



**COMPETENCY STANDARDS & ASSESSMENT GUIDE  
FOR  
ELECTRICAL INSTALLATION AND  
MAINTENANCE**

**Skills for Employment Investment Program (SEIP)  
Finance Division, Ministry of Finance**

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The Competency Standards for Electrical Installation And Maintenance is a document for the development of curricula, teaching and learning materials, and assessment tools. It also serves as the document for providing trainings consistent with the requirement of industry in order for individuals who passed through the set standard via assessment would be qualified and settled for a relevant job.

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## INTRODUCTION:

The Skills for Employment Investment Program (SEIP) Project of the Finance Division of the Ministry of Finance has embarked on a project which aims to qualitatively and quantitatively expand the skilling capacity of identified public and private training providers by establishing and operationalizing a responsive skill eco system and delivery mechanism through a combination of well-defined set of funding triggers and targeted capacity support.

Among the many components of the project, one is to promote a Market Responsive Inclusive Skills Training Delivery program. Key priority economic growth sectors identified by government have been targeted by the project to improve current job skills along with up-skilling of the existing workforce to ensure 'required skills to industry standards'. Training providers are encouraged and supported to work with the industry to address identified skills to enable industry growth and increased employment through the provision of market responsive inclusive skills training programs. Priority sectors were identified to adopt a demand driven approach to training with effective inputs from Industry Skills Councils (ISCs), Employer Associations and Employers.

This document is developed to improve skills in accordance with the job roles and skill sets of the occupation and ensure that the required skills are aligned to industry requirements.

The document details the format, sequencing, wording and layout of the Competency Standard for an occupation which comprised Units of Competence and its corresponding Elements.

## OVERVIEW:

A **Competency Standard** is a written specification of the knowledge, skills and attitudes required for the performance of a job or occupation or trade corresponding to the standard of performance required in the workplace.

Competency standard:

- provides a consistent and reliable set of components for training, recognizing and assessing people's skills, and may also have optional support materials.
- enables industry recognized qualifications to be awarded through direct assessment of workplace competencies
- encourages the development and delivery of flexible training which suits individual and industry requirements
- encourages learning and assessment in a work-related environment which leads to verifiable workplace outcomes.

Competency Standards are developed by a working group who comprised national and international process experts and the participation of experts from the industry to identify the competencies required of an occupation in a particular sector.

Competency Standards describe the skills, knowledge and attitude needed to perform effectively in the workplace. Competency Standards acknowledge that people can achieve vocational and technical competency in many ways by emphasizing what the learner can do, not how or where they learned to do it.

With Competency Standards, assessment and training may be conducted at the workplace, at training organization, during regular work, or through work experience, work placement, work simulation or any combination of these.

A Unit of Competence describes a distinct work activity that would normally be undertaken by one person in accordance with industry standards.

Units of Competence are documented in a standard format that comprises:

- Reference to Industry Sector, Occupational Title and Occupational Description
- Unit code
- Unit title
- Unit descriptor
- Unit of Competence
- Elements and performance criteria
- Variables and range statement
- Evidence guides

Together all the parts of a Unit of Competence:

- Describe a work activity
- Guide the assessor in determining whether the candidate is competent.

Identification and validation of units of competency and elements for each occupation were made by experts of various construction companies through an industry consultative workshop held at the Bangladesh Association of Construction Industry (BACI) on the 14<sup>th</sup> of February 2016. Another competency verification workshop with the participation of industry experts, trainers and the experts from BTEB was held at the SDCMU conference room on 29 August 2016 to further verify and revalidate the units of competencies, performance criteria, range of variables, learning sequence and quality of learning provision.

Profile of experts and facilitators who participated in the Competency Verification and Validation Workshop are given below.

**Competency Verification-Validation Experts/Participants (Meeting held on 29 August 2016):**

<b>Name</b>	<b>Company</b>	<b>Job Position</b>
Mr Aung Sue Prewe Marma	Ocean Electrical Ltd	General Manger
Mr. Mofizul Islam	Directorate of Technical Education	Equipment Officer
Mr. Moniruzzaman	MAWTS	Instructor
Mr. Masud Rana	MAWTS	Instructor
Dr Md. Shah Alam	BTEB	Specialist(Course Accreditation)
Dr. Md. Abul Kalam Azad	Directorate of Technical Education	Project Officer
Mr Md Fazlul Haque	BKTTC	Instructor
Mr. M. Shamsul Hoque	Shams Engineering	Managing Director
Mr. Mohd. Enamul Haque Khan	BEIOA	Coordinator(M&E)

**Workshop Facilitators:**

Mr Syed Nasir Ershad	SEIP	AEPD
Mr. Ahasan Habib	SEIP	TVET Specialist
Md. Mohiuzzaman	SEIP	Course Specialist

The ensuing sections of this document comprise a description of the respective occupation with all the key components of a Unit of Competence:

- An overview of all unit of Competence for the occupation and their corresponding duration required for completion of training.
- The Competency Standards that include the Unit of Competency, Unit Descriptor, Elements and Performance Criteria, Range of Variables, Curricular Content Guide and Assessment Evidence Guide.

# COMPETENCY PROFILE/ CHART

## for Electrical Installation And Maintenance

**UNITS OF  
COMPETENCY**

**ELEMENTS**

### Generic (Basic) Competencies

<b>Perform Computations Using Basic Mathematical Concepts</b> (SEIP-LIG-ELE-1-G)	Identify calculation requirements in the workplace.	Select appropriate mathematical methods/concepts for the calculation.	Use tool/instrument to perform calculations	
<b>Apply Occupational Health and Safety (OHS) Practices in the Workplace</b> (SEIP-LIG-ELE-2-G)	Identify OHS policies and procedures	Apply personal health and safety practices	Report hazards and risks	Respond to emergencies
<b>Communicate In English In The Workplace</b> (SEIP-LIG-ELE-3-G)	Read and understand Workplace documents in English	Write simple workplace written communications in English.	Listen and comprehend to English conversation	Perform conversations in English language
<b>Operate In a Self-Directed Team</b> (SEIP-LIG-ELE-4-G)	Identify team goals and work processes	Communicate and cooperate with team members	Work as a team member	Solve problems as a team member

### Sector Specific (Common) Competencies

<b>Interpret Technical Drawings and Manuals</b> (SEIP-LIG-ELE-1-S)	Select technical drawing.	Interpret technical drawings.	Interpret operation and maintenance manuals	
<b>Work With Electrical Hand and Power Tools</b> (SEIP-LIG-ELE-2-S)	Inspect hand tools and power tools for usability	Use hand tools properly and safely	Operate power tools properly and safely	Clean/maintain hand tools and power tools after use
<b>Carry out Precision Checks and Measurements</b> (SEIP-LIG-ELE-3-S)	Select the job to be checked and measured	Select measuring and checking tool/instrument	Obtain measurements and checks	Record/communicate measurement and check results
	Clean, maintain and store measuring instruments.			
<b>Apply Quality Systems and Procedures</b> (SEIP-LIG-ELE-4-S)	Work within quality system	Apply and monitor quality system improvement in the workplace	Hold responsible for work quality	Apply standard procedures for each job.

## Occupation Specific (Core) Competencies

<b>Perform Basic Electrical Circuit Installation</b> (SEIP-LIG-ELE-1-O)	Gather and check tools and equipment	Carry out circuit installation of an electrical load controlled from one position	Carry out circuit installation of an electrical load controlled from two positions	Carry out circuit installation of two electrical loads controlled from two positions
	Carry out circuit installation of a tube lamp	Carry out circuit installation for a doorbell from two switching positions	Carry out circuit installation for a ceiling fan	Clean/maintain the workplace
<b>Carry Out Electrical Surface Channel, Conduit and Wire Installation</b> (SEIP-LIG-ELE-2-O)	Translate electrical drawings/plans and specifications	Gather and check tools, equipment and materials	Layout the electrical circuit	Fix surface mounted channel/conduit and Electrical wire
	Clean/maintain the work place			
<b>Carry Out Electrical Fittings and Fixtures Installation</b> (SEIP-LIG-ELE-3-O)	Gather tools, equipment and electrical materials	Install electrical circuit protection components	Install electrical fittings and fixtures	Fix Electrical component holders and ceiling rose
	Clean/maintain the workplace			
<b>Carry Out Earthing/Grounding Installation</b> (SEIP-LIG-ELE-4-O)	Identify the type of earthing/ grounding cable to be used	Gather tools, equipment and earthing/grounding materials	Excavate the hole for earthing element installation	Install earthing/grounding components
	Finish earth pit chamber for pipe earthing method	Clean/maintain the work area		
<b>Perform a Service Connection</b> (SEIP-LIG-ELE-5-O)	Interpret drawings and specifications	<b>Collect tools, equipment and materials</b>	<b>Measure the distance of service line</b>	<b>Install cable for service connection</b>
	Install Energy meter	Connect energy meter and main switch	Clean/maintain the work area	
<b>Carry Out Industrial Motor Control Installation</b> (SEIP-LIG-ELE-6-O)	Identify motor control devices	Select and gather motor control devices	Classify motor control devices	Assemble motor control devices and check circuit accuracy
	Clean/maintain the workplace			

<b>Perform Servicing and Repair Of Motor Control Circuits</b> (SEIP-LIG-ELE-7-O)	Prepare tools and materials	Perform troubleshooting and diagnostics	Replace/repair faulty motor control components	Test operation of motor control circuit/system and document result
	Clean and maintain work area.			
<b>Perform Motor Rewinding and Servicing</b> (SEIP-LIG-ELE-8-O)	Identify fault of an AC motor or generator	Wind/rewind AC motor or generator	Identify fault of DC motor or generator	Wind/rewind DC motor
	Clean and maintain work area.			
<b>Install and Maintain Solar Power System</b> (SEIP-LIG-ELE-9-O)	Plan work and calculate cost	Install PV Module at a suitable place maintaining appropriate angle	Connect Solar Charge Controller with PV Module	Connect Inverter and Battery with the Charge Controller
	Perform distribution of electrical supply from the solar system	Install and commission off-grid solar PV system	Perform corrective and preventive maintenance	



## Units & Elements at Glance:

### Generic (Basic) Competencies (40 hrs.)

Code	Unit of Competency	Elements of Competency	Duration (Hours)
SEIP-LIG-ELE-1-G	Perform Computations Using Basic Mathematical Concepts	<ol style="list-style-type: none"> <li>1. Identify calculation requirements in the workplace</li> <li>2. Select appropriate mathematical methods/concepts for the calculation.</li> <li>3. Use tool/instrument to perform calculations</li> </ol>	10
SEIP-LIG-ELE-2-G	Apply Occupational Health and Safety (OHS) Practices in the Workplace	<ol style="list-style-type: none"> <li>1. Identify OHS policies and procedures</li> <li>2. Apply personal health and safety practices</li> <li>3. Report hazards and risks</li> <li>4. Respond to emergencies</li> </ol>	10
SEIP-LIG-ELE-3-G	Communicate in English in the Workplace	<ol style="list-style-type: none"> <li>1. Read and understand workplace documents in English</li> <li>2. Write simple workplace communications in English</li> <li>3. Listen and comprehend to English conversations</li> <li>4. Perform conversations in English language</li> </ol>	15
SEIP-LIG-ELE-4-G	Operate in a Self-Directed Team	<ol style="list-style-type: none"> <li>1. Identify team goals and work processes</li> <li>2. Communicate and cooperate with team members.</li> <li>3. Work as a team member.</li> <li>4. Solve problems as a team member</li> </ol>	5
<b>Total Hour</b>			<b>40</b>

## Sector Specific (Common) Competencies (35 hrs.)

Code	Unit of Competency	Elements of Competency	Duration (Hours)
SEIP-LIG-ELE-1-S	Interpret Technical Drawings and Manuals	<ol style="list-style-type: none"> <li>1. Select technical drawing</li> <li>2. Interpret technical drawings.</li> <li>3. Interpret operation &amp; maintenance manuals</li> </ol>	15
SEIP-LIG-ELE-2-S	Work with Electrical Hand and Power Tools	<ol style="list-style-type: none"> <li>1. Inspect hand tools and power tools for usability</li> <li>2. Use hand tools properly and safely</li> <li>3. Operate power tools properly and safely</li> <li>4. Clean/maintain hand tools and power tools after use</li> </ol>	10
SEIP-LIG-ELE-3-S	Carry Out Precision Checks and Measurements	<ol style="list-style-type: none"> <li>1. Select the job to be checked and measured</li> <li>2. Select measuring and checking tool/instrument</li> <li>3. Obtain measurements and checks</li> <li>4. Record/communicate measurement and check results</li> <li>5. Clean, maintain and store measuring instruments.</li> </ol>	5
SEIP-LIG-ELE-4-S	Apply Quality Systems and Procedures	<ol style="list-style-type: none"> <li>1. Work within quality system</li> <li>2. Apply and monitor quality system improvement in the workplace</li> <li>3. Hold responsible for work quality</li> <li>4. Apply standard procedures for each job.</li> </ol>	5
Total Hours			<b>35</b>

## Occupation Specific (Core) Competencies (285 hrs.)

Code	Unit of Competency	Elements of Competency	Guided Learning Hours
SEIP-LIG-ELE-1-O	Perform Electrical Installation Basic Circuit	<ol style="list-style-type: none"> <li>1. Gather and check tools and equipment</li> <li>2. Carry out circuit installation of an electrical load controlled from one position</li> <li>3. Carry out circuit installation of an electrical load controlled from two positions</li> <li>4. Carry out circuit installation of two electrical loads controlled from two positions</li> <li>5. Carry out circuit installation of a tube lamp</li> <li>6. Carry out circuit installation for a door bell from two switching positions</li> <li>7. Carry out circuit installation for a ceiling fan</li> <li>8. Clean/maintain the workplace</li> </ol>	30
SEIP-LIG-ELE-2-O	Carry Out Electrical Surface Channel, Conduit and Wire Installation	<ol style="list-style-type: none"> <li>1. Translate electrical drawings/plans and specifications</li> <li>2. Gather and check tools, equipment and materials</li> <li>3. Layout the electrical circuit</li> <li>4. Fix surface mounted channel/conduit and Electrical wire</li> <li>5. Clean/maintain the work place</li> </ol>	55
SEIP-LIG-ELE-3-O	Carry Out Electrical Fittings and Fixtures Installation	<ol style="list-style-type: none"> <li>1. Gather tools, equipment and electrical materials</li> <li>2. Install electrical circuit protection components</li> <li>3. Install electrical fittings and fixtures</li> <li>4. Fix Electrical component holders and ceiling rose</li> <li>5. Clean/maintain the workplace</li> </ol>	25

SEIP-LIG-ELE-4-O	Carry Out Earthing/Grounding Installation	<ol style="list-style-type: none"> <li>1. Identify the type of earthing/grounding cable to be used</li> <li>2. Gather tools, equipment and earthing/grounding materials</li> <li>3. Excavate the hole for earthing element installation</li> <li>4. Install earthing/grounding components</li> <li>5. Finish earth pit chamber for pipe earthing method</li> <li>6. Clean/maintain the work area</li> </ol>	15
SEIP-LIG-ELE-5-O	Perform a service connection	<ol style="list-style-type: none"> <li>1. Interpret drawings and specifications</li> <li>2. Collect tools, equipment and materials</li> <li>3. Measure the distance of service line</li> <li>4. Install cable for service connection</li> <li>5. Install energy meter</li> <li>6. Connect energy meter and main switch</li> <li>7. Clean the work place</li> </ol>	10
SEIP-LIG-ELE-6-O	Carry Out Industrial Motor Control Installation	<ol style="list-style-type: none"> <li>1. Identify motor control devices</li> <li>2. Select and gather motor control devices</li> <li>3. Classify motor control devices</li> <li>4. Assemble motor control devices and check circuit accuracy</li> <li>5. Clean/maintain the workplace</li> </ol>	30
SEIP-LIG-ELE-7-O	Perform Servicing and Repair of Motor Control Circuits	<ol style="list-style-type: none"> <li>1. Prepare tools and materials</li> <li>2. Perform troubleshooting and diagnostics</li> <li>3. Replace/repair faulty motor control components</li> <li>4. Test operation of motor control circuit/system and document result</li> <li>5. Clean and maintain work area.</li> </ol>	45
SEIP-LIG-ELE-8-O	Perform Rewinding Motor and Servicing	<ol style="list-style-type: none"> <li>1. Identify fault of an AC motor or generator</li> <li>2. Wind/rewind AC motor or generator</li> <li>3. Identify fault of DC motor or generator</li> <li>4. Wind/rewind DC motor</li> </ol>	55

		5. Clean and maintain work area.	
SEIP-LIG-ELE-9-O	Install and Repair of Solar Power System	<ol style="list-style-type: none"> <li>1. Plan work and calculate cost</li> <li>2. Install PV Module at a suitable place maintaining appropriate angle</li> <li>3. Connect Solar Charge Controller with PV Module</li> <li>4. Connect Inverter and Battery with the Charge Controller</li> <li>5. Perform distribution of electrical supply from the solar system</li> <li>6. Install and commission off-grid solar PV system</li> <li>7. Perform corrective and preventive maintenance</li> </ol>	20
<b>Total Hours</b>			<b>285</b>

## COMPETENCY STANDARD: ELECTRICAL INSTALLATION AND MAINTENANCE

### A: The Generic (Basic Competencies)

<b>Unit of Competency:</b> <b>PERFORM COMPUTATIONS USING BASIC MATHEMATICAL CONCEPTS</b>	<b>Nominal Duration:</b> 10 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-1-G
<b>Unit Descriptor:</b> This unit of competency requires the knowledge, skills and attitude to perform computations using basic mathematical concepts in the workplace. It specifically includes the tasks of identifying calculation requirements in the workplace, selecting appropriate mathematical method/concept for the calculation and using appropriate instruments tools to carry out calculation.		

#### Elements and Performance Criteria:

(Terms in the performance criteria that are written in **bold and underlined** are elaborated in the range of variables).

Elements of Competency	Performance Criteria
1. Identify calculation requirements in the workplace	1.1 <b><u>Calculation requirements</u></b> are identified from <b><u>workplace information</u></b>
2. Select appropriate mathematical methods/concepts for the calculation.	2.1 <b><u>Appropriate method</u></b> is selected to carry out the calculation requirements
3. Use tool/instrument to perform calculations	3.1 Calculations are completed using appropriate <b><u>tools and instruments</u></b>

#### Range of variables:

Variable	Range
	May include but not limited to:
1. Calculation requirements.	1.1 Area 1.2 Height 1.3 Length/Breadth/thickness 1.4 Diameter 1.5 Weight 1.6 Radius 1.7 Time 1.8 Temperature 1.9 Material usage 1.10 Measurement of wire diameter 1.11 Costing calculation of cables 1.12 Calculation of KWH 1.13 Conversion of inches to cm
2. Workplace information	2.1 Electrical Drawing 2.2 Circuit Diagram 2.3 Verbal instructions

	2.4 Job order
3. Appropriate method	3.1 Addition 3.2 Subtraction 3.3 Division 3.4 Multiplication 3.5 Conversion 3.6 Percentage and ratio calculation 3.7 Simple equation
4. Tools/instruments	4.1 Calculator 4.2 Computer

### Curricular Content Guide

1. Underpinning Knowledge	1.1 Numerical concept 1.2 Basic mathematical methods such as addition, subtraction, multiplication and division and percentage. 1.3 Mathematical language, symbols and terminology. 1.4 Measuring units
2. Underpinning Skills	2.1 Adding numbers 2.2 Subtracting numbers 2.3 Multiplying numbers. 2.4 Dividing numbers. 2.5 Using symbols, terminology and technology. 2.6 Measuring wire diameter 2.7 Converting horse power(hp) to kw and kw to hp
3. Underpinning Attitudes	3.1 Commitment to occupational safety and health 3.2 Promptness in carrying out activities. 3.3 Tidiness and timeliness. 3.4 Respect to peers, sub-ordinates and seniors in workplace. 3.5 Environmental concern. 3.6 Sincerity and honesty
4. Resource Implications	The following resources must be provided. 4.1 Stationeries 4.2 Consumables 4.3 Calculators 4.4 Computers 4.5 Measuring tape

## Assessment Evidence Guide

1. Critical Aspects of Competency	Assessment required evidence that the candidate: 1.1 Identified calculation requirements from workplace information 1.2 Selected appropriate method to carry out the calculation requirements 1.3 Completed calculations using appropriate tools/instruments
2. Methods of Assessment	Methods of assessment may include but not limited to: 2.1 Written test 2.2 Oral questions 2.3 Demonstration.
5. Context of Assessment	3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.



<b>Unit of Competency:</b> <b>APPLY OCCUPATIONAL HEALTH AND SAFETY (OHS) PRACTICES IN THE WORKPLACE</b>	<b>Nominal Duration:</b> 10 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-2-G
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required to apply occupational health and safety (OH&S) practices in workplace. It specifically includes the tasks of identifying OHS policies and procedures, applying personal health and safety practices, reporting hazards and risks and responding to emergencies.		

