulation resistance test</li> <li>○ Earth continuity tests</li> <li>○ Ring circuit continuous test</li> </ul> </li> <li>• Conducting final checks for workmanship, conformity with instructions and job requirements</li> <li>• Good housekeeping</li> <li>• Maintenance of tools</li> <li>• Storage of tools</li> <li>• Documentation and reporting</li> <li>• Relevant IEE regulations</li> </ul> | <ul style="list-style-type: none"> <li>• Practical tests</li> <li>• Written tests</li> </ul> |
| <b>Learning Outcome</b> | <b>Content</b>   | <b>Suggested Assessment Methods</b>  |

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| <p>8. Repair and maintain the installation</p> | <ul style="list-style-type: none"> <li>• Meaning of repair and maintenance</li> <li>• Types of maintenance <ul style="list-style-type: none"> <li>○ Routine</li> <li>○ Breakdown</li> <li>○ Periodic</li> <li>○ Overhaul</li> </ul> </li> <li>• Repair and replacements of faulty components</li> <li>• Maintenance procedures</li> <li>• Conducting final checks for workmanship, conformity with instructions and job requirements</li> <li>• Good housekeeping</li> <li>• Maintenance of tools</li> <li>• Storage of tools</li> <li>• Documentation and reporting</li> <li>• Relevant IEE regulations</li> </ul> | <ul style="list-style-type: none"> <li>• Direct observation □</li> <li>• Oral questioning</li> <li>• Practical tests</li> <li>• Written tests</li> </ul> |
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### Suggested Delivery Methods

- Instructor led facilitation of theory
- Demonstration by trainer

- Practical tasks by trainee
- Site visits
- On- job training
- Viewing of related videos and models
- Dual training

## **Recommended Resources**

### **Tools and Equipment**

- Pliers
- Screwdrivers □ Hammers
- Wire splicers
- Electrician knives
- Phase Testers
- Wire gauge
- Wire cutters and strippers
- Steel tapes (draw wire)
- Tape measures
- Crimping and clamping tools
- Hack saw and blades
- Soldering guns
- Multimeters
- Insulation resistance testers
- Loop impedance testers
- Earth electrode resistance testers
- Clamp on ammeters
- PPEs including gloves, helmets, overalls/dust coats, safety boots

### **Materials**

- Cables
- Earth rods/mats/spikes
- Cable lugs
- Glands
- Rubber boots
- Insulating tapes
- Strip connectors
- Earth rods/mats/spikes, clips

## **FIXING AND MAINTENANCE OF LIGHT FITTINGS, POWER OUTLETS AND BASIC APPLIANCES**

**UNIT CODE: EE/CU/ET/CR/03/3**

### **Relationship to Occupational Standards**

This unit of learning addresses the unit of competency: perform fixing of light fittings, power outlets, basic appliances repair and maintenance.

**Duration of Unit:** 400 Hours

### **Unit Description**

This unit describes the competencies required by an electrician in order to fit, mount and install wiring devices and install lighting fixtures for connection to mains power.

### **Summary of Learning Outcomes**

1. Apply workplace safety
2. Select wiring devices