### Elements and Performance Criteria:

(Terms in the performance criteria that are written in **bold and underlined** are elaborated in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Identify OHS policies and procedures	1.1 <b><u>OHS policies</u></b> and safe operating procedures are read and understood. 1.2 Safety signs and symbols are identified and followed 1.3 Emergency response, evacuation procedures and other contingency measures are determined.
2. Apply personal health and safety practices	2.1 OHS policies and procedures are followed and practiced 2.2 <b><u>Personal Protective Equipment (PPE)</u></b> is selected and used 2.3 Personal hygiene is maintained
3. Report hazards and risks	3.1 <b><u>Hazards and risks</u></b> are identified, assessed and controlled. 3.2 Incidents arising from hazards and risks are reported to authority 3.3 Corrective actions are implemented to correct unsafe conditions in the workplace
4. Respond to emergencies	4.1 Alarms and warning devices are responded 4.2 <b><u>Emergency response plans and procedures</u></b> are implemented 4.3 <b><u>First aid procedure</u></b> is applied during emergency situations

### Range of Variables

<b>Variable</b>	<b>Range</b>
1. OHS policies	May include but not limited to: 1.1 International OHS requirements 1.2 Bangladesh standards for OHS 1.3 Building Code 1.4 Fire Safety Rules and Regulations 1.5 Industry Guidelines
2. Personal Protective Equipment (PPE)	2.1 Apron 2.2 Gas Mask 2.3 Gloves 2.4 Safety shoes 2.5 Helmet

	<ul style="list-style-type: none"> <li>2.6 Face mask</li> <li>2.7 Overalls</li> <li>2.8 Goggles and safety glasses</li> <li>2.9 Ear plugs</li> <li>2.10 Sun block</li> <li>2.11 Chemical/Gas masks</li> </ul>
3. Hazards and risks	<ul style="list-style-type: none"> <li>3.1 Chemical hazards.</li> <li>3.2 Biological hazards.</li> <li>3.3 Physical Hazards. <ul style="list-style-type: none"> <li>3.3.1 Machine hazards.</li> <li>3.3.2 Materials hazards.</li> <li>3.3.3 Tools and Equipment hazards.</li> </ul> </li> </ul>
4. Emergency response plans and procedures	<ul style="list-style-type: none"> <li>4.1 Firefighting procedures</li> <li>4.2 Earthquake response procedures</li> <li>4.3 Evacuation procedures</li> <li>4.4 Medical and first aid</li> </ul>
5. First aid procedure	<ul style="list-style-type: none"> <li>5.1 Washing of open wound</li> <li>5.2 Washing chemically infected area</li> <li>5.3 Applying bandage</li> <li>5.4 Tourniquet</li> <li>5.5 Applying CPR (Cardiopulmonary Resuscitation)</li> <li>5.6 Taking appropriate medicine</li> </ul>

**Curricular Evidence Guide:**

1. Underpinning Knowledge	<ul style="list-style-type: none"> <li>1.1 OHS workplace policies and procedures.</li> <li>1.2 Work safety procedures.</li> <li>1.3 Emergency procedures. <ul style="list-style-type: none"> <li>1.3.1 Firefighting.</li> <li>1.3.2 Earthquake response.</li> <li>1.3.3 Explosion response.</li> <li>1.3.4 Accident response.</li> </ul> </li> <li>1.4 Types of (biological, chemical and physical) and their effects.</li> <li>1.5 PPE types and uses.</li> <li>1.6 Personal hygiene practices.</li> <li>1.7 OHS awareness.</li> </ul>
2. Underpinning Skills	<ul style="list-style-type: none"> <li>2.1 Identifying OHS policies and procedures</li> <li>2.2 Following personal work safety practices</li> <li>2.3 Reporting hazards and risks</li> <li>2.4 Responding to emergency procedures</li> <li>2.5 Maintaining physical well-being in the workplace</li> <li>2.6 Performing first aids.</li> <li>2.7 Performing basic firefighting accessories using fire extinguishers</li> <li>2.8 Applying basic first aid procedures</li> </ul>
3. Underpinning Attitudes	<ul style="list-style-type: none"> <li>3.1 Commitment to occupational safety and health</li> <li>3.2 Communication with peers, sub-ordinates and seniors in workplace.</li> <li>3.3 Promptness in carrying out activities.</li> </ul>

	<p>3.4 Tidiness and timeliness.</p> <p>3.5 Respect of peers, sub-ordinates and seniors in workplace.</p> <p>3.6 Environmental concern.</p> <p>3.7 Sincere and honest to duties</p>
4. Resource Implications	<p>4.1 Workplace (simulated or actual)</p> <p>4.2 PPEs</p> <p>4.3 Firefighting equipment</p> <p>4.4 Emergency response manual</p> <p>4.5 First aid kits</p>

**Assessment Evidence Guide:**

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <p>1.1 Followed OHS policies and procedures</p> <p>1.2 Selected and used personal protective equipment (PPE)</p> <p>1.3 Reported incidents arising from hazards and risks to authority</p> <p>1.4 Emergency response plans and procedures are implemented</p> <p>1.5 Applied basic first aide procedure</p>
2. Methods of Assessment	<p>Methods of assessment may include but not limited to:</p> <p>2.1 Written test</p> <p>2.2 Demonstration.</p> <p>2.3 Oral questions</p>
3. Context of Assessment	<p>3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.</p>

<b>Unit of Competency:</b> <b>COMMUNICATE IN ENGLISH IN THE WORKPLACE</b>	<b>Nominal Duration:</b> 15 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-3-G
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required to apply English communication in the workplace. It specifically includes work tasks of reading and understanding workplace documents in English, writing simple workplace written communications in English, listening and comprehending to English conversations and performing conversations in English.		

### Elements and Performance Criteria:

(Terms in the performance criteria that are written in **bold and underlined** are elaborated in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Read and understand workplace documents in English	1.1 Workplace documents are read and understood 1.2 Visual information is interpreted.
2. Write simple workplace communications in English	2.1 Simple <b><u>routine workplace documents</u></b> are prepared using key words, phrases, simple sentences and <b><u>visual aids</u></b> are prepared 2.2 Key information is written in the appropriate places in standard forms.
3. Listen and comprehend to English conversations	3.1 Active listening is demonstrated.
4. Perform conversations in English language	4.1 Conversation is performed in English with peers, customers and management to the required workplace standard.

### Range of Variables

<b>Variable</b>	<b>Range</b>
	May Include but not limited to:
1. Routine workplace documents	1.1 Agenda 1.2 Simple reports such as progress and incident reports 1.3 Job sheets 1.4 Operational manuals 1.5 Brochures and promotional material 1.6 Visual and graphic materials 1.7 Standards 1.8 OSH information 1.9 Signs
2. Visual aids	2.1 Maps 2.2 Diagrams 2.3 Symbols(electrical and electronic) 2.4 Circuit Diagram 2.5 Graphs 2.6 Charts

### Curricular Evidence Guide:

1. Underpinning Knowledge	1.1 Read workplace documents in English
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	<p>1.2 Write simple routine workplace documents in English</p> <p>1.3 Listen and understand conversation in English.</p> <p>1.4 Perform conversation in English.</p> <p>1.5 Interaction skills (i.e., teamwork, interpersonal skills, etc.).</p> <p>1.6 Job roles, responsibilities and compliances.</p>
2. Underpinning Skills	<p>2.1 Ability to read and understand workplace documents in English by using appropriate vocabulary and grammar, standard spelling and punctuation</p> <p>2.2 Ability to write simple routine workplace documents in English such as: Schedules and agenda, job sheets, operational manuals and brochures and promotional material.</p> <p>2.3 Ability of listening in English and interpreting</p> <p>2.4 Ability to perform conversation in English with peers, customers and management to the required workplace standard.</p> <p>2.5 Work effectively with others.</p> <p>2.5.1 Listening and questioning skills</p> <p>2.5.2 Ability to follow simple directions</p>
3. Underpinning Attitudes	<p>3.1 Commitment to occupational safety and health</p> <p>3.2 Promptness in carrying out activities.</p> <p>3.3 Tidiness and timeliness.</p> <p>3.4 Respect of peers, sub-ordinates and seniors in workplace.</p> <p>3.5 Environmental concern.</p> <p>3.6 Sincere and honest to duties.</p>
4. Resource Implications	<p>The following resources must be provided:</p> <p>4.1 Work place Procedure</p> <p>4.2 Materials relevant to the proposed activity</p> <p>4.3 All tools, equipment, material and documentation required.</p> <p>4.4 Relevant specifications or work instructions</p>

### Assessment Evidence Guide:

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <p>1.1 Converse in English with peers and customers</p> <p>1.2 Made reports of workplace documents in English</p>
2. Methods of Assessment	<p>Methods of assessment may include but not limited to:</p> <p>2.1 Written test</p> <p>2.2 Demonstration</p> <p>2.3 Oral questions.</p>
3. Context of Assessment	<p>3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.</p>

<b>Unit of Competency:</b> <b>OPERATE IN A SELF-DIRECTED TEAM</b>	<b>Nominal Duration:</b> 5 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-4-G
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required to work as a team member. It specifically includes identifying team goals, work processes of team members, communicating and cooperating with team members, working and solving problems as a team member.		

### Elements and Performance Criteria:

(Terms in the performance criteria that are written in **bold and underlined** are elaborated in the range of variables).

Elements of Competency	Performance Criteria
1. Identify team goals and work processes	1.1 Team goals and collaborative decision making processes are identified. 1.2 Roles and responsibilities of team members are identified 1.3 Relationships within team and with other workers are identified
2. Communicate and cooperate with team members.	2.1 Effective interpersonal skills are used to interact with team members and to contribute to activities and objectives 2.2 Formal and informal <b><u>forms of communication</u></b> are used effectively to support team achievement. 2.3 Diversity is respected and valued in team functioning. 2.4 Views and opinions of other team members are understood and valued. 2.5 Workplace terminology is used correctly
3. Work as a team member.	3.1 Duties, responsibilities, authorities, objectives and task requirements are identified and clarified 3.2 Tasks are performed in accordance with workplace procedures. 3.3 Team member's support with other members are made to ensure achieving goals 3.4 Agreed reporting lines are followed using standard operating procedure.
4. Solve problems as a team member	4.1 Current and potential problems faced by team are identified 4.2 A solution to the problem is identified 4.3 Problems are solved effectively and the outcome of the implemented solution is evaluated

### Range of Variables

Variable	Range
1. Forms of communication	May Include but not limited to: 1.1 Agenda 1.2 Simple reports such as progress and incident reports. 1.3 Job sheets. 1.4 Operational manuals.

	1.5 Brochures and promotional material. 1.6 Visual and graphic materials. 1.7 Standards. 1.8 OSH information. 1.9 Signs.
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**Curricular Evidence Guide:**

1. Underpinning Knowledge	1.1 Team goals and collaborative decision making processes 1.2 Roles and responsibilities of team members 1.3 Relationships within team and with other workers 1.4 Effective interpersonal skills to interact with team members 1.5 Effective formal and informal forms of communication 1.6 Value of diversity in team functioning. 1.7 Correct use of workplace terminology 1.8 Team's duties, responsibilities, authorities, objectives and task requirements 1.9 Support mechanism to other members of team to ensure achievements of goals. 1.10 Methods of identifying current and potential problems faced by a team 1.11 Effectively problems solving methods and evaluation of outcomes
2. Underpinning Skills	2.1 Identifying team goals and collaborative decision making processes 2.2 Identifying roles and responsibilities of team members 2.3 Identifying relationships within team and with other workers 2.4 Using effective interpersonal skills to interact with team members and to contribute to activities and objectives 2.5 Using formal and informal forms of communication 2.6 Understanding and valuing views and opinions of other team members 2.7 Performing tasks in accordance with organizational and team requirements, specifications and workplace procedures. 2.8 Supporting other members of the team to ensure team achieves goals, awareness and requirements. 2.9 Identifying current and potential problems faced by the team 2.10 Identifying solutions to the problem 2.11 Solving problems effectively and evaluating the outcome of the implemented solution
3. Underpinning Attitudes	3.1 Teamwork 3.2 Promptness in carrying out activities. 3.3 Tidiness and timeliness. 3.4 Respect of peers, sub-ordinates and seniors in workplace. 3.5 Sincere and honest to duties

4. Resource Implications	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> <li>4.1 Workplace (simulated or actual)</li> <li>4.2 Pens</li> <li>4.3 Papers</li> <li>4.4 Work books</li> <li>4.5 Learning manuals</li> </ul>
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**Assessment Evidence Guide:**

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Identified team goals and work processes</li> <li>1.2 Communicated and cooperated with team members.</li> <li>1.3 Worked as a team member</li> <li>1.4 Solved problems as a team member</li> </ul>
2. Methods of Assessment	<p>Methods of assessment may include but not limited to:</p> <ul style="list-style-type: none"> <li>2.1 Written test</li> <li>2.2 Demonstration</li> <li>2.3 Oral questions</li> </ul>
3. Context of Assessment	<p>3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.</p>



## B: The Sector Specific (Common) Competencies

<b>Unit of Competency:</b> <b>INTERPRET TECHNICAL DRAWINGS AND MANUALS</b>	<b>Nominal Duration:</b> 15 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-1-S
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required of a worker to translate technical drawings and plans. It specifically includes the tasks of selecting technical drawing, interpreting technical drawings and storing manuals, designs and plans.		

### Elements and Performance Criteria:

(Terms in the performance criteria that are written in **bold and underlined** are elaborated in the range of variables).

Elements of Competency	Performance Criteria
1. Select electrical drawing	1.1 <b><u>Electrical Drawing</u></b> is selected and checked to ensure that it conforms to the job requirements. 1.2 Drawing is validated.
2. Interpret Electrical drawings.	2.1 Drawing components are identified 2.2 Power, voltage and current ratings are identified according to job requirement 2.3 <b><u>Instructions</u></b> are identified and followed accurately. 2.4 <b><u>Technical specifications</u></b> are interpreted 2.5 Symbols in drawing are interpreted.
3. Interpret operation & maintenance manuals	3.1 Operation and maintenance manuals are collected and interpreted 3.2 Operation and maintenance manuals are followed when operating and maintaining lathe machine

### Range of Variables

Variable	Range
	May Include but not limited to:
1. Electrical Drawing	1.1 Circuit diagram 1.2 Symbols of cables, socket, switch, motor, connectors etc 1.3 Manuals
2. Instructions	2.1 Note 2.2 Instruction 2.3 Special instruction 2.4 Precaution
3. Specifications	3.1 Component specifications 3.2 Motor specifications 3.3 Material specifications

### Curricular Evidence Guide:

1. Underpinning Knowledge	<ul style="list-style-type: none"> <li>1.1 Electrical drawing interpretation</li> <li>1.2 Sequence of drawing</li> <li>1.3 Methods of checking and applying drawing for work</li> <li>1.4 Drawing selection and checking method to ensure conformity to the job requirements.</li> <li>1.5 Symbols of components</li> <li>1.6 Identification of component specifications</li> <li>1.7 Procedure of checking clearances/tolerances</li> <li>1.8 Work instructions</li> <li>1.9 Component specifications</li> <li>1.10 Component symbols interpretation</li> <li>1.11 Use of operation and maintenance manuals</li> </ul>
2. Underpinning Skills	<ul style="list-style-type: none"> <li>2.1 Practicing workplace safety</li> <li>2.2 Interpreting drawing, following operation and maintenance manuals,</li> <li>2.3 Performing jobs in accordance with the drawing</li> <li>2.4 Performing calculation as per circuit diagram</li> <li>2.5 Selecting and checking of drawing to ensure conformity to the job requirements.</li> <li>2.6 Identifying electrical components</li> <li>2.7 Identifying component specifications according to circuit diagram</li> </ul>
3. Underpinning Attitudes	<ul style="list-style-type: none"> <li>3.1 Care in the use of drawings/manuals</li> <li>3.2 Communication with peers, sub-ordinates and seniors in workplace.</li> <li>3.3 Promptness in carrying out activities.</li> <li>3.4 Tidiness and timeliness.</li> <li>3.5 Respect of peers, sub-ordinates and seniors in workplace.</li> <li>3.6 Sincere and honest to duties.</li> </ul>
4. Resource Implications	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> <li>4.1 Workplace (simulated or actual)</li> <li>4.2 Relevant drawing/manuals</li> <li>4.3 Pens</li> <li>4.4 Papers</li> <li>4.5 Work books</li> <li>4.6 Learning manuals</li> </ul>

### Assessment Evidence Guide:

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Identified and measured line voltage according to job requirement</li> <li>1.2 Maintained safety precaution to workplace requirement.</li> <li>1.3 Interpreted symbols of electrical components</li> <li>1.4 Interpreted operation &amp; maintenance manuals</li> </ul>
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2. Methods of Assessment	Competency should be assessed by: 2.1 Written examination 2.2 Demonstration 2.3 Oral Interview 2.4 Workplace observation 2.5 Portfolio
3. Context of Assessment	3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.

<b>Unit of Competency:</b> <b>WORK WITH HAND AND POWER TOOLS</b>	<b>Nominal Duration:</b> 10 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-2-S
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required to work with hand and power tools. It specifically includes the tasks of inspecting hand tools and power tools for usability, using hand tools properly and safely, operating power tools properly and safely and cleaning/maintaining hand tools and power tools after use.		

### Elements and Performance Criteria:

(Terms in the performance criteria that are written in **bold and underlined** are elaborated in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Inspect tools and power tools for usability	1.1 Appropriate tools are selected 1.2 Application of tools to job requirement is determined 1.3 Usability of tools are checked and verified 1.4 <b><u>Tools</u></b> and <b><u>power tools</u></b> are prepared. 1.5 Sources of power supply for power tools are identified
2. Use hand tools properly and safely	2.1 Appropriate hand tool for the job is used 2.2 Proper and safe use/operation is applied in the different types of hand tools 2.3 <b><u>Safety precautions</u></b> is observed when using hand tools 2.4 Unsafe or faulty tools are identified and marked for repair
3. Operate power tools properly and safely	3.1 Power supply outlet and electrical cord are inspected and confirmed safe for use in accordance with established workplace safety requirements. 3.2 Proper sequence of operation is applied in using power tools to produce results. 3.3 Power tools are used safely in accordance to manufacturer's operating specification.
4. Clean/maintain hand tools and power tools after use	4.1 Dust and foreign matters are removed from power tools in accordance to workplace standard. 4.2 Condition of tools is checked after use 4.3 Appropriate lubricant is applied after use and prior to storage 4.4 <b><u>Measuring tools</u></b> are checked and calibrated. 4.5 Defective tools, instruments, power tools and accessories are inspected and corrected or replaced

### Range of Variables

<b>Variable</b>	<b>Range</b>	
	May include but not limited to:	
1. Tools	1.1 Ball peen hammer. 1.2 Mallet/soft hammer. 1.3 Bench vise. 1.4 Chisels. 1.5 Wrenches. 1.6 Pliers. 1.7 Scriber.	1.12 Drill bits 1.13 Sockets 1.14 Spanners 1.15 Vice grip 1.16 Wire Cutters 1.17 Hand drill machine. 1.18 Hand grinding machine.

	1.8 Scraper. 1.9 Screw drivers. 1.10 Dividers. 1.11 Hacksaw	1.19 Pedestal drill. 1.20 Powered screw driver. 1.21 Soldering iron. 1.22 Allen wrenches.
2. Power tools	2.1 Power drills 2.2 Power rivet gun. 2.3 Hand grinders 2.4 Pneumatic wrenches 2.5 Press machine 2.6 Jack hammer	2.7 Planers 2.8 Pedestal drills
3. Safety precautions	3.1 Use of appropriate PPEs. 3.2 Proper hand, feet and eye coordination 3.3 Safe condition of electrical outlets, cords and lamps 3.4 Working environment 3.5 Safe operating condition of hand tools and power tools. 3.6 Awareness to OHS requirements	
4. Measuring instruments	4.1 AVO meter 4.2 Wattmeter 4.3 Clip on Ammeter 4.4 Ampere meter 4.5 Volt meter 4.6 Earth tester 4.7 Measuring tape 4.8 Steel rule 4.9 Meter rule	

### Curricular Evidence Guide:

1. Underpinning Knowledge	1.1 Types of tools, functions and use 1.2 Types of Hand tools and their proper use and techniques 1.3 Types of Power tools, use and safe handling method 1.4 Technical application of tools 1.5 Procedures in the use of hand tools and power tools 1.6 Policies and procedures for occupational health and safety 1.7 Use of PPE 1.8 Handling of tools and equipment 1.9 Reporting and documentation 1.10 Preventive maintenance 1.11 Methods and techniques 1.12 Quality procedures 1.13 Storage procedures
2. Underpinning Skills	2.1 Using appropriate hand tool for the job. 2.2 Observing safety precautions when using hand tools. 2.3 Using power tools correctly and safely in accordance to manufacturer's operating specification. 2.4 Checking condition of tools after use. 2.5 Applying appropriate lubricant on hand tools and power tools after use and prior to storage.

	<p>2.6 Inspecting and correcting or replacing defective tools, instruments, power tools and accessories.</p> <p>2.7 Storing Tools and power tools safely in appropriate location.</p>
3. Underpinning Attitudes	<p>3.1 Commitment to occupational safety and health</p> <p>3.2 Communication with peers, sub-ordinates and seniors in workplace. Promptness in carrying out activities.</p> <p>3.3 Tidiness and timeliness.</p> <p>3.4 Respect of peers, sub-ordinates and seniors in workplace.</p> <p>3.5 Environmental concern.</p> <p>3.6 Sincere and honest to duties.</p>
4. Resource Implications	<p>4.1 Workplace (simulated or actual)</p> <p>4.2 Different types of hand tools and power tools</p> <p>4.3 Pens</p> <p>4.4 Papers</p> <p>4.5 Work books</p> <p>4.6 Tools and power tools and maintenance manuals</p>

#### Assessment Evidence Guide:

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <p>1.1 Using appropriate hand tool for the job.</p> <p>1.2 Observing safety precautions when using hand tools.</p> <p>1.3 Used power tools safely in accordance to manufacturer's operating specification.</p> <p>1.4 Checking the condition of tools after use.</p> <p>1.5 Applying appropriate lubricant on hand tools and power tools after use and prior to storage.</p> <p>1.6 Inspecting and corrected or replaced defective tools, instruments, power tools and accessories.</p> <p>1.7 Storing tools and power tools safely in appropriate location.</p>
2. Methods of Assessment	<p>Competency should be assessed by:</p> <p>2.1 Written examination</p> <p>2.2 Demonstration</p> <p>2.3 Oral Interview</p> <p>2.4 Workplace observation</p> <p>2.5 Portfolio</p>
3. Context of Assessment	<p>3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.</p>

<b>Unit of Competency:</b> <b>CARRY OUT PRECISION CHECKS AND MEASUREMENTS</b>	<b>Nominal Duration:</b> 5 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-3-S
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required to use graduated measuring instrument in the workplace. It specifically includes the tasks of selecting the job to be measured, selecting graduated measuring instrument, obtaining measurements, recording and communicating measurements, cleaning, maintaining and storing measuring instruments.		

**Elements and Performance Criteria:**

(Terms in the performance criteria that are written in **bold and underlined** are elaborated in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Select the job/ component to be checked and measured	1.1 Job/ Electrical component/device is selected for measuring and checking 1.2 Required <b><u>specifications/ power, voltage and current ratings</u></b> are determined in accordance with electrical drawing 1.3 Required physical condition is identified in accordance with drawing/plan 1.4 Required <b><u>specifications</u></b> is identified in accordance with drawing/plan 1.5 Job drawing is used to select the measuring instruments.
2. Select measuring instrument	2.1 Appropriate measuring instruments is selected in accordance with job requirement. 2.2 <b><u>Measuring instruments</u></b> are identified and checked 2.3 Applications of measuring device is determined. 2.4 Usability and accuracy of measuring device is checked and verified. 2.5 Measuring device is prepared for measurement. 2.6 Fits, Tolerance, clearance and limits are identified according to job requirements.
3. Obtain measurements and checks	3.1 Measurements are obtained using appropriate measuring instrument. 3.2 <b><u>Systems of measurements</u></b> are identified and converted where necessary. 3.3 Measurement is kept accurately in accordance to specification/power ratings 3.4 Measurement is checked against job requirement 3.5 Physical conditions are checked in accordance with job requirements
4. Record/communicate measurement and check results	4.1 Measurements of voltage, current and power ratings are recorded in accordance with workplace procedure 4.2 Measurements are interpreted, recorded and communicated to authority
5. Clean, maintain and store measuring instruments.	5.1 Dust and dirt are removed from the measuring instruments 5.2 Condition of measuring instruments are checked 5.3 Measuring instruments are checked and calibrated 5.4 Measuring instruments are stored in accordance with workplace procedure.

### Range of Variables

Variable	Range
1. Specifications/ ratings	May include but not limited to: 1.1 Voltage 1.2 Current 1.3 Power- KW/hp 1.4 KWH 1.5 Area measurement for cables/wire( SWG, mm2)
2. Specifications	2.1 Ampere 2.2 Volt, 2.3 Ohms 2.4 Watt 2.5 Microfarad 2.6 Henry 2.7 Milliampere etc
3. Measuring instruments.	3.1 AVO meter (analogue/digital) 3.2 Watt meter 3.3 Ampere meter 3.4 Earth- Tester 3.5 Megger 3.6 Voltmeter 3.7 Tachometer
4. Systems of measurements	4.1 ISO standard 4.2 English system(FPS system) 4.3 Metric system

### Curricular Content Guide

1. Underpinning Knowledge	1.1 Difference between measuring and checking 1.2 Types of measuring instruments and their applications 1.3 Types of checking tools and their applications 1.4 Specifications, ratings of instruments 1.5 Method, procedure and techniques when taking Measurements 1.6 Methods, procedures and techniques when checking physical conditions of electrical components and devices 1.7 Methods, procedures and techniques when Checking cables and electrical wire 1.8 Conversion systems of voltage, current and power 1.9 Preventive maintenance for measuring instruments and checking tools 1.10 Calibration and adjustment procedures for measuring instruments and checking tools
2. Underpinning Skills	2.1 Determining required specifications of the components, physical conditions and power ratings in accordance with electrical drawing 2.2 Checking physical conditions using appropriate checking



	<p>tool</p> <p>2.3 Identifying specifications and converting current, voltage and power ratings, for example ampere to milli-ampere, kilovolt to volt, kW to watt etc.</p> <p>2.4 Measuring specifications and ratings of the components and cables etc in accordance with the drawing</p> <p>2.5 Interpreting and communicating measurement, specifications and power ratings</p> <p>2.6 Checking condition of measuring instruments, calibrating and storing in accordance with workplace procedure</p>
3. Underpinning Attitudes	<p>3.1 Commitment to occupational safety and health</p> <p>3.2 Communication with peers, sub-ordinates and seniors in workplace.</p> <p>3.3 Promptness in carrying out activities.</p> <p>3.4 Tidiness and timeliness.</p> <p>3.5 Respect of peers, sub-ordinates and seniors in workplace.</p> <p>3.6 Environmental concern.</p> <p>3.7 Sincere and honest to duties.</p>
4. Resource Implications	<p>4.1 Workplace (simulated or actual)</p> <p>4.2 Different types of measuring instruments and devices</p> <p>4.3 Pens</p> <p>4.4 Papers</p> <p>4.5 Work books</p> <p>4.6 Measuring instruments and maintenance manual.</p>

### Assessment Evidence Guide

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <p>1.1 Determined required specifications, power, voltage and current ratings of the electrical components and devices and physical conditions in accordance with electrical drawing/plan</p> <p>1.2 Checked and measured electrical system using appropriate checking instrument</p>
2. Methods of Assessment	<p>Competency should be assessed by:</p> <p>2.1 Written examination</p> <p>2.2 Demonstration</p> <p>2.3 Oral Interview</p> <p>2.4 Workplace observation</p> <p>2.5 Portfolio</p>
3. Context of Assessment	<p>3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.</p>

<b>Unit of Competency:</b> <b>APPLY QUALITY SYSTEMS AND PROCEDURES</b>	<b>Nominal Duration:</b> 5 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-4-S
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required to apply quality systems and procedures. It specifically includes the tasks of working within quality system, applying and monitoring quality system improvement in the workplace, holding responsibility for quality work and applying standard procedures for each job.		

### Elements and Performance Criteria:

(Terms in the performance criteria that are written in **bold and underlined** are elaborated in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Work within quality system	1.1 Instructions and procedures are followed strictly and duties are performed in accordance with demand of <b><u>quality improvement system.</u></b> 1.2 Conformance to specifications is ensured. 1.3 Defects are detected and reported to authority according to standard operating procedures. 1.4 Customer's satisfaction is ensured in performing an operation or quality of product or services.
2. Apply and monitor quality system improvement in the workplace	2.1 Performance measurement systems are identified 2.2 Performance is assessed at regular interval. 2.3 Specifications and standard operating procedures are established and identified. 2.4 Defects are detected and reported according to standard operating procedures. 2.5 Process improvement procedures are applied 2.6 Quality of product is checked and verified.
3. Hold responsible for work quality	3.1 Concept of supplying product or service to meet the <b><u>customer quality requirements</u></b> is understood and accordingly applied. 3.2 Responsibility is taken for quality work.
4. Apply standard procedures for each job.	4.1 <b><u>Quality control and quality assurance</u></b> system procedures for each job are followed. 4.2 Conformance to specification is ensured in every case at all situations.

### Range of Variables

<b>Variable</b>	<b>Range</b>
	May include but not limited to:
1. Quality improvement system	A system comprising some or all of the following elements: 1.1 Quality inspection 1.2 Quality control. 1.3 Quality improvement. 1.4 Quality assurance
2. Customer quality requirements.	2.1 Appropriateness of product 2.2 Appearance

	2.3 Durability. 2.4 Grade or quality design 2.5 Usability life span 2.6 Conformance to Quality 2.7 Reliability 2.8 Maintainability	
3. Quality control and quality assurance	3.1 Quality control 3.1.1 Product 3.1.2 Reactive 3.1.3 Line function 3.1.4 Find the defects 3.1.5 Walk through 3.1.6 Testing 3.1.7 Inspection 3.1.8 Checkpoint Review	3.2 Quality Assurance 3.2.1 Process 3.2.2 Pro-active 3.2.3 Staff function 3.2.4 Prevent the defects 3.2.5 Quality audit 3.2.6 Defining process 3.2.7 Selection of tools 3.2.8 Training

### Curricular Evidence Guide

1. Underpinning Knowledge	1.1 The reasons why good quality should be maintained and poor quality should be eliminated 1.2 Meaning of the key terms - quality, quality assurance, quality control, quality inspection, quality improvement and total quality control. 1.3 Process and procedures for improving and maintaining quality 1.4 Procedures for addressing defects. 1.5 Record keeping within the quality improvement system in workplace 1.6 Factors, which affect successful implementation of the quality systems and procedures.
2. Underpinning Skills	2.1 Maintaining good quality 2.2 Eliminating poor quality 2.3 Understanding the meaning of the key terms - quality, quality assurance, quality control, quality inspection, quality improvement and total quality control. 2.4 Improving and maintaining quality 2.5 Addressing defects and procedures 2.6 Recording within the quality improvement system in workplace. 2.7 Implementing quality systems and procedures
3. Underpinning Attitudes	3.1 Commitment to occupational safety and health 3.2 Communication with peers, sub-ordinates and seniors in workplace. 3.3 Promptness in carrying out activities. 3.4 Tidiness and timeliness. 3.5 Respect of peers, sub-ordinates and seniors in workplace. 3.6 Environmental concern. 3.7 Sincere and honest to duties.
4. Resource Implications	The following resources must be provided:

	<ul style="list-style-type: none"> <li>4.1 Workplace</li> <li>4.2 Tools and equipment appropriate to maintain workplace</li> <li>4.3 Materials relevant to the proposed activity</li> <li>4.4 Relevant drawings, manuals, codes, standards and reference material</li> </ul>
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**Assessment Evidence Guide:**

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Followed instructions and procedures strictly</li> <li>1.2 Performed duties in accordance with demand of quality system</li> <li>1.3 Ensured conformance to specifications</li> <li>1.4 Detected defects and reported to authority in accordance to standard operating procedures.</li> <li>1.5 Understood concept of supplying product or service to meet the customer quality requirements</li> <li>1.6 Held responsible for quality work</li> <li>1.7 Followed quality control and quality assurance system procedures for each job</li> </ul>
2. Methods of Assessment	<p>Competency should be assessed by:</p> <ul style="list-style-type: none"> <li>2.1 Written examination</li> <li>2.2 Demonstration</li> <li>2.3 Oral Interview</li> <li>2.4 Workplace observation</li> <li>2.5 Portfolio</li> </ul>
3. Context of Assessment	<ul style="list-style-type: none"> <li>3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.</li> </ul>

## C: The Sector Specific (Core) Competencies

<b>Unit of Competency:</b> <b>PERFORM BASIC ELECTRICAL CIRCUIT INSTALLATION</b>	<b>Nominal Duration:</b> 30 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-1-O
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required for a worker to perform simple electrical circuit installation in industry sector. It specifically includes work tasks of gathering and checking tools and equipment, carrying out circuit installation of an electrical load controlled from one position, carrying out circuit installation of an electrical load controlled from two positions, carrying out circuit installation of two electrical load controlled from two position, carrying out circuit installation of a tube lamp, carrying out circuit installation for a door bell from two switching positions, carry out circuit installation for a ceiling fan, and clean/maintain the workplace.		

### Elements and Performance Criteria Template:

(Terms in the performance criteria that are written in **bold and underlined** are described in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Gather and check tools and equipment	1.1 <b><u>PPEs, tools and equipment</u></b> are collected and used at work 1.2 Tools and Equipment are checked for usability and familiarized before performing electrical circuit connection.
2. Carry out circuit installation of an electrical load controlled from one position	2.1 An electrical circuit of an <b><u>electrical load</u></b> controlled from one position is drawn 2.2 <b><u>Electrical circuit components</u></b> of an electrical load controlled from one position is identified and gathered 2.3 Electrical circuit components of an electrical load controlled from one position are connected and terminated using <b><u>appropriate materials</u></b> 2.4 Electrical circuit is tested for continuity and grounding using appropriate test instruments 2.5 Rewiring correction is made for identified circuit faults before live testing
3. Carry out circuit installation of an electrical load controlled from two positions	3.1 An electrical circuit of an electrical load controlled from two positions is drawn 3.2 Electrical circuit components of an electrical load controlled from two positions is identified and gathered 3.3 Electrical circuit components of an electrical load controlled from two positions are connected and terminated using appropriate materials 3.4 Electrical circuit is tested for continuity and grounding using appropriate test instruments 3.5 Rewiring correction is made for identified circuit faults before live testing
4. Carry out circuit installation of two electrical loads controlled from two positions	4.1 An electrical circuit of two electrical loads controlled from two positions is drawn 4.2 Electrical circuit components of two electrical loads controlled from two positions is identified and gathered 4.3 Electrical circuit components of two electrical loads controlled from two positions are connected and terminated

	<p>using appropriate materials</p> <p>4.4 Electrical circuit is tested for continuity and grounding using appropriate test instruments</p> <p>4.5 Rewiring correction is made for identified circuit faults before live testing</p>
5. Carry out circuit installation of a tube lamp	<p>5.1 Circuit diagram of a tube lamp is drawn in accordance to manufacturer's specification</p> <p>5.2 Electrical circuit components for a tube lamp is sourced and tested for usability and quality</p> <p>5.3 Electrical circuit components for a tube lamp are laid out in its corresponding position in accordance to electrical plan/design</p> <p>5.4 Electrical circuit components of a tube lamp are connected/terminated in accordance with electrical plan/drawing.</p> <p>5.5 Electrical circuit is tested for continuity and grounding using appropriate test instruments</p> <p>5.6 Rewiring correction is made for identified circuit faults before live testing</p>
6. Carry out circuit installation for a door bell from two switching positions	<p>6.1 Circuit diagram for a door bell controlled from two switching positions is drawn correctly</p> <p>6.2 Circuit components for a doorbell controlled from two switching positions are connected/terminated accurately</p> <p>6.3 Circuit is tested for continuity and grounding and effect re-connection when fault is observed</p> <p>6.4 Test operation of the doorbell in accordance with workplace safety requirements</p>
7. Carry out circuit installation for a ceiling fan	<p>7.1 Circuit diagram for a ceiling fan is drawn correctly</p> <p>7.2 Circuit components for a ceiling fan are connected/terminated in accordance with manufacturer's electrical circuit diagram/specification</p> <p>7.3 Circuit is tested for continuity and grounding and effect re-connection when fault is observed</p> <p>7.4 Test the circuit for a ceiling in accordance to OH&amp;S requirements</p> <p>7.5 Test operation of the ceiling fan in accordance with workplace safety requirements</p>
8. Clean/maintain the workplace	<p>8.1 Electrical tools/instruments are cleaned and checked for operability</p> <p>8.2 Work area is cleaned and waste materials are disposed in accordance with workplace requirements</p>

## Range of Variables

Variable	Range (Includes but not limited to):
1. PPEs, Tools and Equipment	1.1 PPEs 1.1.1 Safety shoes 1.1.2 Safety Gloves 1.1.3 Safety glass/receptacles 1.1.4 Proper clothes (long sleeves and long pants) 1.2 Tools 1.2.1 Tri- square 1.2.2 Pocket tape (3m) 1.2.3 Claw hammer / crow bar 1.2.4 Wire stripper 1.2.5 Adjustable Wrench 1.2.6 Chisels: (wooden, cold) 1.2.7 Drill bits 1.2.8 Files: (flat, round, half round) 1.2.9 Hacksaw 1.2.10 Hammers: (ball peen, claw) 1.2.11 Pliers: (combination pliers, cutting pliers, diagonal cutting pliers, long nose pliers) 1.2.12 Screwdrivers: (star, negative, positive) 1.2.13 Electrician Knife 1.3 Equipment 1.3.1 Electric Drill machine 1.3.2 Grinder 1.3.3 Soldering Iron 1.3.4 Multi Meter/AVO Meter
2. Electrical load	2.1 Tube Lamp 2.2 Incandescent lamp 2.3 Buzzer 2.4 Bell 2.5 Relay coil 2.6 Timer coil 2.7 Solenoid coil
3. Electrical circuit components	Refers to all electrical control and load circuit components but not limited to: 3.1 Switches 3.1.1 SPST switch 3.1.2 SPDT switch 3.1.3 DPDT switch 3.1.4 One-way switch 3.1.5 Two-way switch 3.1.6 Tree way switch 3.2 Fuse 3.3 Relay 3.4 Sockets 3.5 Fuses 3.6 MCB

	3.7 Fan regulator 3.8 Bracket 3.9 Outlet 3.10 Ballast (Chock coil) 3.11 Starter 3.12 Tube light holder 3.13 Batten holder 3.14 Ceiling rose
4. Appropriate materials.	Refers to all construction (Electrical) materials included but not limited to the following: 4.1 Cable 4.2 Bracket 4.3 GI Wire 4.4 Elbow 4.5 Bend 4.6 PVC Circular Box 4.7 Rowel plug 4.8 Saddle 4.9 Screw 4.10 Cable Lugs 4.11 Cable tie 4.12 VIR 4.13 Insulating clip 4.14 Flexible conduit 4.15 Electric soldering lead 4.16 Copper plate 4.17 Copper sheet 4.18 Bare copper conductor 4.19 Electrical tape 4.20 Masking tape 4.21 Screws 4.22 Boards

### Curricular Content Guide

1. Underpinning Knowledge	1.1 Series and parallel circuits 1.2 Types of electrical control components and their use/function 1.3 Methods and techniques of connecting and terminating electrical circuit components of an electrical load controlled from one position 1.4 Methods and techniques of connecting and terminating electrical circuit components of an electrical load controlled from two positions 1.5 Methods and techniques of connecting and terminating electrical circuit components of two electrical loads controlled from two positions 1.6 Methods and techniques of connecting/terminating electrical circuit components of a tube lamp 1.7 Methods and techniques of connecting/terminating circuit
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	<p>components for a doorbell controlled from two switching positions</p> <p>1.8 Methods and techniques of connecting/terminating circuit components for a ceiling fan</p> <p>1.9 Procedure of testing electrical circuits for continuity and grounding using appropriate test instruments</p> <p>1.10 Workplace requirements of cleaning electrical tools/instruments and disposing waste materials in accordance with workplace requirements</p> <p>1.11 Fault finding and rectification procedure of the different types of circuits</p> <p>1.12 Safety in working with electricity</p>
2. Underpinning Skills	<p>2.1 Connecting and terminating electrical circuit components of an electrical load controlled from one position</p> <p>2.2 Connecting and terminating electrical circuit components of an electrical load controlled from two positions</p> <p>2.3 Connecting and terminating electrical circuit components of two electrical loads controlled from two positions</p> <p>2.4 Connecting/terminating electrical circuit components of a tube lamp</p> <p>2.5 Connecting/terminating circuit components for a doorbell controlled from two switching positions</p> <p>2.6 Connecting/terminating circuit components for a ceiling fan</p> <p>2.7 Tested electrical circuits for continuity and grounding using appropriate test instruments</p> <p>2.8 Cleaning Electrical tools/instruments and disposing waste materials are in accordance with workplace requirements</p>
3. Underpinning Attitudes	<p>3.1 Concern for work quality</p> <p>3.2 Cleanliness/tidiness</p> <p>3.3 Commitment to occupational health and safety</p> <p>3.4 Environmental concerns</p> <p>3.5 Eagerness to learn</p> <p>3.6 Timeliness and orderliness</p> <p>3.7 Respect for rights of peers and seniors in workplace</p> <p>3.8 Orderliness</p>
4. Resource Implications	<p>4.1 Workplace (simulated or actual)</p> <p>4.2 Different types of electrical load component</p> <p>4.3 Various electrical materials</p> <p>4.4 Various types of electrical control components</p> <p>4.5 Pens</p> <p>4.6 Papers</p> <p>4.7 Work books</p>

### Assessment Evidence Guide

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <p>1.1 Connected and terminated electrical circuit components of an electrical load controlled from one position using appropriate materials</p> <p>1.2 Connected and terminated electrical circuit components of</p>
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	<p>an electrical load controlled from two positions using appropriate materials</p> <p>1.3 Connected and terminated electrical circuit components of two electrical loads controlled from two positions using appropriate materials</p> <p>1.4 Connected/terminated electrical circuit components of a tube lamp in accordance with electrical plan/drawing.</p> <p>1.5 Connected/terminated circuit components for a doorbell controlled from two switching positions accurately</p> <p>1.6 Connected/terminated circuit components for a ceiling fan in accordance with manufacturer's electrical circuit diagram/specification</p> <p>1.7 Tested electrical circuits for continuity and grounding using appropriate test instruments</p> <p>1.8 Electrical tools/instruments are cleaned and waste materials are disposed in accordance with workplace requirements</p>
2. Methods of Assessment	<p>Competency should be assessed by:</p> <p>2.1 Written examination</p> <p>2.2 Demonstration</p> <p>2.3 Oral Interview</p> <p>2.4 Workplace observation</p> <p>2.5 Portfolio</p>
3. Context of Assessment	<p>3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.</p>

<b>Unit of Competency:</b> <b>CARRY OUT ELECTRICAL SURFACE CHANNEL, CONDUIT AND WIRE INSTALLATION</b>	<b>Nominal Duration:</b> 55 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-2-O
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required for a worker to carry out electrical surface channel/conduit and wire installation. It specifically includes work tasks of translating electrical drawings/plans and specifications, gathering and checking tools, equipment and materials, laying-out the electrical circuit, fixing surface mounted channel/conduit and electrical wire and cleaning/maintaining the work place.		

**Elements and Performance Criteria Template:**

(Terms in the performance criteria that are written in **bold and underlined** are described in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Translate electrical drawings/plans and specifications	1.1 Electrical plans/drawings are collected. 1.2 Electrical plans/drawings are translated 1.3 <b><u>Sign and symbols</u></b> are identified. 1.4 Terms and abbreviations are identified. identify 1.5 Specifications are translated
2. Gather and check tools, equipment and materials	2.1 <b><u>Tools, equipment</u></b> and materials are collected. 2.2 <b><u>PPE</u></b> is collected & used 2.3 Tools, equipment and materials are checked for usability 2.4 <b><u>Electrical components/materials</u></b> are gathered and checked for operability and quality 2.5 Proper use of tools and equipment is observed in accordance to OH&S and workplace requirements
3. Layout the electrical circuit	3.1 Layout is drawn on the corresponding location in accordance with electrical plan/drawing. 3.2 Layout is drawn using appropriate <b><u>lay outing and measuring device</u></b> .
4. Fix surface mounted channel/conduit and Electrical wire	4.1 Appropriate size and type of electrical channel/mold/conduit is cut in accordance to plan/layout 4.2 Appropriate electrical box for outlets and switches is installed in its proper location in accordance to plan/layout 4.3 Surface mounted electrical channel/molding is fix in accordance to electrical plan/layout 4.4 Channel/conduit is bended in accordance with workplace requirement/specification 4.5 Appropriate wire size and type is installed on the channel/mold/conduit and into the electrical box 4.6 Cover is fitted into the fixed half part for channel/mover securely 4.7 Checking and testing of wiring system is performed
5. Clean/maintain the work place	5.1 Electrical tools/instruments are cleaned and checked for operability 5.2 Work area is cleaned and waste materials are disposed in accordance with workplace requirements

## Range of Variables

Variable	Range (Includes but not limited to):
1. Sign and symbols	May include but not limited to: 1.1 Construction safety signs 1.2 ISO standard electrical symbol 1.3 IEE standards 1.4 Bangladesh Electrical Engineering Standards 1.5 Electrical safety signs and warnings 1.6 Electrical drawing/circuit diagram symbols: 1.6.1 Circuit diagrams 1.6.2 Connection symbol 1.6.3 Load symbol 1.6.4 Socket symbol 1.6.5 Switch symbol 1.6.6 Symbol of fitting and fixture 1.6.7 Size of wire symbol 1.6.8 Numbers symbol 1.6.9 Supply symbol 1.6.10 Switch board symbol 1.6.11 Conduit symbol 1.6.12 Circuit breaker symbol 1.6.13 Protective device symbol
2. Tools and equipment	2.1 Tools 2.1.1 Adjustable Wrench 2.1.2 Wire Stripper 2.1.3 Bolt cutters 2.1.4 C-clamp 2.1.5 Chisels: (Wooden, Cold) 2.1.6 Drill bits (steel/masonry) 2.1.7 Files: (Flat, Round, Half round) 2.1.8 Hacksaw (Machinist's hammers: ball peen, claw) 2.1.9 Hand drill 2.1.10 Measuring Tapes 2.1.11 Paint Brush 2.1.12 Pliers: (Combination Pliers, cutting Pliers, Diagonal cutting Pliers, Long 2.1.13 Nose Pliers, 2.1.14 Punches 2.1.15 Screwdrivers: Star, Flat, Philips 2.1.16 Tri square 2.1.17 Neon Tester 2.1.18 Wire Cutters 2.1.19 Set squares 2.1.20 Electrician Knife 2.2 Equipment/test instruments 2.2.1 Electric hand drill 2.2.2 Grinder 2.2.3 Soldering Iron 2.2.4 Megger tester 2.2.5 Multi Meter/AVO Meter

	2.2.6 Earth Tester
3. PPE	3.1 Hand gloves 3.2 Safety helmet 3.3 Safety shoes 3.4 Safety glass 3.5 Standard clothing
4. Electrical components/materials	4.1 Metal Channel 4.2 PVC channel/molding 4.3 PVC conduit 4.4 G.I. Wire 4.5 Elbow 4.6 PVC Circular Box 4.7 Utility box 4.8 Saddle 4.9 Screw 4.10 Cable Lugs 4.11 Cable tie 4.12 Thread ball 4.13 Insulating clip 4.14 Flexible conduit 4.15 Electric soldering lead 4.16 Plastic tape 4.17 Cable (PVC, VIR)

### Curricular Content Guide

1. Underpinning Knowledge	1.1 Electrical drawings and specifications interpretation 1.2 Tools, equipment and materials checking procedure 1.3 Electrical components/materials checking techniques 1.4 Tools used in laying out and methods/techniques in laying out 1.5 Procedure and techniques in surface installation of electrical utility boxes 1.6 Methods of fixing electrical channel/molding and conduit on surfaces 1.7 Types of adhesives for fixing channels 1.8 Method and techniques of bending channels 1.9 Methods and techniques of bending PVC and metallic conduits 1.10 Electrical wire Installation procedure for on open channels 1.11 Electrical wire installation procedure on conduits 1.12 Installation procedures of electrical metallic conduits, wire ways, cable tray, telephone terminal cabinet and distribution frame and cable bridge 1.13 Cable pulling procedures 1.14 Wire termination techniques
2. Underpinning Skills	2.1 Checking of tools, equipment and materials for usability

	<ul style="list-style-type: none"> <li>2.2 Gathering Electrical components/materials and checking for operability and quality</li> <li>2.3 Drawing layout on the corresponding location in accordance with electrical plan/drawing.</li> <li>2.4 Installing appropriate electrical utility boxes</li> <li>2.5 Fixing surface mounted electrical channel/molding</li> <li>2.6 Bending of channels</li> <li>2.7 Bending of PVC conduit</li> <li>2.8 Bending of metal conduits</li> <li>2.9 Installing wires on open channels</li> <li>2.10 Installing wires on conduits/enclosed channel</li> <li>2.11 Fitting cover into the fixed half part for channel/mold securely</li> </ul>
3. Underpinning Attitudes	<ul style="list-style-type: none"> <li>3.1 Concern for work quality</li> <li>3.2 Cleanliness/tidiness</li> <li>3.3 Commitment to occupational health and safety</li> <li>3.4 Environmental concerns</li> <li>3.5 Eagerness to learn</li> <li>3.6 Timeliness and orderliness</li> <li>3.7 Respect for rights of peers and seniors in workplace</li> <li>3.8 Orderliness</li> </ul>
4. Resource Implications	<ul style="list-style-type: none"> <li>4.1 Workplace (simulated or actual)</li> <li>4.2 Various Channels and cables</li> <li>4.3 Tools and equipment</li> <li>4.4 Work instruction sheet</li> <li>4.5 Worksheets/Instruction sheet</li> </ul>

### Assessment Evidence Guide

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Checked tools, equipment and materials for usability</li> <li>1.2 Gathered Electrical components/materials and checked for operability and quality</li> <li>1.3 Drawn Layout on the corresponding location in accordance with electrical plan/drawing.</li> <li>1.4 Installed appropriate electrical utility boxes in its proper location in accordance to plan/layout</li> <li>1.5 Fixed surface mounted electrical channel/molding in accordance to electrical plan/layout</li> <li>1.6 Bended channel/conduit in accordance with workplace requirement/specification</li> <li>1.7 Installed appropriate wire size and type on the channel/mold/conduit and into the electrical box</li> <li>1.8 Performed checking and testing of wiring system</li> </ul>
2. Methods of Assessment	<p>Competency should be assessed by:</p> <ul style="list-style-type: none"> <li>2.1 Written examination</li> <li>2.2 Demonstration</li> <li>2.3 Oral Interview</li> <li>2.4 Workplace observation</li> <li>2.5 Portfolio</li> </ul>

3. Context of Assessment	3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.
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<b>Unit of Competency:</b> <b>CARRY OUT ELECTRICAL FITTINGS AND FIXTURES INSTALLATION</b>	<b>Nominal Duration:</b> 25 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-3-O
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required for a worker to carry out electrical fittings and fixtures installation in industry sector. It specifically includes work tasks of gathering tools, equipment and electrical materials, installing electrical circuit protection components, installing electrical fittings and fixtures, fixing electrical component holders and ceiling rose and cleaning/maintaining the workplace.		

### Elements and Performance Criteria Template:

(Terms in the performance criteria that are written in **bold and underlined** are described in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Gather tools, equipment and electrical materials	1.1 Electrical plans/drawings are collected and interpreted 1.2 Specifications are translated and bill of materials is identified 1.3 Required fittings, fixtures and electrical cables are gathered and secured in the worksite 1.4 Electrical fittings, fixtures and cables are checked for usability, operability and quality with referenced to electrical plan/design specifications 1.5 Tools, equipment and PPEs are gathered and checked for usability
2. Install electrical circuit protection components	2.1 <b><u>Electrical protection board/encasement</u></b> is installed in accordance to electrical plan/design specification 2.2 <b><u>Electrical protection components</u></b> are fixed into the board/encasement 2.3 Installed electrical protection components are checked for mounting integrity, operability and quality
3. Install electrical fittings and fixtures	3.1 <b><u>Electrical fittings and fixtures</u></b> are collected and checked for usability, quality and quantity 3.2 Electrical fittings and fixtures are installed to the specified location in accordance to electrical plan/design specification 3.3 Electrical fittings and fixtures are wired in accordance to the electrical circuit plan/wiring lay out
4. Fix Electrical component holders and ceiling rose	4.1 <b><u>Electrical component holders</u></b> are fixed in accordance to electrical plan/design specification 4.2 Ceiling rose are installed and fixed in accordance to electrical plan/design specification 4.3 Ceiling rose wiring connection is terminated and checked for accuracy in accordance with specified electrical circuit diagram 4.4 Checking and testing of wiring system is carried out
5. Clean/maintain the workplace	5.1 Electrical tools/instruments are cleaned and checked for operability 5.2 Work area is cleaned and waste materials are disposed in accordance with workplace requirements



### Range of Variables

Variable	Range (Includes but not limited to:)	
1. Tools and equipment and PPEs	1.1 Hand Tools 1.1.1 Adjustable Wrench 1.1.2 Wire Stripper 1.1.3 Bolt cutters 1.1.4 Mallet 1.1.5 C-clamp 1.1.6 Chisels: (Wooden, Cold) 1.1.7 Drill bits 1.1.8 Files: (Flat, Round, Half, round) 1.1.9 Hacksaw 1.1.10 Hammers: (Ball peen, Claw) 1.1.11 Hand drill 1.1.12 Measuring Tapes 1.1.13 Paint Brushes/Rollers 1.1.14 Pliers: (Combination Pliers, cutting pliers, diagonal cutting Pliers, Long Nose Pliers, 1.1.15 Punches 1.1.16 Screwdrivers: (star (torx), flat, positive)	1.1.17 Try square 1.1.18 Neon Tester 1.1.19 Wire Cutters 1.1.20 Set squares 1.1.21 Electrician Knife 1.1.22 Electric Drill machine 1.1.23 Angle Grinder 1.1.24 Soldering Iron 1.2 Equipment 1.2.1 Megger tester 1.2.2 Calculator 1.2.3 Multi Meter/AVO Meter 1.2.4 Earth Tester 1.2.5 Digital Weight Machine 1.3 PPE 1.3.1 Hard hat/helmet 1.3.2 Hand gloves 1.3.3 Safety glass 1.3.4 Safety shoes 1.3.5 Required working clothes
2. Electrical protection board/encasement	2.1 Fuse box 2.2 Knife switch box 2.3 Emergency shut off box 2.4 Fuse holder 2.5 Main Circuit Breaker (MCB) panel board	
3. Electrical protection components	3.1 Fuse 3.2 Air Circuit Breaker 3.3 Push pull emergency switch 3.4 Knife switch	
4. Electrical fittings and Fixtures	4.1 Screws 4.2 Boards 4.3 Fuse box 4.4 Switches 4.5 Sockets 4.6 Fuses 4.7 Relays 4.8 MCB, MCCB 4.9 Fan regulator	4.10 Bracket 4.11 Socket 4.12 Ballast 4.13 Starter 4.14 Tube light holder 4.15 Holder 4.16 Ceiling rose
5. Electrical component holders	5.1 Pendent holder 5.2 Batten holder 5.3 Bracket holder 5.4 Swivel holder	

	5.5 Push-pull holder 5.6 Ceiling rose
6. Equipment	6.1 Megger tester 6.2 Calculator 6.3 Multi Meter/AVO Meter 6.4 Earth Tester 6.5 Digital Weight Machine

### Curricular Content Guide

1. Underpinning Knowledge	1.1 Understanding and interpreting electrical plans and designs 1.2 Method of creating bill of materials 1.3 Method of checking electrical fittings, fixtures and cables 1.4 Procedure for installing electrical protection board/encasement 1.5 Ways of fixing electrical protection components into the board/encasement 1.6 Installing procedure of electrical fittings and fixtures to the specified location 1.7 Methods and techniques of wiring electrical fittings and fixtures 1.8 Types of electrical component holders and their use 1.9 Installation procedure of ceiling rose and fixing 1.10 Techniques of terminating wiring connection for ceiling rose
2. Underpinning Skills	2.1 Translating specifications and identifying bill of materials 2.2 Checking electrical fittings, fixtures and cables for usability, operability and quality 2.3 installing Electrical protection board/encasement 2.4 Fixing electrical protection components into the board/encasement 2.5 Installing electrical fittings and fixtures to the specified location 2.6 Wiring electrical fittings and fixtures 2.7 Fixing electrical component holders in accordance to electrical plan/design specification 2.8 Installing ceiling rose and fixing 2.9 Terminating wiring connection for ceiling rose
3. Underpinning Attitudes	3.1 Concern for work quality 3.2 Cleanliness/tidiness 3.3 Commitment to occupational health and safety 3.4 Environmental concerns 3.5 Eagerness to learn 3.6 Timeliness and orderliness 3.7 Respect for rights of peers and seniors in workplace 3.8 Orderliness
4. Resource Implications	4.1 Workplace (simulated or actual) 4.2 Different types of earthing materials/elements 4.3 Electrical tools and equipment to carry out the activity

	4.4 Instruction sheets/work sheets 4.5 Pens 4.6 Papers
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### Assessment Evidence Guide

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <ol style="list-style-type: none"> <li>1.1 Checked electrical fittings, fixtures and cables for usability, operability and quality with referenced to electrical plan/design specifications</li> <li>1.2 installed Electrical protection board/encasement in accordance to electrical plan/design specification</li> <li>1.3 Fixed electrical protection components into the board/encasement</li> <li>1.4 Installed electrical fittings and fixtures to the specified location in accordance to electrical plan/design specification</li> <li>1.5 Wired electrical fittings and fixtures in accordance to the electrical circuit plan/wiring lay out</li> <li>1.6 Fixed electrical component holders in accordance to electrical plan/design specification</li> <li>1.7 Terminated ceiling rose wiring connection and checked for accuracy in accordance with specified electrical circuit diagram</li> <li>1.8 Carried out checking and testing of wiring system</li> </ol>
2. Methods of Assessment	<p>Competency should be assessed by:</p> <ol style="list-style-type: none"> <li>2.1 Written examination</li> <li>2.2 Demonstration</li> <li>2.3 Oral Interview</li> <li>2.4 Workplace observation</li> <li>2.5 Portfolio</li> </ol>
3. Context of Assessment	<ol style="list-style-type: none"> <li>3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.</li> </ol>

<b>Unit of Competency:</b> <b>CARRY OUT EARTHING/GROUNDING INSTALLATION</b>	<b>Nominal Duration:</b> 15 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-4-O
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required for a worker to carry out earthing/grounding installation. It specifically includes tasks of identifying type of earthing/grounding cable to be used, gathering tools, equipment and earthing/grounding materials, excavating the hole for earthing element installation, installing earthing/grounding components, finishing earth pit chamber for pipe earthing method and cleaning/maintaining the work area.		

### Elements and Performance Criteria Template:

(Terms in the performance criteria that are written in **bold and underlined** are described in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Identify the type of earthing/grounding cable to be used	1.1 Types and sizes of <b><u>earthing/grounding materials</u></b> are identified in accordance to electrical plan/design and total loads 1.2 Types and <b><u>method of earthing/grounding</u></b> is identified in accordance to electrical plan/design
2. Gather tools, equipment and earthing/grounding materials	2.1 <b><u>Tools and Equipment</u></b> are gathered and checked for usability 2.2 Earthing materials are collected and checked for conformance in accordance to specification
3. Excavate the hole for earthing element installation	3.1 <b><u>PPE</u></b> is collected & used in accordance to OH&S requirements 3.2 Hole is dug following with OH&S requirements 3.3 Hole is shaped and sized in accordance to electrical plan/design specification
4. Install earthing/grounding components	4.1 <b><u>Earthing/grounding element</u></b> is fitted in the bottom of the excavated hole following standard earthing procedure 4.2 Earth lead is connected to the earth element tightly and brought up the meter board through the conduit. 4.3 Powdered Charcoal and salt are laid around the earthing element in accordance to workplace procedure 4.4 A proper sized and length of GI pipe is fitted from top of the earth element to the bottom of the earth pit chamber 4.5 Rest of the excavated hole is filled with earth
5. Finish earth pit chamber for pipe earthing method	5.1 Earth pit chamber is constructed with brick chips, cements sand and water mixture in accordance with standard/specification. 5.2 Pit chamber cover is made with G.I sheet in accordance with electrical plan/design 5.3 Pit cover is fitted/installed on the pit chamber 5.4 Check earth/grounding resistance in accordance with electrical plan/specification
6. Clean/maintain the work area	6.1 Electrical tools/instruments are cleaned and checked for operability 6.2 Work area is cleaned and waste materials are disposed in accordance with workplace requirements

## Range of Variables

Variable	Range (Includes but not limited to:)
1. <u>Earthing/grounding materials</u>	1.1 Continuity conductor/cable 1.2 Earthing lead 1.3 Earth electrode/plate 1.4 Connector 1.5 G.I. pipe/conduit 1.6 Bolts and nuts 1.7 Powdered charcoal 1.8 Salt
2. Method of earthing/grounding	2.1 Pipe earthing 2.2 Rod earthing 2.3 Plate earthing 2.4 Waterman earthing 2.5 Strip or wire earthing
3. Tools and Equipment	3.1 Tools <ul style="list-style-type: none"> <li>3.1.1 Measuring Tape (30m)</li> <li>3.1.2 Tri- square</li> <li>3.1.3 Pocket tape (3m)</li> <li>3.1.4 Claw hammer / crow bar</li> <li>3.1.5 Shovel</li> <li>3.1.6 Wire stripper</li> <li>3.1.7 Water level (precision)</li> <li>3.1.8 Masonry Trowel</li> <li>3.1.9 Point trowel</li> <li>3.1.10 Concrete pans</li> <li>3.1.11 Adjustable Wrench</li> <li>3.1.12 Bolt cutters</li> <li>3.1.13 C-clamp</li> <li>3.1.14 Chisels: (wooden, cold)</li> <li>3.1.15 Drill bits</li> <li>3.1.16 Files: (flat, round, half round)</li> <li>3.1.17 Hand hacksaw</li> <li>3.1.18 Hammers: (ball peen, claw)</li> <li>3.1.19 Pliers: (combination pliers, cutting pliers, diagonal cutting pliers, long nose pliers)</li> <li>3.1.20 Punches</li> <li>3.1.21 Screwdrivers: ( star, negative, positive)</li> <li>3.1.22 Electrician Knife</li> </ul> 3.2 Equipment <ul style="list-style-type: none"> <li>3.2.1 Electric Drill machine</li> <li>3.2.2 Grinder</li> <li>3.2.3 Soldering Iron</li> <li>3.2.4 Megger tester</li> <li>3.2.5 Multi Meter/AVO Meter</li> <li>3.2.6 Earth Tester</li> <li>3.2.7 Welding machine</li> <li>3.2.8 Oxy-acetylene cutting outfit</li> </ul>

4. PPE	4.1 Safety shoes 4.2 Safety Gloves 4.3 Safety helmet 4.4 Proper clothes (long sleeves and long pants)
5. Earthing/grounding element	5.1 G.I. pipe 5.2 Steel plate 5.3 Steel sheet 5.4 Rod

### Curricular Content Guide

1. Underpinning Knowledge	1.1 Types and quality of earthing materials 1.2 Procedure of checking earthing materials 1.3 Method of earthing/grounding installation 1.4 Procedure of Excavating a hole for the earthing element 1.5 Procedure of Fitting earthing/grounding element 1.6 Connecting procedure for earth lead to the earth element 1.7 Means of laying powdered charcoal and salt around the earthing element 1.8 Earth pit chamber construction procedure 1.9 Workplace cleaning requirements 1.10 Method of Checking earthing/grounding loop resistance
2. Underpinning Skills	2.1 Collecting earthing materials and checked for conformance in accordance to specification 2.2 Identifying the method of earthing/grounding 2.3 Excavating a hole for the earthing element 2.4 Fitting earthing/grounding element in the bottom of the excavated hole following standard earthing procedure 2.5 Connecting earth lead to the earth element tightly and brought up the meter board through the conduit. 2.6 laying Powdered Charcoal and salt around the earthing element 2.7 Constructing earth pit chamber using concreting materials 2.8 Cleaning work area and disposing waste materials in accordance to workplace requirements 2.9 Checking earth/grounding loop resistance using appropriate test instrument
3. Underpinning Attitudes	3.1 Concern for work quality 3.2 Cleanliness/tidiness 3.3 Commitment to occupational health and safety 3.4 Environmental concerns 3.5 Eagerness to learn 3.6 Timeliness and orderliness 3.7 Respect for rights of peers and seniors in workplace 3.8 Orderliness
4. Resource Implications	4.1 Workplace (simulated or actual) 4.2 Different types of earthing work tools and equipment 4.3 Earthing work materials and consumables 4.4 Pens 4.5 Papers

	4.6 Work books 4.7 Earthing work instruction manual
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### Assessment Evidence Guide

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <ol style="list-style-type: none"> <li>1.1 Identified the method of earthing/grounding in accordance with electrical plan/design</li> <li>1.2 Excavate a hole in accordance with electrical plan/design specification</li> <li>1.3 Fitted earthing/grounding element in the bottom of the excavated hole following standard earthing procedure</li> <li>1.4 Connected earth lead to the earth element tightly and brought up the meter board through the conduit.</li> <li>1.5 laid Powdered Charcoal and salt around the earthing element in accordance to workplace procedure</li> <li>1.6 Constructed earth pit chamber with brick chips, cements sand and water mixture in accordance with standard/specification.</li> <li>1.7 Checked earth/grounding loop resistance using appropriate test instrument</li> <li>1.8 Cleaned work area and disposed waste materials in accordance to workplace requirements</li> </ol>
2. Methods of Assessment	<p>Competency should be assessed by:</p> <ol style="list-style-type: none"> <li>2.1 Written examination</li> <li>2.2 Demonstration</li> <li>2.3 Oral Interview</li> <li>2.4 Workplace observation</li> <li>2.5 Portfolio</li> </ol>
3. Context of Assessment	<ol style="list-style-type: none"> <li>3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.</li> </ol>

<b>Unit of Competency:</b> <b>Perform a Service Connection</b>	<b>Nominal Duration:</b> 10 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-5-O
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitude required to perform service connection. It includes measuring distance, installing cables, main switch and energy meter and perform service connection.		

**Elements and Performance Criteria Template:**

(Terms in the performance criteria that are written in **bold and underlined** are described in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Interpret drawings and specifications	1.1 Drawings are collected and interpreted. 1.2 Sign and symbols are identified. 1.3 Terms and abbreviations are identified. 1.4 Specifications are interpreted.
2. Collect tools, equipment and materials	2.1 <b><u>Tools, Equipment and materials</u></b> are gathered 2.2 Necessary motor control devices are selected and collected. 2.3 Necessary motor control devices are sorted and tested for functionality
3. Measure the distance of service line	3.1 PPEs are collected & used. 3.2 Distance between distribution pole and meter are checked and measured. 3.3 Distance between main switch and meter are checked and measured.
4. Install cable for service connection	4.1 Quality cables are selected and collected for service connection. 4.2. Collected cables are cut and set. 4.3 Cables are held on and clamped properly with distribution pole. 4.4 Cables are joined and connected with the pole and energy meter.
5. Install energy meter	5.1 Energy meter is collected and set on the board. 5.2 Energy meter is connected with service line.
6. Connect energy meter and main switch	6.1 Cables are measured and sized 6.2 Cables are laid into the conduit. 6.3. Connection between energy meter and main-switch is performed .
7. Clean the work place	7.1 Cleaning Tools and equipment are selected & collected. 7.2 Cleaning Tools and equipment are prepared for cleaning 7.3 Waste materials are disposed. 7.4 Cleaning is completed.

**Range of Variables**

<b>Variable</b>	<b>Range</b> (Includes but not limited to):
1. Drawings	1.1 Sketch 1.2 Blue print 1.3 Electrical drawings
2. Specifications	2.1 Product specifications 2.2 Performance specifications 2.3 Method specifications 2.3 Specification manuals



3. Signs and Symbols	<p>Include all signs and symbols associated with Electrical and maintenance under the Civil construction sector.</p> <ul style="list-style-type: none"> <li>3.1 Drawing symbols</li> <li>3.2 Connection symbol</li> <li>3.3 Load symbol</li> <li>3.4 Socket symbol</li> <li>3.5 Main switch symbol</li> <li>3.6 Supply symbol</li> <li>3.7 Danger symbol</li> <li>3.8 Switch board symbol</li> <li>3.9 Conduit symbol</li> <li>3.10 Circuit breaker symbol</li> <li>3.11 Protective device symbol</li> </ul>
4. Tools	<ul style="list-style-type: none"> <li>5.1 Hand Tool: <ul style="list-style-type: none"> <li>5.1.1 Adjustable wrench</li> <li>5.1.2 Wire Stripper</li> <li>5.1.3 Mallet</li> <li>5.1.4 Chisels: (a)Wood, (b) Cold</li> <li>5.1.5 Hacksaw</li> <li>5.1.6 Hammers: (a) Ball pin, (b) Claw</li> <li>5.1.7 Measuring Tapes</li> <li>5.1.8 Pliers: (a) Combination Pliers, (b) Side cutting Pliers, (c) Diagonal cutting Pliers, (d) Nose Pliers,</li> <li>5.1.9 Screwdrivers:(a) Star, (b) Flat, (c) Connecting</li> <li>5.1.10 Sockets</li> <li>5.1.11 Try square</li> <li>5.1.12 Neon tester</li> <li>5.1.13 Wire Cutters</li> <li>5.1.13 Ladder</li> </ul> </li> <li>5.4 Power Tools <ul style="list-style-type: none"> <li>5.1.14 Electric Drill machine</li> <li>5.1.15 Soldering Iron</li> <li>5.1.16 Grinder</li> </ul> </li> </ul>
5. Equipment	<ul style="list-style-type: none"> <li>6.1 Set squares and Try Square</li> <li>6.2 S.W.G.</li> <li>6.3 Steel rule</li> <li>6.4 Megger</li> <li>6.5 Calculator</li> <li>6.6 Multi Meter/AVO Meter</li> <li>6.7 Ammeter (AC/DC)</li> <li>6.8 Volt Meter (AC/DC)</li> </ul>
6. Materials	<ul style="list-style-type: none"> <li>7.1 GI wire</li> <li>7.2 Connector</li> <li>7.3 Distribution board</li> <li>7.4 Energy meter</li> <li>7.5 Main switch</li> <li>7.6 Cables</li> <li>7.7 Guy insulator</li> <li>7.8 Clamps</li> <li>7.9 Tie</li> <li>7.10 Hook</li> </ul>

7. PPE	<ul style="list-style-type: none"> <li>7.1 Skull guard/helmet</li> <li>7.2 Goggles</li> <li>7.3 Safety shoes.</li> <li>7.4 Safety gloves</li> <li>7.5 Proper working clothes</li> </ul>
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Evidence Guide:

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Collected all necessary accessories and materials.</li> <li>1.2 Drawn layouts</li> <li>1.3 Measured accurately</li> <li>1.4 Set and held service cables.</li> <li>1.5 Installed energy meter as per drawing.</li> <li>1.6 Connected energy meter and main switch on proper place.</li> </ul>
2. Underpinning knowledge	<ul style="list-style-type: none"> <li>2.1 Types of tools and equipment</li> <li>2.2 Material collection and preparation</li> <li>2.3 Layout drawing</li> <li>2.4 Measurement</li> <li>2.5 Service cables and Energy meter setting</li> <li>2.6 Service cables and energy meter connection</li> </ul>
3. Underpinning Skills	<ul style="list-style-type: none"> <li>3.1 Collecting materials</li> <li>3.2 Preparing materials</li> <li>3.3 Measuring distance</li> <li>3.4 Setting service cables</li> <li>3.5 Connecting service cables, energy meter and main switch</li> </ul>
4. Underpinning attitudes	<ul style="list-style-type: none"> <li>4.1 Commitment to occupational health and safety</li> <li>4.2 Environmental concerns</li> <li>4.3 Eagerness to learn</li> <li>4.4 Tidiness and timeliness</li> <li>4.5 Respect for rights of peers and seniors in workplace</li> </ul>
5. Resource Implications	<ul style="list-style-type: none"> <li>5.1 Access to the work place</li> <li>5.2 Tools and equipment appropriate to joint and connection process</li> <li>5.3 Availability of materials</li> </ul>
6. 6. Methods of Assessment	<ul style="list-style-type: none"> <li>6.1 Direct observation on application of task</li> <li>6.2 Demonstration</li> <li>6.3 Portfolio</li> <li>6.4 Oral questioning</li> <li>6.4 Third parties</li> </ul>
7. Context of Assessment	<p>Competency must be assessed individually in the actual work place or in a simulated workplace by direct observation after completion of the module.</p>

<b>Unit of Competency:</b> <b>CARRY OUT INDUSTRIAL MOTOR CONTROL INSTALLATION</b>	<b>Nominal Duration:</b> 30 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-6-O
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required for a worker to carry out industrial motor control installation. It specifically includes work tasks of identifying motor control devices, selecting and gathering motor control devices, classifying motor control devices, connecting motor control devices and checking circuit accuracy and cleaning/maintaining the workplace.		

### Elements and Performance Criteria Template:

(Terms in the performance criteria that are written in **bold and underlined** are described in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Identify motor control devices	1.1 <b><u>Manuals</u></b> and documents of controlling devices are collected 1.2 <b><u>Drawings</u></b> and <b><u>symbols</u></b> of motor control devices are sorted 1.3 Types and nature of motor control devices are classified and sorted 1.4 Functions and <b><u>circuit designs/diagrams</u></b> of different types of <b><u>motor control circuit</u></b> components is identified
2. Select and gather motor control devices	2.4 <b><u>Tools, Equipment and materials</u></b> are gathered 2.5 Necessary motor control devices with appropriate current and voltage ratings are selected and collected. 2.6 Motor control devices with appropriate current and voltage ratings are sorted and tested for functionality
3. Classify motor control devices	3.1 <b><u>Motor control devices</u></b> are specified and classified 3.2 all controlling devices are classified and sorted in accordance to the working functions
4. Assemble motor control devices and check circuit accuracy	4.1 <b><u>PPE</u></b> is collected and used 4.2 All necessary motor control devices are set according to the need of the operations. 4.3 Necessary controlling devices are set and connected. 4.4 Electrical circuit is tested for continuity in accordance with circuit design
5. Clean/maintain the workplace	5.1 Electrical tools/instruments are cleaned and checked for operability 5.2 Work area is cleaned and waste materials are disposed in accordance with workplace requirements

### Range of Variables

<b>Variable</b>	<b>Range</b> (Includes but not limited to):
8. Manuals	8.1 Manufacturer's Specification Manual 8.2 Repair Manual 8.3 Maintenance Procedure Manual 8.4 Periodic Maintenance Manual 8.5 Quality Manual 8.6 Manual of Instruction

9. Drawings	9.1 Sketch 9.2 Blue print 9.3 Electrical drawings
10. Symbols	10.1 Drawing symbols 10.2 Connection symbols 10.3 Socket symbols 10.4 Switches symbol 10.5 Size of wire symbol 10.6 Numbers symbols 10.7 Supply symbols 10.8 Danger symbols 10.9 Switch board symbol 10.10 Main switch symbol 10.11 Isolator symbol 10.12 Regulator symbol
11. Circuit designs/diagrams	11.1 Standard symbols of common industrial motor control components 11.2 Types of circuit diagramming 11.3 AC and DC motor circuits 11.4 Starting methods (Single phase motors; Three phase motors) 11.5 Industrial motor control wiring diagrams 11.6 Simple industrial control wiring 11.7 Protective and safety devices
12. Motor Control Circuits	12.1 Direct on line 12.2 Star-delta Circuits
13. Tools and Equipment	1 Tools 13.1.1 Tri- square 13.1.2 Pocket measuring tape (3m) 13.1.3 Claw hammer 13.1.4 Wire stripper 13.1.5 Adjustable Wrench 13.1.6 Chisels: (wooden, cold) 13.1.7 Drill bits 13.1.8 Files: (flat, round, half round) 13.1.9 Hacksaw 13.1.10 Hammers: (ball peen, claw) 13.1.11 Pliers: (combination pliers, cutting pliers, diagonal cutting pliers, long nose pliers) 13.1.12 Screwdrivers: (star, negative, positive) 13.1.13 Electrician Knife  13.2 Equipment 13.2.1 Electric Drill machine 13.2.2 Grinder 13.2.3 Soldering Iron/gun
14. Materials	14.1 Electrical wires 14.2 Terminal eye 14.3 Connectors 14.4 Clamps

	14.5 Cable Tie 14.6 Electrical tape 14.7 Terminal block
15. Motor control devices	15.1 Relay 15.2 Timer Relay 15.3 Switches 15.4 Fuse 15.5 Pressure switch 15.6 Overload relay 15.7 Magnetic contactor 15.8 Magnetic starter 15.9 Transformer
16. PPE	1 Skull guard/helmet 2 Goggles 3 Safety shoes. 4 Safety gloves 5 Proper working clothes

### Curricular Content Guide

8. Underpinning knowledge	1.1 Types of documents, drawings, manuals and symbols identification 1.2 Types and functions of motor control devices 1.3 Selection procedure of motor control devices 1.4 Methods of classifying and sorting motor control devices 1.5 Techniques and procedure of terminating/connecting motor control devices 1.6 Functions and circuit designs of different types of motor control circuit components 1.7 Procedure of checking/testing the operation of motor control devices and components 1.8 Troubleshooting of faulty motor control devices
9. Underpinning Skills	2.1 Selecting and collecting necessary motor control devices 2.2 Classifying and sorting motor control devices according to the working functions 2.3 Terminating/connecting motor control devices according to the need of the operation and circuit design/diagram. 2.4 Checking/testing operation of motor control devices and components in accordance to circuit design 2.5 Cleaning work area and disposed waste materials in accordance to workplace requirements
10. Underpinning attitudes	3.1 Concern for work quality 3.2 Cleanliness/tidiness 3.3 Commitment to occupational health and safety 3.4 Environmental concerns 3.5 Eagerness to learn 3.6 Timeliness and orderliness 3.7 Respect for rights of peers and seniors in workplace 3.8 Orderliness
11. Resource Implications	4.1 Workplace (simulated or actual)

	<p>4.2 Materials, tools and equipment needed for the activity</p> <p>4.3 Pens</p> <p>4.4 Papers</p> <p>4.5 Work books</p> <p>4.6 Instruction manual</p>
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### Evidence Guide

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <p>1.1 Selected and collected necessary motor control devices</p> <p>1.2 Classified and sorted motor control devices according to the working functions</p> <p>1.3 Terminated/connected motor control devices according to the need of the operation and in accordance to circuit design/diagram.</p> <p>1.4 Checked/tested operation of motor control devices and components in accordance to circuit design</p> <p>1.5 Cleaned work area and disposed waste materials in accordance to workplace requirements</p>
2. Methods of assessment	<p>Competency should be assessed by:</p> <p>2.1 Written examination</p> <p>2.2 Demonstration</p> <p>2.3 Oral Interview</p> <p>2.4 Workplace observation</p> <p>2.5 Portfolio</p>
3. Context of assessment	<p>3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.</p>

<b>Unit of Competency:</b> <b>PERFORM SERVICING AND REPAIR OF MOTOR CONTROL CIRCUITS</b>	<b>Nominal Duration:</b> 45 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-7-O
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required for a worker to perform servicing and repair of motor control circuits. It specifically includes work tasks of preparing tools and materials, performing troubleshooting and diagnostics, replacing/repairing faulty motor control components, testing operation of motor control circuit/system and documenting work and cleaning and maintaining work area.		

### Elements and Performance Criteria Template:

(Terms in the performance criteria that are written in **bold and underlined** are described in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Prepare tools and materials	1.1 <b><u>Manuals, tools</u></b> and <b><u>materials</u></b> required for servicing are gathered. 1.2 Tools, equipment and materials are checked for operability/functionality. 1.3 Operation and maintenance manuals are checked for compatibility with the machine under servicing/maintenance
2. Perform troubleshooting and diagnostics	2.1 Job order/job instruction is read and analyzed 2.2 Initial inspection and investigation on machine operation is carried out 2.3 Circuit integrity/functionality of motor control system is checked and verified. 2.4 <b><u>Trouble/fault</u></b> is identified and confirmed
3. Replace/repair faulty motor control components	3.2 Identified/suspected faulty <b><u>motor control component/s</u></b> like magnetic contractor, timer, relays etc is checked and fault is confirmed 3.3 Faulty motor control component/s is repaired/replaced 3.4 Replacement/repared motor control component is installed/fitted back to the system 3.5 Circuit continuity and integrity of termination is checked and reviewed
4. Test operation of motor control circuit/system and document result	4.1 <b><u>Appropriate test instruments</u></b> are used for circuit and operation testing 4.2 Static test is carried out 4.3 Hot functional test is performed
5. Clean and maintain work area.	5.1 Tools, equipment and materials are cleaned and stored in its proper storage 5.2 Work area is cleaned

## Range of Variables

Variable	Range (Includes but not limited to):
1. Manuals	1.1 Manufacturer's Specification Manual 1.2 Repair Manual 1.3 Maintenance Procedure Manual 1.4 Periodic Maintenance Manual 1.5 Quality Manual 1.6 Manual of Instruction
2. Tools	2.1 Wire stripper 2.2 Adjustable Wrench 2.3 Files: (flat, round, half round) 2.4 Hacksaw 2.5 Hammers: (ball peen, claw) 2.6 Pliers: (combination pliers, cutting pliers, diagonal cutting pliers, long nose pliers) 2.7 Screwdrivers: (star, negative, positive) 2.8 Electrician Knife 2.9 Electric Drill machine 2.10 Grinder 2.11 Soldering Iron/gun
3. Materials	3.1 Electrical wires 3.2 Terminal eye 3.3 Connectors 3.4 Clamps 3.5 Cable Tie 3.6 Electrical tape
4. Motor control component	4.1 Motor terminal block 4.2 Relay 4.3 Timer Relay 4.4 Switches 4.5 Fuse 4.6 Pressure switch 4.7 Overload relay 4.8 Magnetic contactor 4.9 Magnetic starter 4.10 Transformer 4.11 Motor terminal block
5. Trouble/fault	5.1 Faulty power supply 5.2 Faulty motor winding 5.3 Burnt electrical control component 5.4 Loose/open wiring 5.5 Faulty/damaged control component/s
6. Appropriate test instruments	6.1 Skull guard/helmet 6.2 Goggles 6.3 Safety shoes. 6.4 Safety gloves 6.5 Proper working clothes



## Curricular Content Guide

<p>1. Underpinning knowledge</p>	<p>1.1 Manuals, tools and materials gathering procedures            1.2 Methods of checking tools, equipment and materials for usability            1.3 Operation and maintenance manuals procedure for compatibility checking with the machines/equipment            1.4 Job order/job instruction analysis            1.5 Initial inspection and investigation on machine operation            1.6 Circuit integrity/functionality of motor control system            1.7 Trouble/fault identification and confirmation procedures            1.8 Checking and fault finding procedures for motor control component/s            1.9 Repairing/replacing procedures of faulty motor control component/s            1.10 Method of repairing and installing motor control component            1.11 Circuit continuity and integrity of termination            1.12 Use of test instruments for circuit and operation testing            1.13 Principle of Static testing            1.14 Procedure of Hot functional testing            1.15 Workplace procedures of Tools, equipment and materials are cleaning and storing            1.16 Workplace policy of Work place hygiene policy</p>
<p>2. Underpinning Skills</p>	<p>2.1 Gathering manuals, tools and materials required for servicing            2.2 Checking tools, equipment and materials for operability/functionality.            2.3 Checking of operation and maintenance manuals for compatibility with the machine under servicing/maintenance            2.4 Reading and analyzing job order/job instruction            2.5 Carrying out Initial inspection and investigation on machine operation            2.6 Checking and verifying Circuit integrity/functionality of motor control system            2.7 Identifying and confirming trouble/fault            2.8 Checking and confirming Identified/suspected fault of motor control component/s            2.9 Repairing/replacing faulty motor control component/s            2.10 Installing/fitting back to the system replaced/repaired motor control component            2.11 Checking and reviewing circuit continuity and integrity of termination            2.12 Using appropriate test instruments for circuit and operation testing            2.13 Carrying out static testing            2.14 Performing hot functional testing            2.15 Cleaning and storing tools, equipment and materials in its proper storage            2.16 Cleaning work area</p>

3. Underpinning attitudes	3.1 Concern for work quality 3.2 Cleanliness/tidiness 3.3 Commitment to occupational health and safety 3.4 Environmental concerns 3.5 Eagerness to learn 3.6 Timeliness and orderliness 3.7 Respect for rights of peers and seniors in workplace 3.8 Orderliness
4. Resource Implications	4.1 Workplace (simulated or actual) 4.2 Materials, tools and equipment needed for the activity 4.3 Pens 4.4 Papers 4.5 Work books 4.6 Instruction manual

### Evidence Guide

1. Critical Aspects of Competency	Assessment required evidence that the candidate: <ol style="list-style-type: none"> <li>1.1 Used appropriate manuals, tools and materials</li> <li>1.2 Performed accurate troubleshooting and diagnostics procedures</li> <li>1.3 Replaced faulty motor control components</li> <li>1.4 Replaced faulty motor control components</li> <li>1.5 Tested operation of motor control circuit/system</li> <li>1.6 Carry out required workplace documentation</li> <li>1.7 Cleaning work area and storing tools and materials in accordance with workplace requirements</li> </ol>
2. Methods of assessment	Competency should be assessed by: <ol style="list-style-type: none"> <li>2.1 Written examination</li> <li>2.2 Demonstration</li> <li>2.3 Oral Interview</li> <li>2.4 Workplace observation</li> <li>2.5 Portfolio</li> </ol>
3. Context of assessment	3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.

<b>Unit of Competency:</b> <b>PERFORM MOTOR REWINDING AND SERVICING</b>	<b>Nominal Duration:</b> 55 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-8-O
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**Unit Descriptor:**

This unit covers the knowledge, skills and attitudes required for a worker to perform motor rewinding and servicing. It specifically includes tasks of identifying fault/s of an AC motor or generator, winding/rewinding ac motor or generator, identifying fault of DC motor or generator, winding/rewinding DC motor and cleaning and maintaining work area.

**Elements and Performance Criteria Template:**

(Terms in the performance criteria that are written in **bold and underlined** are described in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Identify fault of an AC motor or generator	2.1 <b><u>Types of AC motor or generator</u></b> are identified 2.2 <b><u>Types of winding of the AC motor</u></b> or generator are identified 2.3 Functions of <b><u>parts/components of AC motor or generator</u></b> is explained 2.4 Faulty parts/components of AC motor or generator is identified
2. Wind/rewind AC motor or generator	2.1 Winding of an AC motor is drawn 2.2 Illustrate <b><u>starting arrangement of the AC motor</u></b> 2.3 <b><u>Tools, equipment and materials</u></b> needed for motor rewinding are prepared 2.4 Winding/rewinding of AC motor/generator is carried out 2.5 Continuity of AC motor/generator terminals are tested and marked
3. Identify fault of DC motor or generator	3.1 <b><u>Types of DC motor or generator</u></b> are identified 3.2 <b><u>Types of winding of the DC motor</u></b> or generator are identified 3.3 Functions of <b><u>parts/components of DC motor or generator</u></b> is explained 3.4 Faulty parts/components of DC motor or generator are identified
4. Wind/rewind DC motor	4.1 Winding of a DC motor is drawn 4.2 Tools, equipment and materials needed for motor rewinding are prepared 4.3 Winding/rewinding the DC motor is carried out 4.4 Continuity of DC motor terminals are tested and marked
5. Clean and maintain work area.	5.1 Tools, equipment and materials are cleaned and stored in its proper storage 5.2 Work area is cleaned

**Range of Variables**

<b>Variable</b>	<b>Range (Includes but not limited to):</b>
1. Types of AC motor or generator	1.1 Induction 1.2 Synchronous
2. Windings of the AC motor	2.1 Single phase 2.2 Three-phase

3. Parts/components of AC motor or generator	3.1 Stator 3.2 Rotor 3.3 Bearings 3.4 Thermostat 3.5 Relay 3.6 Starting capacitor 3.7 Running capacitor 3.8 Terminal block
4. Starting arrangement of the AC motors	4.1 For single phase AC induction motors; 4.1.1 Split-phase induction motor 4.1.2 Capacitor start induction motor 4.1.3 Capacitor start capacitor run induction motor 4.1.4 Permanent split capacitor (PSC) motor 4.1.5 Shaded pole induction motor 4.2 For Three-phase AC motors; 4.2.1 Direct-On-Line (DOL) starting 4.2.2 Reduced voltage method 4.2.3 Star-Delta starting
5. Tools, equipment and materials	5.1 Tools; 5.1.1 Wire stripper 5.1.2 Screw driver 5.1.3 Electrical pliers 5.1.4 Plastic mallet 5.1.5 Rubber mallet 5.1.6 Bearing tool set 5.1.7 Feeler gauge 5.1.8 Coil tampering tool 5.1.9 Electrician's knife 5.1.10 Commutator slot shaver 5.2 Equipment; 5.2.1 Rewinding machine 5.2.2 Drill press 5.2.3 Pedestal grinder 5.2.4 Hydraulic press 5.2.5 Bearing heater 5.2.6 Bearing puller 5.3 Materials; 5.3.1 Magnet wires 5.3.2 Insulating plastic film 5.3.3 PVC tape 5.3.4 Laminates 5.3.5 Insulating paper 5.3.6 Ceramic fiber 5.3.7 Varnish 5.3.8 Enamel coated copper wire 5.3.9 Winding string
6. Types of DC motor or generator	6.1 Separately excited 6.2 Self excited; 6.2.1 Shunt 6.2.2 Series

	6.2.3 Compound 6.3 Permanent magnet
7. Types of winding of the DC motor	7.1 Field winding 7.2 Armature winding 7.2.1 Lap winding 7.2.2 Wave winding
8. Parts/components of DC motor or generator	8.1 Commutator 8.2 Brush 8.3 Armature 8.4 Armature conductors 8.5 Field winding 8.6 Pole 8.7 Yoke 8.8 Terminal box

### Curricular Content Guide

1. Underpinning knowledge	1.1 Types of AC motor or generator 1.2 Types of winding of the AC motor or generator 1.3 Operation and functions of the parts/components of AC motor or generator 1.4 Procedure of identifying Faulty parts/components of AC motor or generator 1.5 Different types of AC motor windings 1.6 Starting arrangements of the ac motor 1.7 Tools, equipment and materials needed for motor rewinding 1.8 Methods and techniques of winding/rewinding AC motors 1.9 Procedure of testing continuity of AC motor and marking of terminals 1.10 Different types of DC motor or generator 1.11 Types of DC motor or generator windings 1.12 Functions of the different parts/components of DC motor or generator 1.13 Procedure of identifying a faulty parts/components of DC motor or generator 1.14 Different types of dc motor windings 1.15 Methods and techniques of carrying out winding/rewinding of DC motors 1.16 Testing the continuity of dc motor and marking of terminals 1.17 Cleaning and storing Tools, equipment and materials 1.18 Cleaning of Work area after each work activity
2. Underpinning Skills	2.1 Explaining the functions/operation of the different types of AC motor or generator 2.2 Identifying faulty parts/components of AC motor or generator 2.3 Preparing tools, equipment and materials needed for motor rewinding 2.4 Testing continuity of AC motor and marking of terminals 2.5 Explaining functions of parts/components of dc motor or generator

	<ul style="list-style-type: none"> <li>2.6 Identifying faulty parts/components of DC motor or generator</li> <li>2.7 Preparing tools, equipment and materials needed for motor rewinding</li> <li>2.8 Carrying out winding/rewinding of motors</li> <li>2.9 Testing Continuity of DC motor and marking of terminals</li> <li>2.10 Cleaning Tools, equipment and materials and storing in accordance with workplace policy</li> </ul>
3. Underpinning attitudes	<ul style="list-style-type: none"> <li>3.1 Concern for work quality</li> <li>3.2 Cleanliness/tidiness</li> <li>3.3 Commitment to occupational health and safety</li> <li>3.4 Environmental concerns</li> <li>3.5 Eagerness to learn</li> <li>3.6 Timeliness and orderliness</li> <li>3.7 Respect for rights of peers and seniors in workplace</li> <li>3.8 Orderliness</li> </ul>
4. Resource Implications	<ul style="list-style-type: none"> <li>4.1 Workplace (simulated or actual)</li> <li>4.2 Materials, tools and equipment needed for the activity</li> <li>4.3 Pens</li> <li>4.4 Papers</li> <li>4.5 Work books</li> <li>4.6 Instruction manual</li> </ul>

### Evidence Guide

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Identified faulty parts/components of AC motor or generator</li> <li>1.2 Carry out winding/rewinding of AC motor/generator</li> <li>1.3 Tested continuity of AC motor/generator and marked terminals</li> <li>1.4 identified Faulty parts/components of DC motor or generator</li> <li>1.5 Carried out winding/rewinding of DC motor /generator</li> <li>1.6 Tested Continuity of DC motor/generator and marked terminals</li> <li>1.7 Cleaned tools, equipment and materials and stored in accordance with workplace requirements</li> </ul>
2. Methods of assessment	<p>Competency should be assessed by:</p> <ul style="list-style-type: none"> <li>2.1 Written examination</li> <li>2.2 Demonstration</li> <li>2.3 Oral Interview</li> <li>2.4 Workplace observation</li> <li>2.5 Portfolio</li> </ul>
3. Context of assessment	<ul style="list-style-type: none"> <li>3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.</li> </ul>

<b>Unit of Competency:</b> <b>INSTALL AND MAINTAIN SOLAR POWER SYSTEM</b>	<b>Nominal Duration:</b> 20 hrs.	<b>Unit Code:</b> SEIP-LIG-ELE-9-O
<b>Unit Descriptor:</b> This unit covers the knowledge, skills and attitudes required for a worker to install and maintain solar power system. It specifically includes tasks of planning work and calculating cost, performing distribution of electrical supply, installing and commissioning off-grid solar PV system and perform corrective and preventive maintenance.		

**Elements and Performance Criteria Template:**

(Terms in the performance criteria that are written in **bold and underlined** are described in the range of variables).

<b>Elements of Competency</b>	<b>Performance Criteria</b>
1. Plan work and calculate cost	1.1 Drawings, sketches and specifications are interpreted 1.2 Drawings and sketches are developed 1.3 Material and labor cost are calculated
2. Install PV Module at a suitable place maintaining appropriate angle	2.1 PV Module is installed and interpreted 2.2 Maintenance and servicing of PV module are explained
3. Connect Solar Charge Controller with PV Module	3.1 Current and Voltage Rating of charge controller are determined 3.2 Charge Controller is installed and interpreted
4. Connect Inverter and Battery with the Charge Controller	4.1 Current and Voltage rating are determined and interpreted 4.2 Ampere-hour of the Battery and Battery voltage are determined and interpreted 4.3 Battery and inverter are connected with charge controller and the load to be used
5. Perform distribution of electrical supply from the solar system	5.1 <b><u>Electrical load schedule</u></b> is reviewed 5.2 Distribution priority is set 5.3 <b><u>Electrical load parameters</u></b> are monitored
6. Install and commission off-grid solar PV system	6.1 <b><u>Types of solar PV system</u></b> is identified 6.2 <b><u>Major components</u></b> of solar PV system is identified 6.3 Solar PV system installation is planned and prepared 6.4 Photovoltaic array is mounted 6.5 Solar photovoltaic array is installed and commissioned
7. Perform corrective and preventive maintenance	7.1 Corrective maintenance is planned and prepared 7.2 Planned preventive maintenance is carried out 7.3 Troubleshooting is performed 7.4 Corrective maintenance procedures are carried out 7.5 Work is completed

### Range of Variables

Variable	Range (Includes but not limited to):
1. Electrical load schedule	1.1 Lay out plan 1.2 Input & output voltages 1.3 Voltage drops
2. Electrical load parameters	2.1 Current 2.2 Energy 2.3 Voltage
3. Types of solar PV system	3.1 Roof top mounted 3.2 Building integrated 3.3 Grid-connected 3.4 Off-grid (standalone)
4. Major components	4.1 Solar panels( PV Module) 4.2 Solar inverter 4.3 Charge Controller 4.4 Battery 4.5 Mounting 4.6 Cabling 4.7 Accessories

### Curricular Content Guide

1. Underpinning knowledge	1.1 Understanding technical drawings, sketches and specifications 1.2 Procedure for developing drawings and sketches 1.3 Calculating methods and techniques for material and labor cost 1.4 Electrical load schedule 1.5 Method of setting distribution priority 1.6 Monitoring electrical load parameters 1.7 Types of solar PV system 1.8 Major components of solar PV system 1.9 Solar PV system installation procedure 1.10 Photovoltaic array 1.11 Solar photovoltaic array installation and commissioning 1.12 Charge controller rating in terms of voltage and current 1.13 Ampere-hour, voltage and number of plates in the battery 1.14 Current and Voltage rating of inverter 1.15 Corrective maintenance planning, preparation and execution 1.16 Procedure of carrying out planned preventive maintenance 1.17 Troubleshooting and fault detection methods for Charge Controller, inverter and battery 1.18 Procedures on carrying out corrective maintenance
2. Underpinning Skills	2.1 Interpreting drawings, sketches and specifications 2.2 Developing Drawings and sketches 2.3 Calculating Material and labor cost 2.4 Reviewing electrical load schedule 2.5 Setting distribution priority 2.6 Monitoring electrical load parameters 2.7 Identifying types of solar PV system 2.8 Identifying major components of solar PV system



	<p>2.9 Selection of Charge controller as per the load to be used( voltage and current rating)</p> <p>2.10 Ampere-hour, voltage and number of plates in the battery</p> <p>2.11 Finalizing Current and Voltage rating of inverter</p> <p>2.12 Solar PV system installation is planned and prepared</p> <p>2.13 Mounting of photovoltaic array</p> <p>2.14 Installing and commissioning solar photovoltaic array</p> <p>2.15 Planning and preparing for corrective maintenance is</p> <p>2.16 Carrying out planned preventive maintenance</p> <p>2.17 Performing troubleshooting</p> <p>2.18 Carrying out corrective maintenance procedures</p>
3. Underpinning attitudes	<p>3.1 Concern for work quality</p> <p>3.2 Cleanliness/tidiness</p> <p>3.3 Commitment to occupational health and safety</p> <p>3.4 Environmental concerns</p> <p>3.5 Eagerness to learn</p> <p>3.6 Timeliness and orderliness</p> <p>3.7 Respect for rights of peers and seniors in workplace</p> <p>3.8 Orderliness</p>
4. Resource Implications	<p>4.1 Workplace (simulated or actual)</p> <p>4.2 Materials, tools and equipment needed for the activity</p> <p>4.3 Pens</p> <p>4.4 Papers</p> <p>4.5 Work books</p> <p>4.6 Instruction manual</p>

### Evidence Guide

1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <p>1.1 Planned work activities in accordance with project plan/design</p> <p>1.2 Calculated project cost in accordance with plan/design</p> <p>1.3 Performed electrical supply loading and distribution</p> <p>1.4 Mounted photovoltaic array in accordance with design plan</p> <p>1.5 installed and commissioned Solar photovoltaic array following design and workplace requirements</p> <p>1.6 Performed corrective maintenance in accordance with unit supplier specification</p> <p>1.7 Performed preventive maintenance as per plan</p>
2. Methods of assessment	<p>Competency should be assessed by:</p> <p>2.1 Written examination</p> <p>2.2 Demonstration</p> <p>2.3 Oral Interview</p> <p>2.4 Workplace observation</p> <p>2.5 Portfolio</p>
3. Context of assessment	<p>3.1 Competency assessment must be done in a training center or in an actual or simulated work place after completion of the training module.</p>

### END OF COMPETENCY STANDARD

# **Assessment Guide**

**A Framework for Effective Assessment**

## **Electrical Installation and Maintenance**

## *How to Use this Assessment Guide*

- This Assessment Guide presents need-to-know information for Assessors and others who want to know more about the assessment process. A handy Table of Contents Guide on the next page shows you where to look.
- If you want the basics of assessment, its key terms and definitions, in a Question & Answer (Q&A) format, see Section One.
- If you want a knowledge of who does what, the key roles and responsibilities involved in assessment, see Section Two.
- If you want a “toolbox” of tools and templates, that you can select from depending on your assessment need, see Section Three.
- If you want to look at working samples of completed assessment tools, see the Appendices.

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# Assessment Guide

## Section One: Objectives linked to Key Terms & Definitions

### *Define assessment.*

Assessment is a systematic process of collecting proof or evidence on whether or not a candidate has demonstrated competence in the performance of a work-related activity/task that is directly linked to a performance standard. The assessment confirms that the individual can perform to the standard expected in the workplace and/or the nationally approved competency standard.

### *Give an example of assessment.*

A helpful example in this regard is the driving test. The driver must prove his competence to drive by demonstrating to the driving assessor his ability to do so. The driving assessor uses a checklist to assess the candidate and make the necessary recommendations, based on the evidence he has collected in observing the candidate's driving. S/He either records/recommends that the candidate is **competent** or **not yet competent**.

### *What is the purpose of assessment?*

The Purpose of Assessment is to confirm that a trainee can perform competently to the standards expected in the workplace.

### *What is Assessment based on?*

- An effective Assessment is based on a Competency Standard.
- A Competency Standard describes the skills, knowledge, and attitudes needed to perform effectively in the workplace, not the classroom.

### *Define the term "competency."*

Competency is the ability to do a task successfully. Aspects of competency include:

- The capacity to perform tasks to the required standard consistently
- The ability to respond to different needs in the workplace
- The ability to plan and integrate a variety of tasks to attain a work outcome

*Describe what makes up a competency standard.*

It must be noted that a competency standard is made up of individual units of competency that include elements of competency as well as the performance criteria needed to accomplish them.

*Define the term “Assessment tool.”*

An assessment tool is, in effect, an evidence-gathering tool. It contains both the instrument used for the assessment and instructions for gathering evidence in the assessment process. As an assessment instrument it contains the context and conditions for the assessment; tasks to be administered to the learner; an outline of the evidence to be gathered for the learner; the criteria for judging the evidence; and the necessary housekeeping records for recording and reporting requirements.

*Describe the difference between Conventional Testing & Competency Based Assessment.*

Conventional Testing	CBT Assessment
<ul style="list-style-type: none"> <li>• Emphasis on knowledge/memorization</li> <li>• Teachers/Training Providers have main role</li> <li>• Theory &amp; practical Tests can become outdated</li> <li>• High cost &amp; central control</li> <li>• Relatively inflexible</li> </ul>	<ul style="list-style-type: none"> <li>• Based on competency standards</li> <li>• Involve industry partners in crucial role</li> <li>• Assessment based on demonstration of work skills rather than classroom knowledge</li> <li>• Flexible delivery</li> <li>• Competencies widely recognized</li> </ul>

- |  |   |
|--|---|
|  | <ul style="list-style-type: none"><li>• Guidelines &amp; Templates used</li></ul> |
|--|---|

*Describe briefly what makes up an assessment system.*

An Assessment System must be understood as a well-coordinated set of documented policies and procedures, including assessment materials and tools, that ensure assessments are consistently valid, reliable, flexible, fair, and safe.

*Define the purpose of the Assessor role.*

The role of Assessor is the heart and soul of effective competency based assessment. Without this pivotal role, determining the competency of the trainee is mere guesswork.

Note:

- The Industry Assessor will be asked to provide specs and practical demonstration tests from his workplace that will provide the evidence for determining competency.
- The importance of this input cannot be overemphasized for it best matches and tests the required performance criteria from the Standard.

*Describe the basic questions that an Assessor must ask when planning an Assessment.*

### **Planning an Assessment: What Needs to Happen?**

- Determine which Units of Competency need to be assessed?
- Determine what Assessment Methods will be used?
- Determine what evidence-based tools (specs) need to be developed by the Assessor to guide the assessment?
- Determine how long it will take?
- Determine when the assessment will occur?
- Determine where the assessment will take place?
- Determine how it will be recorded?



*Give some Assessor Requirements/Competencies.*

### **Requirements/Competencies of an Assessor-**

- The ability to use assessment tools to gather evidence effectively is essential, adjusting the language where necessary to reflect the language/literacy/numeracy levels of the workplace and not to exceed them in order to ensure learner understanding. This will also entail an ability to respond to learner needs such as responding to learner disability.
- The skill to develop specifications and practical tests, based on performance criteria, that provide evidence of competency that will fast track the assessment process.
- The ability to clearly demonstrate current industry skills and competencies relevant to the Standard.
- The Assessor is selected/appointed by Industry to act as an Assessor because of his proven competencies.
- Knows what needs to be done to assess the performance criteria
- Demonstrates a high level of expertise in the technical area to be examined
- Can provide constructive feedback

*Define the challenges of the Assessor Role.*

### **Assessor Role: Challenges**

- Needs to be objective and unbiased
- Must have interpersonal skills to relax nervous candidates or deal with those who are aggressive or emotional
- Must have ability to deal with those who have literacy problems or difficult dialect

*Review some basic need-to-know elements concerning assessment.*

### **Assessment Basics: Need to Know Elements**

- Assessment to be conducted by Industry Assessor selected by industry
- Industry assessor must be familiar with units of competency outlined in the course standards
- Industry Assessor should drafts specs that reflect industry requirements for trainees and that are based on critical aspects of competency

- Industry assessor is responsible for making final judgment of **competent** or **not yet competent**
- Trainer will assist industry assessor
- Trainees must demonstrate competence based on the units of competency outlined in the standards
- All resources related to units of competency must be made available prior to the assessment event, e.g., tools, equipment, materials

*Describe the trainer's role in the assessment process.*

The Trainer acts as a primary resource for the Assessor and acts as a Facilitator.

Trainer ensures:

- All industry required tools, equipment, and materials are available for the assessment
- The training venue is booked and has sufficient space for demonstrations/tasks
- That all logistics such as admission slips, signature sheets, and records are readily available for distribution and collection
- That all teaching materials and Standard documents and Assessment tools are ready for the Assessor

*Discuss the importance of principles of assessment and what is involved.*

**Principles of Assessment Table**

Key Principles	Relevance/Meaning
<b>Valid</b>	Ensures assessment aligned with the Unit of Competency and is based on evidence that shows the learner can demonstrate skills and knowledge in other similar contexts (workplace)
<b>Reliable</b>	Evidence presented for assessment is consistently interpreted regardless of the Assessor
<b>Flexible</b>	Assesses competencies held by the learner regardless of where they have been acquired; reflects the individual learner's needs
<b>Fair</b>	The individual learner's needs or disability is considered in the assessment process; the learner is provided with information about the assessment process and given the opportunity to challenge the result of the assessment if warranted

<b>Safe</b>	The assessor has inspected the venue for assessment and determined that it is safe for all involved and that emergency evacuations are in place if needed
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*Define the term “evidence.”*

Evidence is information that is gathered and matched against a Unit of Competency to provide proof of competency.

*State the different forms of evidence that can be collected.*

Different forms of evidence that can be collected are-

- **Direct** such as demonstration test, or observation of Candidate
- **Indirect** such as Candidate’s self-assessment or third party reports such as an employer interview

*Describe and outline what is involved in “rules of evidence” and why they are important.*

Rules of Evidence Table

Rules of Evidence	Meaning
<b>Valid</b>	The assessor is given assurance that the learner possesses the skills, knowledge, and attitudes described in the Unit of Competency and related assessment requirements
<b>Sufficient</b>	The assessor is assured that the quality, quantity, and relevance of the evidence is sufficient to enable a judgment to be made on the learner’s competency
<b>Authentic</b>	The assessor is assured that the evidence provided for assessment is the learner’s own work
<b>Current</b>	The assessor is assured that the assessment evidence demonstrates current competency of the learner. This evidence must be from the present or very recent past.

*Describe the purpose of evidence gathering tools.*

The Purpose of evidence gathering tools are-

- To help candidates understand what is expected of them
- To provide a focus for the assessment
- To identify what is needed to verify competency

*State the use of the evidence guide.*

The evidence guide provides useful advice on Unit of Competency assessment and must be read in conjunction with the performance criteria, required underpinning skills/knowledge/attitudes, range statement, and the critical aspects of competency for the Standard.

*State why assessment evidence is important.*

Evidence is the information gathered that provides proof that the performance criteria of a unit of competency has been met. Evidence can take many forms:

- **Observation:** watching the trainee perform
- **Questioning:** asking the trainee questions
- **Demonstration of specific skills:** seeing how the trainee performs a procedure or creates a final product
- **Examining** previous work the trainee has done

*Describe the kinds of Assessment Methods that can be used for Evidence gathering purposes.*

Various kinds of Assessment Methods can be used for Evidence gathering purposes. A wide range of assessment methods are available for Evidence- gathering purposes. Assessment methods are not limited to those listed below. The greater the range of assessment methods applied, the better the accuracy of the assessment.

Assessment Methods Table

Methods	Examples
Direct Observation of Candidate	Actual real-time activities in the workplace Work activities in a simulated workplace/training center
Questioning	Written questions; interviews; self-evaluation with questions; verbal questioning; questionnaires
Evidence compiled by Candidate	Portfolio; collection of work samples; products with supporting documentation; logbooks; information about life experience
Methods	Examples
Review of Product	Work samples and products; products as a result of a demonstration test/spec
Third Party Feedback	Reports/testimonials from Employers and Supervisors; evidence of training; interviews with Employers and Supervisors

**Advice to the Assessor:** use these methods and examples as a means of making your assessment valid, reliable, flexible, fair, and safe.

*Define the term “evidence gathering tools” and give some examples of these tools.*

Evidence gathering tools are the actual instruments that the Assessor uses to collect evidence. Evidence may be collected through:

- Demonstration of work activity
- Observation Checklist
- Question List
- Third party reports e.g. supervisor to verify consistent performance
- Review of candidate’s portfolio

- Verifying the Candidate's capacity to deal with contingencies (unexpected things that come up)
- Written test

*Define the term "portfolio."*

A collection of evidence that may be presented by the Candidate to an Assessor to prove the Candidate's competence at a job or task.

What are some examples of Portfolio Evidence?

- Training results and certificates
- Training workbooks
- References from employers
- Job description and work experience
- Photos and videos
- Work journals
- Awards
- Work samples
- Letters and memos

*Outline a 6-step method for preparing an evidence plan.*

### **Steps in Preparing an Evidence Plan (Sequence of Steps to Follow)-**

The Evidence Plan is the most important planning tool for an Assessor. A good evidence plan generates a list of the evidence that the Assessor must gather when conducting the assessment for a specific Unit of Competency. The following 6-Point Method for preparing an Evidence Plan provides a useful sequence of inter-related steps to follow:

1. Select Unit of Competency for assessment
2. Read full Unit of Competency
3. Identify evidence requirements based on:
  - a. Elements and Performance Criteria
  - b. Dimensions of Competence
  - c. Underpinning skills knowledge
  - d. Critical aspects of competency
4. Develop a list of evidence requirements
5. Identify best ways of collecting evidence (tools)
6. Document evidence plan

*Outline the steps (sequence of activities) involved in developing an assessment tool.*

Following are the steps (sequence of activities) involved in developing an assessment tool:

1. Select the Unit of Competency
2. Read the Unit of Competency
3. Identify the required evidence: critical aspects of competency
4. Identify the evidence gathering method
5. Complete the evidence plan
6. Select the appropriate template
7. Complete the template
8. Check the evidence gathering tools against the evidence plan and Unit of Competency
9. Check the tool with another Assessor for his opinion

*Describe the four dimensions of competency.*

**Task Skills:** the capacity to perform tasks in the workplace and demonstrate competence that meets the required Standard;

**Task Management Skills:** the ability to plan and integrate several tasks simultaneously that achieve a desired work outcome such as those skills involved in budgeting for a work operation, securing supplies and equipment for the work operation, completing the task in a timely, cost-effective manner, and ensuring safety practices are followed throughout;

**Contingency Management Skills:** the ability to respond to crises and breakdowns in the workplace, such as accidents and emergency situations that are unanticipated and require immediate action and resolution;

**Job/Role Environment Skills:** the capacity to own the responsibilities and expectations of the work environment that involves working with others effectively and participating in creating a work culture where all can contribute their best within the parameters of their job role

# Assessment Guidelines

## Section Two: Roles and Responsibilities

### *The Assessment System: Planning Guide for the Assessor*

An Assessment System must be understood as a well-coordinated set of documented policies and procedures, including assessment materials and tools, that ensure assessments are consistently valid, reliable, flexible, fair, and safe.

*Competency Assessment is a systematic process of collecting proof or evidence on whether or not a candidate has demonstrated competence in the performance of a work-related activity/task that is directly linked to a performance standard. The assessment confirms that the individual can perform to the standard expected in the workplace and/or the nationally approved competency standard.*

Each **Unit of Competency** contained in a Standard describes a distinct part of a Mason's work and job profile. Within each Unit of Competency, the following components appear:

- Unit Title
- Unit Descriptor
- Elements of Competency
- Performance Criteria
- Range of Variables
- Evidence Guide

As a prelude to conducting assessments, the Assessor must be thoroughly familiar with all of the particulars and details of the Unit of Competency that is being assessed. This is a "must" for the role of the Assessor. He must be especially familiar with the Evidence Guide for gathering critical information.

The three sample assessment tools found below focus on the critical aspects of competency that can provide the required evidence to determine competency- the evidence guide. These sample assessment tools are as follows:

- Demonstration Checklist
- Observation Checklist
- Oral Questions Checklist



**The duties of the Assessor include:**

- Covering all of the key elements of the Unit of Competency under assessment
- Applying rigorously the Evidence Guide for the Unit of Competency as this contains the method and context of assessment, resources required for the assessment, the critical aspects of competency, and the required underpinning knowledge, skills, and attitudes
- Developing specifications (specs) for the task sheet for Demonstration as required
- Requiring the candidate to perform project tasks that cover interrelated units of competency- known as a “clustering.”
- Making what can be termed “reasonable adjustments” for candidates with disabilities or for example, those candidates with regional dialects that prove difficult to understand

Note: These “reasonable adjustments” may involve reconfiguring a simulated workplace site so that a candidate’s disability does not impede the assessment process, or for example, finding someone who can understand a regional dialect and assist the Assessor with essential communication skills.

## *Roles and Responsibilities of Assessor*

Prior to any assessment, the Assessor should follow the specific instructions below to ensure a well-planned assessment event. In most cases s/he will be assisted by a Trainer. Nevertheless, s/he should make certain that good preparation has taken place for the assessment event.

1. Visit the assessment venue or workplace to ensure an adequate work area or platform containing:
  - Sufficient space for working- ensure square meters of work space enough for task to be carried out effectively and safely
  - Fire extinguisher and safety equipment within reach
  - Emergency procedures in place
  - All necessary tools, equipment, and materials ready at hand
  - All necessary machinery in good working order
2. Assessment is drawn and extracted from the relevant Unit of Competency based on an approved Standard and on an Evidence plan that clearly focuses on critical aspects of competency.
3. The duration of time to assess the demonstration is clearly indicated, for example, 3 hours. This information is shared with the Candidate along with other pertinent

information such as the sequence of tasks that he must follow, and the fact that he will be closely observed as the tasks are performed.

4. After the Candidate has performed the task, the Assessor will provide feedback to the Candidate on his performance.

5. The responsibility on finally deciding whether or not the Candidate was Competent or Not Yet Competent belongs to the accredited Assessor.

6. At the conclusion of the assessment, the Assessor will provide feedback on whether or not the Candidate was Competent or Not Yet Competent. S/He will also share information on next steps. These next steps include where to obtain the certificate related to the assessment or, if unsuccessful, how to re-try for competency within a specified period of time.

## *Roles and Responsibilities of Trainer*

Prior to the assessment, you will have studied and become familiar with the Competency Standard for the industry occupation. You will also have met with or contacted the Assessor beforehand and discussed preparations and arrangements for the assessment. Your role will be to facilitate the assessment process and ensure all necessary resources are available, assisting the Assessor wherever possible. For example, once a draft spec has been produced by the Assessor, you will ensure it is fully consistent with the evidence plan and copied appropriately for use by both the Assessor and Candidate.

In addition to confirming a suitable training venue and time, you will ensure that:

- Sufficient space is allotted for task work- square meters of work space enough for demonstration tasks to be carried out effectively and safely
- Fire extinguisher and safety equipment within reach if necessary
- Emergency procedures in place
- All necessary tools, equipment, and materials ready at hand
- All necessary machinery in good working order

Your duties include:

- **notifying** the Assessor and candidates of planned assessment events and their location
- **advising and assisting** the Assessor on planned assessment events
- **collecting** admission slips and signature sheets for assessment events
- **ensuring** all required forms and reporting mechanisms are in place and ready for distribution to the Assessor and to the Candidate
- **ensuring** all requisite forms are duly signed and forwarded to the SEIP Office, or certifying body

- **responding** to candidate queries and concerns such as re-assessment procedures
- **reconfiguring** workplace simulations so that candidates with disabilities are able to participate fully and without impediment
- **working** closely with the SEIP contact to ensure a successful assessment event

## *Roles and Responsibilities of Candidate*

Prior to the assessment, you will have studied and become familiar with the Competency Standard for your industry.

1. Initially, you will be given information on the task you are to perform, and the estimated time you will require to perform it. These tasks are based on the critical aspects of competency related to the performance criteria within the approved Competency Standard.

Given the necessary instructions, and/or a task-related spec and the necessary tools, materials, and equipment, you will carry out and complete a work task. You will observe that there is:

- Sufficient space for working- square meters of work space enough for task to be carried out effectively and safely
- Fire extinguisher and safety equipment within reach if necessary
- Emergency procedures in place
- All necessary tools, equipment, and materials ready at hand
- All necessary machinery in good working order

2. Assessment is drawn and extracted from the relevant Unit of Competency based on the approved Competency Standard and on an Evidence plan (proof of competence) developed by the Assessor that clearly focuses on critical aspects of competency. The Evidence plan will be based on critical assessment tools such as demonstration/task; observation; oral questions.

3. The duration of time to assess the demonstration should be clearly indicated, for example, 3 hours. This information will be given to you along with other pertinent information such as the procedure or sequence of tasks that you must follow. It is important to note that you will be closely observed and assessed throughout the duration of your demonstration. You will be given time to ask questions and request clarification. You will also be given 10 minutes to familiarize yourself with the resources to be used in the assessment.

4. Based on your performance in demonstrating the task, you will be assessed by the Assessor to be Competent or Not Yet Competent. Regardless of the result you will be given feedback from the Assessor on your performance and the next steps.

5. After you have performed the task, the Assessor will provide feedback to you on your performance.

6. The responsibility on finally deciding whether or not you are Competent or Not Yet Competent belongs to the accredited Assessor.

7. At the conclusion of the assessment, the Assessor will provide feedback on whether or not you have been assessed to be **Competent** or **Not Yet Competent**. Both your signatures will be required on the Assessment Form. You will also be allowed to make comments on the Assessor's decision. The Assessor will then share information on next steps. These next steps include where to obtain the certificate related to the successful assessment or, if unsuccessful, how to re-try for competency within a specified period of time.

## Section Three: Tools and Templates

This toolbox of Tools and Templates offers a wide range of assessment tools that will facilitate evidence gathering and other assessment-related needs. Evidence gathering, however, should not be limited to these tools and templates alone. The toolbox should be revised or expanded as necessary, to include other tools and templates that are deemed relevant.

- Demonstration Checklist
- Observation Checklist
- Oral Questions Checklist
- Evidence Plan (Overall Summary)
- Assessor Job Sheet and Specifications (Spec) Form
- Competency Assessment Results
- Assessor Planning Checklist Tool
- All About Questioning Techniques for Use in Assessment
- Quick Guide to Conducting Competency Assessments
- Assessor's Quick Start

# Demonstration Checklist

<b>Candidate's name:</b>			
<b>Assessor's name:</b>			
<b>Qualification:</b>			
<b>Project-Based Assessment Title</b>			
<b>Units of competency covered:</b>			
<b>Date of assessment:</b>			
<b>Time of assessment:</b>			
<b>Instructions for demonstration</b>			
Please see attached Instruction for Demonstration (Candidate/Assessor)			
<b>Supplies and Materials</b> ▪ Please refer to attached specific instruction	<b>Tools and equipment</b> • Please refer to attached specific instruction		
	✓ to show if evidence is demonstrated		
<b>During the demonstration of skills, did the candidate:</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Observation Checklist

Candidate's name:		
Assessor's name:		
Date of Assessment:		
Unit of Competency:		
Code:		
Name of Workplace/Training Center		
Procedure to Follow:	Observe Candidate's performing the task, and following the spec- if a spec is provided	
During the demonstration of skills, did the Candidate do the following (List steps that reflect critical aspects of competency from performance criteria of Unit of Competency):		
	<b>YES</b>	<b>NO</b>
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
<b>Candidate's performance was:</b>	<b>COMPETENT</b>	<b>NOT YET COMPETENT</b>
<b>Feedback to Candidate:</b>		
<b>Candidate's Signature:</b>		Date:
<b>Assessor's Signature:</b>		Date:

## Oral Questions Checklist

Candidate's name:	
Assessor's name	
Date of Assessment:	
Assessment Venue:	
Unit of Competency:	
Reference Standard:	

The List of Questions below must be pegged to the competency demonstration test and may involve related specs for each Unit of Competency tested. Underpinning skills for Knowledge may also be reviewed for competent/non yet competent.

List of Questions	Satisfactory Response	

Indicate Y or N in the box provided	YES	NO
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		

Feedback to Candidate:

Candidate's overall performance was (circle):	Satisfactory	Not Satisfactory
The Candidate's underpinning knowledge was (circle):	Satisfactory	Not Satisfactory

Assessor Signature:	Date:
Candidate Signature:	Date:



## EVIDENCE PLAN: Overall Summary

QUALIFICATION:				
Project-Based Assessment Title				
Units of competency covered				
Ways in which evidence will be collected: [tick the column]	Observation with Questioning	Demonstration with Questioning	Written Examination	Portfolio
The evidence must show that the candidate .....				
•				
•				
•				
•				
•				
•				
•				
•				
•				
•				
•				
•				
•				
•				
•				
•				
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•				
•				

# Assessor Job Sheet and Specifications (Spec) Form

This Spec is in reference to the \_\_\_\_\_ Standard, and has been developed by an Industry Representative/Assessor.

The Result\* indicates either C for Competent, or NYC for Not Yet Competent.

Unit of Competency	Elements Reviewed	Critical Aspects of Competency Covered	Result*: C/NYC

JOB #1 Procedure for Developing Specification (Spec): List the steps involved in performing the task/spec successfully. It will cover, in logical order, the critical aspects of competency listed above that will determine if the candidate is **Competent** or **Not Yet Competent**.

1.	
2.	
3.	
4.	
5.	

Tools and Equipment Required for Spec completion: List all tools, equipment, and materials required in completing Job #1:

Tools	Equipment	Materials

Assessor Name:

Date:

## Competency Assessment Results

Candidate's name:	
Assessor's name	
Qualification Title:	
Date of Assessment:	
Assessment Venue:	
Reference Standard:	
Unit of Competency:	

Assessment Unit	Competent	Not Yet Competent

Assessor's Recommendation and Comments:

Overall Assessment:

**Yes:** The Candidate successfully met the required evidence/standards and demonstrated all of the competencies necessary for certification in the Qualification and Units of Competency listed above.

**No:** The Candidate did not meet the evidence requirements. Re-assessment is recommended.

Assessor Signature:	Date:
Candidate Signature:	Date:
Assessment Center Manager Signature:	

## ASSESSMENT PLANNING CHECKLIST TOOL

Assessor's name:	
Date:	

**Directions: Circle the 'Yes' or 'No' response to each item.**

1.	The Assessor is familiar with the unit(s) of competency being assessed	Yes	No
2.	The Assessor has verified that the workplace or training center has the correct equipment, machinery, tools, and materials necessary to complete all of the relevant aspects of the unit of competency	Yes	No
3.	The Assessor has ensured that all materials and equipment were assembled and arranged in advance.	Yes	No
4.	The Assessor has all the necessary tools, templates, and specifications needed to assess the trainee including a variety of assessment tools covering practical demonstration, observation, oral question, and (where necessary) written tests relevant to the competency specified in the standard	Yes	No
5.	The Assessor has met with the trainer prior to the assessment event to discuss his/her role.	Yes	No
6.	The Assessor will discuss the performance test with the trainee and address any concerns prior to giving the test	Yes	No
7.	The Assessor will discuss and record with the trainee the results of their performance	Yes	No

**Action to be taken on "No" responses:**

## *General Guidelines for Effective Questioning*

- Keep questions short and focused on one key concept
- Ensure that questions are structured
- Test the questions to check that they are not ambiguous
- Use `open-ended questions such as `what if...?' and `why...?' questions, rather than closed questions
- Keep questions clear and straight forward and ask one at a time
- Use words that the candidate is able to understand
- Look at the candidate when asking questions
- Check to ensure that the candidate fully understands the questions
- Ask the candidate to clarify or re-phrase their answer if the assessor does not understand the initial response
- Confirm the candidate's response by repeating the answer back in his/her own words
- Encourage a conversational approach with the candidate when appropriate, to put him or her at ease
- Use questions or statements as prompts for keeping focused on the purpose of the questions and the kind of evidence being collected
- Use language at a suitable level for the candidate
- Listen carefully to the answers for opportunities to find unexpected evidence
- Follow up responses with further questions, if useful, to draw out more evidence or to make links between knowledge areas
- Compile a list of acceptable responses to ensure reliability of assessments

## *Recording responses*

When using oral questioning, you may need a tool that has a structured approach (see below) and also enables you to record a candidate's responses. If the candidate's response is insufficient the assessor should record why on the recording sheet or checklist. This provides information that can be used later, if necessary, to explain to the candidate where he or she needs to develop their skills and/or knowledge to achieve the required competence.

Recording sheet for oral questioning (template)

Candidate's Name		
Assessor or Observer's Name		
Unit of Competency)		
Code		
Date of Assessment		
Location		
Task/Procedure		
Questions to be Answered by candidate	Response/Answer*	Satisfactory (Yes/No)
What would you do if ...		
What would you do if ...		
What would you do if ...		
How do you ...		
What are ...		
Why did you... (Clarification)		
Follow up Questions		
The candidate's knowledge was:	Satisfactory Unsatisfactory	
Feedback to candidate:		
Candidate signature:	Date:	
Assessor/Observer's Signature:	Date:	

## ASSESSOR GUIDE TO CONDUCTING COMPETENCY ASSESSMENTS

1. BEFORE THE ASSESSMENT	2. DAY OF ASSESSMENT	3. DURING THE ASSESSMENT	4. POST ASSESSMENT
<p>- Review unit(s) of competency to be assessed especially evidence to be collected against performance criteria</p> <p>- Ensure the workplace or training center complies with all safety requirements and that high risk areas are clearly marked</p> <p>- Identify/request essential assessment resources:</p> <ul style="list-style-type: none"> <li>• tools and equipment</li> <li>• supplies and materials</li> <li>• personal protective equipment</li> <li>• print resources and rating sheets</li> <li>• Have trainees contacted if they have to bring any resources for the assessment, e.g. logbook</li> </ul>	<p>-Verify attendance through signed attendance sheet</p> <p>- Provide overview of what is to happen throughout day</p> <p>Orient the trainees to:</p> <ul style="list-style-type: none"> <li>• purpose of assessment</li> <li>• qualification to be assessed</li> <li>• assessment procedures to be followed</li> <li>• address needs of trainees and provide information on evidence requirements and assessment process</li> <li>• make all announcements just before start of assessment</li> </ul>	<p>Give clear instructions to trainees on what they are required to do:</p> <ul style="list-style-type: none"> <li>• time limits and expectations</li> <li>• all equipment and tools must be of the same quality for all trainees</li> <li>• written and verbal instructions translated into local dialects as needed</li> <li>• encourage questions</li> <li>• avoid providing any assistance to trainees during assessment</li> <li>• stop process if accident imminent</li> <li>• keep focused on evidence being valid, reliable, fair, flexible, and safe</li> <li>• Record details of evidence collected</li> </ul>	<p>Provide feedback on outcome of assessment process re:</p> <ul style="list-style-type: none"> <li>• give clear feedback on assessment decision</li> <li>• provide information on overcoming any gaps in competency assessment</li> <li>• provide opportunity to discuss assessment process and outcome</li> </ul> <p><b>Prepare required assessment reports:</b></p> <ul style="list-style-type: none"> <li>• all rating sheets signed by trainee as well as Assessor</li> <li>• maintain records of assessment procedures, evidence collected, and assessment outcome</li> <li>• verify assessment results/outcomes with training center</li> </ul> <p><b>Prepare</b></p> <p>recommendations for issuance of national certificate</p>

## *Assessor's Quick Start*

1. Identify the Unit(s) of Competency from the Program Standard that you are going to assess.
2. Review the Critical Aspects of Competency from the Unit of Competency that will be the basis of your Evidence Guide.
3. Select the Assessment Tools that you will use to gather evidence.
  - i. Demonstration Checklist
  - ii. Observation Checklist
  - iii. Oral Questions Checklist
4. Create spec sheet(s) for the Unit of Competency to be examined.
5. Review the assessment procedure with the Candidate and ask if there are any questions.
6. Complete the assessment using the assessment tools in the order above. You are free to use other tools as well if you wish.
7. Determine whether Candidate is **Competent** or **Not-Yet-Competent**
8. Complete all necessary record sheets.
9. Give feedback to the Candidate.



## *Demonstration Checklist: Perform Basic Electrical Circuit Installation*

Candidate's name:			
Assessor's name:			
Qualification:	Electrical Installation and Maintenance		
Project-Based Assessment Title			
Units of competency covered:	Perform Basic Electrical Circuit Installation (SEIP-LIG-ELE-1-0)		
Date of assessment:			
Time of assessment:			
Instructions for demonstration			
Please see attached Instruction for Demonstration (Candidate/Assessor)			
Supplies and Materials ▪ Please refer to attached specific instruction	Tools and equipment • Please refer to attached specific instruction		
	✓ to show if evidence is demonstrated		
During the demonstration of skills, did the candidate:	Yes	No	N/A
1. Connect and terminate electrical circuit components of an electrical load controlled from one position using appropriate materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Connect and terminate electrical circuit components of an electrical load controlled from two positions using appropriate materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Connect and terminate electrical circuit components of two electrical loads controlled from two positions using appropriate materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Connect and terminate electrical circuit components of a tube lamp in accord with electrical plans/drawings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Connect/terminate circuit components for a doorbell controlled from two switching positions accurately.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Connect/terminate circuit components for a ceiling fan in accord with manufacturer's electrical circuit diagram/specification.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Test electrical circuits for continuity and grounding using appropriate test instruments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Clean electrical tools/instruments and dispose of waste materials in accord with workplace requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## *Observation Checklist: Perform Basic Electrical Circuit Installation*

Candidate's name:			
Assessor's name:			
Date of Assessment:			
Unit of Competency:	Perform Basic Electrical Circuit Installation		
Code:	SEIP-LIG-ELE-1-0		
Name of Workplace/Training Center			
Procedure to Follow:	Observe Candidate's performing the task, and following the spec- if a spec is provided		
During the demonstration of skills, did the Candidate do the following (List steps that reflect critical aspects of competency from performance criteria of Unit of Competency):			
	<b>YES</b>	<b>NO</b>	
1. Connect and terminate electrical circuit components of an electrical load controlled from one position using appropriate materials.			
2. Connect and terminate electrical circuit components of an electrical load controlled from two positions using appropriate materials.			
3. Connect and terminate electrical circuit components of two electrical loads controlled from two positions using appropriate materials.			
4. Connect and terminate electrical circuit components of a tube lamp in accord with electrical plans/drawings.			
5. Connect/terminate circuit components for a doorbell controlled from two switching positions accurately.			
6. Connect/terminate circuit components for a ceiling fan in accord with manufacturer's electrical circuit diagram/specification.			
7. Test electrical circuits for continuity and grounding using appropriate test instruments.			
8. Clean electrical tools/instruments and dispose of waste materials in accord with workplace requirements.			
<b>Candidate's performance was:</b>	<b>COMPETENT</b>		<b>NOT YET COMPETENT</b>
<b>Feedback to Candidate:</b>			
<b>Candidate's Signature:</b>			Date:

Assessor's Signature:

Date:

## *Oral Questions Checklist: Perform Basic Electrical Circuit Installation*

Candidate's name:	
Assessor's name:	
Date of Assessment:	
Assessment Venue:	
Unit of Competency:	Perform Basic Electrical Circuit Installation
Reference Standard:	<b>Electrical Installation and Maintenance</b>

The List of Questions below must be pegged to the competency demonstration test and may involve related specs for each Unit of Competency tested. Underpinning skills for Knowledge may also be reviewed for Competent/Not Yet Competent designation.

List of Questions	Satisfactory Response
-------------------	-----------------------

Indicate Y or N in the box provided	YES	NO
1. Why is it important to test electrical circuits for continuity and grounding?		
2. To what extent is orderliness important on the job?		
3. What is meant by "rectification procedure" of different types of circuits?		
4. What are some important safety considerations to practice on the job?		
5. How often should electrical tools be cleaned?		

**Feedback to Candidate:**

The Candidate's overall performance was (circle):      Satisfactory/ Not Satisfactory

The Candidate's underpinning knowledge was (circle): Satisfactory/ Not Satisfactory

Assessor Signature:	Date:
Candidate Signature:	Date:

## *Demonstration Checklist: Carry Out Electrical Surface Channel, Conduit and Wire Installation*

Candidate's name:			
Assessor's name:			
Qualification:	Electrical Installation and Maintenance		
Project-Based Assessment Title			
Units of competency covered:	Carry Out Electrical Surface Channel, Conduit And Wire Installation (SEIP-LIG-ELE-2-0)		
Date of assessment:			
Time of assessment:			
Instructions for demonstration			
Please see attached Instruction for Demonstration (Candidate/Assessor)			
Supplies and Materials ▪ Please refer to attached specific instruction	Tools and equipment • Please refer to attached specific instruction		
	✓ to show if evidence is demonstrated		
During the demonstration of skills, did the candidate:	Yes	No	N/A
1. Check tools, equipment, and materials for usability.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Gather electrical components/materials and check for operability and quality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Draw layout on corresponding location in accord with electrical plan/drawing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Install appropriate electrical utility boxes in its proper location in accord with electrical plan/drawing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Fix surface mounted electrical channel/moulding in accord with electrical plan/layout.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Bend channel/conduit in accord with workplace requirement/specification.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Install appropriate wire size and type on channel/mould/conduit and into the electrical box.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Perform checking and testing of wiring system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## *Observation Checklist: Carry Out Electrical Surface Channel, Conduit and Wire Installation*

Candidate's name:			
Assessor's name:			
Date of Assessment:			
Unit of Competency:	Carry Out Electrical Surface Channel, Conduit and Wire Installation		
Code:	SEIP-LIG-ELE-2-0		
Name of Workplace/Training Center			
Procedure to Follow:	Observe Candidate's performing the task, and following the spec- if a spec is provided		
During the demonstration of skills, did the Candidate do the following (List steps that reflect critical aspects of competency from performance criteria of Unit of Competency):			
	<b>YES</b>	<b>NO</b>	
1. Check tools, equipment, and materials for usability.			
2. Gather electrical components/materials and check for operability and quality.			
3. Draw layout on corresponding location in accord with electrical plan/drawing.			
4. Install appropriate electrical utility boxes in its proper location in accord with electrical plan/drawing.			
5. Fix surface mounted electrical channel/moulding in accord with electrical plan/layout.			
6. Bend channel/conduit in accord with workplace requirement/specification.			
7. Install appropriate wire size and type on channel/mould/conduit and into the electrical box.			
8. Perform checking and testing of wiring system.			
<b>Candidate's performance was:</b>	<b>COMPETENT</b>		<b>NOT YET COMPETENT</b>
<b>Feedback to Candidate:</b>			
<b>Candidate's Signature:</b>			Date:
<b>Assessor's Signature:</b>			Date:

## *Oral Questions Checklist: Carry Out Electrical Surface Channel, Conduit and Wire Installation*

Candidate's name:	
Assessor's name:	
Date of Assessment:	
Assessment Venue:	
Unit of Competency:	Carry Out Electrical Surface Channel, Conduit and Wire Installation
Reference Standard:	<b>Electrical Installation and Maintenance</b>

**The List of Questions below must be pegged to the competency demonstration test and may involve related specs for each Unit of Competency tested. Underpinning skills for Knowledge may also be reviewed for Competent/Not Yet Competent designation.**

List of Questions	Satisfactory Response
-------------------	-----------------------

Indicate Y or N in the box provided	YES	NO
1. What tools are involved in bending metal conduits?		
2. Can you describe what is involved in performing checking and testing of a wiring system?		
3. How important is work planning and preparation?		
4. Can you describe why safety is important, giving some examples?		
5. What are some environmental concerns in electrical work?		

<b>Feedback to Candidate:</b>
-------------------------------

The Candidate's overall performance was (circle):      Satisfactory/ Not Satisfactory

The Candidate's underpinning knowledge was (circle): Satisfactory/ Not Satisfactory

<b>Assessor Signature:</b>	<b>Date:</b>
<b>Candidate Signature:</b>	<b>Date:</b>

## *Demonstration Checklist: Carry Out Electrical Fittings and Fixtures Installation*

Candidate's name:			
Assessor's name:			
Qualification:	Electrical Installation and Maintenance		
Project-Based Assessment Title			
Units of competency covered:	Carry Out Electrical Fittings And Fixtures Installation (SEIP-LIG-ELE-3-0)		
Date of assessment:			
Time of assessment:			
<b>Instructions for demonstration</b>			
Please see attached Instruction for Demonstration (Candidate/Assessor)			
<b>Supplies and Materials</b> ▪ Please refer to attached specific instruction	<b>Tools and equipment</b> • Please refer to attached specific instruction		
	✓ to show if evidence is demonstrated		
<b>During the demonstration of skills, did the candidate:</b>	Yes	No	N/A
1. Check electrical fittings, fixtures, and cables for usability, operability, and quality re: electrical plan/design specs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Install electrical protection board/encasement in accord with electrical plan/design spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Fix electrical protection components into the board/encasement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Install electrical fittings and fixtures in specified location in accord with electrical plan/design spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Wire electrical fittings and fixtures in accord with electrical circuit plan/design spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Fix electrical component holders in accord with electrical plan/design spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Terminate ceiling rose wiring connection and check for accuracy in accord with specified electrical circuit diagram.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Carry out checking and testing of wiring system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## *Observation Checklist: Carry Out Electrical Fittings and Fixtures Installation*

Candidate's name:			
Assessor's name:			
Date of Assessment:			
Unit of Competency:	Carry Out Electrical Fittings and Fixtures Installation		
Code:	SEIP-LIG-ELE-3-0		
Name of Workplace/Training Center			
Procedure to Follow:	Observe Candidate's performing the task, and following the spec- if a spec is provided		
During the demonstration of skills, did the Candidate do the following (List steps that reflect critical aspects of competency from performance criteria of Unit of Competency):			
	<b>YES</b>	<b>NO</b>	
1. Check electrical fittings, fixtures, and cables for usability, operability, and quality re: electrical plan/design specs.			
2. Install electrical protection board/encasement in accord with electrical plan/design spec.			
3. Fix electrical protection components into the board/encasement.			
4. Install electrical fittings and fixtures in specified location in accord with electrical plan/design spec.			
5. Wire electrical fittings and fixtures in accord with electrical circuit plan/design spec.			
6. Fix electrical component holders in accord with electrical plan/design spec.			
7. Terminate ceiling rose wiring connection and check for accuracy in accord with specified electrical circuit diagram.			
8. Carry out checking and testing of wiring system.			
<b>Candidate's performance was:</b>	<b>COMPETENT</b>		<b>NOT YET COMPETENT</b>
<b>Feedback to Candidate:</b>			
<b>Candidate's Signature:</b>			Date:
<b>Assessor's Signature:</b>			Date:



## *Oral Questions Checklist: Carry Out Electrical Fittings And Fixtures Installation*

Candidate's name:	
Assessor's name:	
Date of Assessment:	
Assessment Venue:	
Unit of Competency:	Carry Out Electrical Fittings And Fixtures Installation
Reference Standard:	<b>Electrical Installation and Maintenance</b>

**The List of Questions below must be pegged to the competency demonstration test and may involve related specs for each Unit of Competency tested. Underpinning skills for Knowledge may also be reviewed for Competent/Not Yet Competent designation.**

List of Questions	Satisfactory Response
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Indicate Y or N in the box provided	YES	NO
1. Why is it important to be able to read electrical plan/design specs with 100% accuracy?	<input type="checkbox"/>	<input type="checkbox"/>
2. What is meant by the term "ceiling rose?"	<input type="checkbox"/>	<input type="checkbox"/>
3. To what extent is safety an important consideration in planning electrical work?	<input type="checkbox"/>	<input type="checkbox"/>
4. To what extent are instruction sheets/work sheets important?	<input type="checkbox"/>	<input type="checkbox"/>
5. Is it important to have a procedure for disposing of waste, and if so, why?	<input type="checkbox"/>	<input type="checkbox"/>

**Feedback to Candidate:**

The Candidate's overall performance was (circle):      Satisfactory/ Not Satisfactory

The Candidate's underpinning knowledge was (circle): Satisfactory/ Not Satisfactory

Assessor Signature:	Date:
Candidate Signature:	Date:

## *Demonstration Checklist: Carry Out Earthing/ Grounding Installation*

Candidate's name:			
Assessor's name:			
Qualification:	Electrical Installation and Maintenance		
Project-Based Assessment Title			
Units of competency covered:	Carry Out Earthing Grounding Installation (SEIP-LIG-ELE-4-0)		
Date of assessment:			
Time of assessment:			
Instructions for demonstration			
Please see attached Instruction for Demonstration (Candidate/Assessor)			
Supplies and Materials ▪ Please refer to attached specific instruction	Tools and equipment • Please refer to attached specific instruction		
	✓ to show if evidence is demonstrated		
During the demonstration of skills, did the candidate:	Yes	No	N/A
1. Identify the method of earthing/grounding in accord with electrical plan/design.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Excavate a hole in accord with electrical plan/design spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Fit earthing/grounding element in bottom of excavated hole following standard earthing procedure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Connect earth lead to earth element tightly and bring up the meter board through the conduit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Lay powdered charcoal and salt around earthing element in accord with workplace procedure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Construct earth pit chamber with brick chips, cement, sand, and water mixture in accord with standard/specification.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Check earth/grounding loop resistance using appropriate test instrument.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Clean work area and dispose of waste materials in accord with workplace requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## *Observation Checklist: Carry Out Earthing/ Grounding Installation*

Candidate's name:			
Assessor's name:			
Date of Assessment:			
Unit of Competency:	Carry Out Earthing Grounding Installation		
Code:	SEIP-LIG-ELE-4-0		
Name of Workplace/Training Center			
Procedure to Follow:	Observe Candidate's performing the task, and following the spec- if a spec is provided		
During the demonstration of skills, did the Candidate do the following (List steps that reflect critical aspects of competency from performance criteria of Unit of Competency):			
	<b>YES</b>	<b>NO</b>	
1. Identify the method of earthing/grounding in accord with electrical plan/design.			
2. Excavate a hole in accord with electrical plan/design spec.			
3. Fit earthing/grounding element in bottom of excavated hole following standard earthing procedure.			
4. Connect earth lead to earth element tightly and bring up the meter board through the conduit.			
5. Lay powdered charcoal and salt around earthing element in accord with workplace procedure.			
6. Construct earth pit chamber with brick chips, cement, sand, and water mixture in accord with standard/specification.			
7. Check earth/grounding loop resistance using appropriate test instrument.			
8. Clean work area and dispose of waste materials in accord with workplace requirements.			
<b>Candidate's performance was:</b>	<b>COMPETENT</b>		<b>NOT YET COMPETENT</b>
<b>Feedback to Candidate:</b>			
<b>Candidate's Signature:</b>			Date:
<b>Assessor's Signature:</b>			Date:

## *Oral Questions Checklist: Carry Out Earthing/Grounding Installation*

Candidate's name:	
Assessor's name:	
Date of Assessment:	
Assessment Venue:	
Unit of Competency:	Carry Out Earthing Grounding Installation
Reference Standard:	<b>Electrical Installation and Maintenance</b>

**The List of Questions below must be pegged to the competency demonstration test and may involve related specs for each Unit of Competency tested. Underpinning skills for Knowledge may also be reviewed for Competent/Not Yet Competent designation.**

List of Questions	Satisfactory Response
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Indicate Y or N in the box provided	YES	NO
1. Why is powdered charcoal and salt laid around earthing elements on a job site?	<input type="checkbox"/>	<input type="checkbox"/>
2. Of what importance is constructing an earth pit chamber?	<input type="checkbox"/>	<input type="checkbox"/>
3. How is the method of earthing/grounding determined?	<input type="checkbox"/>	<input type="checkbox"/>
4. What environmental concerns exist around earthing/grounding electrical work?	<input type="checkbox"/>	<input type="checkbox"/>
5. To what extent is communication on the job important and why?	<input type="checkbox"/>	<input type="checkbox"/>

**Feedback to Candidate:**

The Candidate's overall performance was (circle):      Satisfactory/ Not Satisfactory

The Candidate's underpinning knowledge was (circle): Satisfactory/ Not Satisfactory

Assessor Signature:	Date:
Candidate Signature:	Date:

## *Demonstration Checklist: Perform a Service Connection*

Candidate's name:			
Assessor's name:			
Qualification:	Electrical Installation and Maintenance		
Project-Based Assessment Title			
Units of competency covered:	Perform A Service Connection(SEIP-LIG-ELE-5-0)		
Date of assessment:			
Time of assessment:			
<b>Instructions for demonstration</b>			
Please see attached Instruction for Demonstration (Candidate/Assessor)			
Supplies and Materials ▪ Please refer to attached specific instruction	Tools and equipment • Please refer to attached specific instruction		
	✓ to show if evidence is demonstrated		
<b>During the demonstration of skills, did the candidate:</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
1. Collect all necessary accessories and materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Draw layouts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Measure accurately.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Set and hold service cables.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Install energy meter as per drawing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Connect energy meter and main switch on proper place.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Observation Checklist: Perform a Service Connection

Candidate's name:			
Assessor's name:			
Date of Assessment:			
Unit of Competency:	Perform a Service Connection		
Code:	SEIP-LIG-ELE-5-0		
Name of Workplace/Training Center			
Procedure to Follow:	Observe Candidate's performing the task, and following the spec- if a spec is provided		
During the demonstration of skills, did the Candidate do the following (List steps that reflect critical aspects of competency from performance criteria of Unit of Competency):			
	<b>YES</b>	<b>NO</b>	
1. Collect all necessary accessories and materials.			
2. Draw layouts.			
3. Measure accurately.			
4. Set and hold service cables.			
5. Install energy meter as per drawing.			
6. Connect energy meter and main switch on proper place.			
<b>Candidate's performance was:</b>	<b>COMPETENT</b>		<b>NOT YET COMPETENT</b>
<b>Feedback to Candidate:</b>			
<b>Candidate's Signature:</b>			Date:
<b>Assessor's Signature:</b>			Date:

## Oral Questions Checklist: Perform a Service Connection

Candidate's name:	
Assessor's name:	
Date of Assessment:	
Assessment Venue:	
Unit of Competency:	Perform a Service Connection
Reference Standard:	<b>Electrical Installation and Maintenance</b>

The List of Questions below must be pegged to the competency demonstration test and may involve related specs for each Unit of Competency tested. Underpinning skills for Knowledge may also be reviewed for Competent/Not Yet Competent designation.

List of Questions	Satisfactory Response
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Indicate Y or N in the box provided	YES	NO
1. What three steps are involved in connecting an energy meter and a main switch?	<input type="checkbox"/>	<input type="checkbox"/>
2. What are the four kinds of specifications commonly used when performing a service connection?	<input type="checkbox"/>	<input type="checkbox"/>
3. Can you identify 11 symbols associated with electrical installation and maintenance under the civil construction sector?	<input type="checkbox"/>	<input type="checkbox"/>
4. What steps are involved in installing cable for service connection?	<input type="checkbox"/>	<input type="checkbox"/>
5. What three types of drawings are commonly used?	<input type="checkbox"/>	<input type="checkbox"/>

**Feedback to Candidate:**

The Candidate's overall performance was (circle):      Satisfactory/ Not Satisfactory

The Candidate's underpinning knowledge was (circle): Satisfactory/ Not Satisfactory

Assessor Signature:	Date:
Candidate Signature:	Date:

## *Demonstration Checklist: Carry Out Industrial Motor Control Installation*

Candidate's name:			
Assessor's name:			
Qualification:	Electrical Installation and Maintenance		
Project-Based Assessment Title			
Units of competency covered:	Carry Out Industrial Motor Control Installation (SEIP-LIG-ELE-6-0)		
Date of assessment:			
Time of assessment:			
Instructions for demonstration			
Please see attached Instruction for Demonstration (Candidate/Assessor)			
Supplies and Materials ▪ Please refer to attached specific instruction	Tools and equipment • Please refer to attached specific instruction		
	✓ to show if evidence is demonstrated		
During the demonstration of skills, did the candidate:	Yes	No	N/A
1. Select and collect necessary motor control devices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Classify and sort motor control devices according to work functions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Terminate/connect motor control devices according to need of the operation and in accord with circuit design/diagram.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Check/test operation of motor control devices and components in accord with circuit design.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Clean work area and dispose of waste materials in accord with workplace requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



## *Observation Checklist: Carry Out Industrial Motor Control Installation*

Candidate's name:			
Assessor's name:			
Date of Assessment:			
Unit of Competency:	Carry Out Industrial Motor Control Installation		
Code:	SEIP-LIG-ELE-6-0		
Name of Workplace/Training Center			
Procedure to Follow:	Observe Candidate's performing the task, and following the spec- if a spec is provided		
During the demonstration of skills, did the Candidate do the following (List steps that reflect critical aspects of competency from performance criteria of Unit of Competency):			
	<b>YES</b>	<b>NO</b>	
1. Select and collect necessary motor control devices.			
2. Classify and sort motor control devices according to work functions.			
3. Terminate/connect motor control devices according to need of the operation and in accord with circuit design/diagram.			
4. Check/test operation of motor control devices and components in accord with circuit design.			
5. Clean work area and dispose of waste materials in accord with workplace requirements.			
<b>Candidate's performance was:</b>	<b>COMPETENT</b>		<b>NOT YET COMPETENT</b>
<b>Feedback to Candidate:</b>			
<b>Candidate's Signature:</b>			Date:
<b>Assessor's Signature:</b>			Date:

## Oral Questions Checklist: Carry Out Industrial Motor Control Installation

Candidate's name:	
Assessor's name:	
Date of Assessment:	
Assessment Venue:	
Unit of Competency:	Carry Out Industrial Motor Control Installation
Reference Standard:	<b>Electrical Installation and Maintenance</b>

**The List of Questions below must be pegged to the competency demonstration test and may involve related specs for each Unit of Competency tested. Underpinning skills for Knowledge may also be reviewed for Competent/Not Yet Competent designation.**

List of Questions	Satisfactory Response
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Indicate Y or N in the box provided	YES	NO
1. How are motor control devices classified and sorted?		
2. How are motor control devices checked and tested?		
3. To what extent is the ability to interpret circuit design important?		
4. In what ways is communication on the job important, giving examples?		
5. Why is it important to have a procedure for cleaning the work area that is a part of each job operation?		

**Feedback to Candidate:**

The Candidate's overall performance was (circle):      Satisfactory/ Not Satisfactory

The Candidate's underpinning knowledge was (circle): Satisfactory/ Not Satisfactory

Assessor Signature:	Date:
Candidate Signature:	Date:

## *Demonstration Checklist: Perform Servicing and Repair Of Motor Control Circuits*

Candidate's name:			
Assessor's name:			
Qualification:	Electrical Installation and Maintenance		
Project-Based Assessment Title			
Units of competency covered:	Perform Servicing And Repair Of Motor Control Circuits (SEIP-LIG-ELE-7-0)		
Date of assessment:			
Time of assessment:			
<b>Instructions for demonstration</b>			
Please see attached Instruction for Demonstration (Candidate/Assessor)			
<b>Supplies and Materials</b> ▪ Please refer to attached specific instruction	<b>Tools and equipment</b> • Please refer to attached specific instruction		
	✓ to show if evidence is demonstrated		
<b>During the demonstration of skills, did the candidate:</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
1. Use appropriate manuals, tools, and materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Perform accurate troubleshooting and diagnostics procedures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Replace faulty motor control components.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Test operation of motor control circuit/system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Carry out required workplace documentation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Clean work area and store tools and materials in accord with workplace requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## *Observation Checklist: Perform Servicing and Repair Of Motor Control Circuits*

Candidate's name:			
Assessor's name:			
Date of Assessment:			
Unit of Competency:	Perform Servicing And Repair Of Motor Control Circuits		
Code:	SEIP-LIG-ELE-7-0		
Name of Workplace/Training Center			
Procedure to Follow:	Observe Candidate's performing the task, and following the spec- if a spec is provided		
During the demonstration of skills, did the Candidate do the following (List steps that reflect critical aspects of competency from performance criteria of Unit of Competency):			
	<b>YES</b>	<b>NO</b>	
1. Use appropriate manuals, tools, and materials.			
2. Perform accurate troubleshooting and diagnostics procedures.			
3. Replace faulty motor control components.			
4. Test operation of motor control circuit/system.			
5. Carry out required workplace documentation.			
6. Clean work area and store tools and materials in accord with workplace requirements.			
<b>Candidate's performance was:</b>	<b>COMPETENT</b>		<b>NOT YET COMPETENT</b>
<b>Feedback to Candidate:</b>			
<b>Candidate's Signature:</b>			Date:
<b>Assessor's Signature:</b>			Date:

## *Oral Questions Checklist: Perform Servicing and Repair Of Motor Control Circuits*

Candidate's name:	
Assessor's name:	
Date of Assessment:	
Assessment Venue:	
Unit of Competency:	Perform Servicing and Repair Of Motor Control Circuits
Reference Standard:	<b>Electrical Installation and Maintenance</b>

**The List of Questions below must be pegged to the competency demonstration test and may involve related specs for each Unit of Competency tested. Underpinning skills for Knowledge may also be reviewed for Competent/Not Yet Competent designation.**

List of Questions	Satisfactory Response
-------------------	-----------------------

Indicate Y or N in the box provided	YES	NO
1. Can you describe a simple troubleshooting and diagnostic procedure?	<input type="checkbox"/>	<input type="checkbox"/>
2. What is involved in preparing workplace documentation?	<input type="checkbox"/>	<input type="checkbox"/>
3. In what ways are manuals used on the job, giving examples?	<input type="checkbox"/>	<input type="checkbox"/>
4. Why is a commitment to occupational health and safety important on the job, giving examples?	<input type="checkbox"/>	<input type="checkbox"/>
5. To what extent is cleanliness and tidiness important on the job?	<input type="checkbox"/>	<input type="checkbox"/>

**Feedback to Candidate:**

The Candidate's overall performance was (circle):      Satisfactory/ Not Satisfactory

The Candidate's underpinning knowledge was (circle): Satisfactory/ Not Satisfactory

Assessor Signature:	Date:
Candidate Signature:	Date:

## *Demonstration Checklist: Perform Motor Rewinding and Servicing*

Candidate's name:			
Assessor's name:			
Qualification:	Electrical Installation and Maintenance		
Project-Based Assessment Title			
Units of competency covered:	Perform Motor Rewinding And Servicing(SEIP-LIG-ELE-8-0)		
Date of assessment:			
Time of assessment:			
Instructions for demonstration			
Please see attached Instruction for Demonstration (Candidate/Assessor)			
Supplies and Materials ▪ Please refer to attached specific instruction	Tools and equipment • Please refer to attached specific instruction		
	✓ to show if evidence is demonstrated		
During the demonstration of skills, did the candidate:	Yes	No	N/A
1. Identify faulty parts/components of AC motor or generator.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Carry out winding/rewinding of AC motor/generator.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Test continuity of AC motor/generator and marked terminals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Identity faulty parts/components of DC motor/generator.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Carry out winding/rewinding of DC motor/generator.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Test continuity of DC motor/generator and marked terminals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Clean tools, equipment, and materials, and store in accord with workplace requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## *Observation Checklist: Perform Motor Rewinding and Servicing*

Candidate's name:		
Assessor's name:		
Date of Assessment:		
Unit of Competency:	Perform Motor Rewinding and Servicing	
Code:	SEIP-LIG-ELE-8-0	
Name of Workplace/Training Center		
Procedure to Follow:	Observe Candidate's performing the task, and following the spec- if a spec is provided	
During the demonstration of skills, did the Candidate do the following (List steps that reflect critical aspects of competency from performance criteria of Unit of Competency):		
	<b>YES</b>	<b>NO</b>
1. Identify faulty parts/components of AC motor or generator.		
2. Carry out winding/rewinding of AC motor/generator.		
3. Test continuity of AC motor/generator and marked terminals.		
4. Identity faulty parts/components of DC motor/generator.		
5. Carry out winding/rewinding of DC motor/generator.		
6. Test continuity of DC motor/generator and marked terminals.		
7. Clean tools, equipment, and materials, and store in accord with workplace requirements.		
<b>Candidate's performance was:</b>	<b>COMPETENT</b>	<b>NOT YET COMPETENT</b>
<b>Feedback to Candidate:</b>		
<b>Candidate's Signature:</b>		Date:
<b>Assessor's Signature:</b>		Date:

## *Oral Questions Checklist: Perform Motor Rewinding and Servicing*

Candidate's name:	
Assessor's name:	
Date of Assessment:	
Assessment Venue:	
Unit of Competency:	Perform Motor Rewinding and Servicing
Reference Standard:	<b>Electrical Installation and Maintenance</b>

**The List of Questions below must be pegged to the competency demonstration test and may involve related specs for each Unit of Competency tested. Underpinning skills for Knowledge may also be reviewed for Competent/Not Yet Competent designation.**

<b>List of Questions</b>	<b>Satisfactory Response</b>
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<b>Indicate Y or N in the box provided</b>	<b>YES</b>	<b>NO</b>
1. Can you describe the difference between an AC motor or generator and a DC motor or generator?	<input type="checkbox"/>	<input type="checkbox"/>
2. What is involved in testing the continuity of an AC motor or generator?	<input type="checkbox"/>	<input type="checkbox"/>
3. Can you identify 3 parts of a DC motor or generator and describe their functions?	<input type="checkbox"/>	<input type="checkbox"/>
4. To what extent is teamwork important on the job, giving examples?	<input type="checkbox"/>	<input type="checkbox"/>
5. What is involved in rewinding a DC motor/generator?	<input type="checkbox"/>	<input type="checkbox"/>

**Feedback to Candidate:**

The Candidate's overall performance was (circle):      **Satisfactory/ Not Satisfactory**

The Candidate's underpinning knowledge was (circle): **Satisfactory/ Not Satisfactory**

<b>Assessor Signature:</b>	<b>Date:</b>
<b>Candidate Signature:</b>	<b>Date:</b>



## Demonstration Checklist: Install and Maintain Solar Power System

Candidate's name:			
Assessor's name:			
Qualification:	Electrical Installation and Maintenance		
Project-Based Assessment Title			
Units of competency covered:	Install And Maintain Solar Power System (SEIP-LIG-ELE-9-0)		
Date of assessment:			
Time of assessment:			
Instructions for demonstration			
Please see attached Instruction for Demonstration (Candidate/Assessor)			
Supplies and Materials ▪ Please refer to attached specific instruction	Tools and equipment • Please refer to attached specific instruction		
	✓ to show if evidence is demonstrated		
During the demonstration of skills, did the candidate:	Yes	No	N/A
1. Plan work activities in accord with project plan/design.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Calculate project cost in accord with project plan/design.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Perform electrical supply loading and distribution.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Mount photovoltaic array in accord with design plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Install and commission solar photovoltaic array following design and workplace requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Perform corrective maintenance in accord with unit supplier specification.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Perform preventive maintenance as per plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## *Observation Checklist: Install and Maintain Solar Power System*

Candidate's name:			
Assessor's name:			
Date of Assessment:			
Unit of Competency:	Install and Maintain Solar Power System		
Code:	SEIP-LIG-ELE-9-0		
Name of Workplace/Training Center			
Procedure to Follow:	Observe Candidate's performing the task, and following the spec- if a spec is provided		
During the demonstration of skills, did the Candidate do the following (List steps that reflect critical aspects of competency from performance criteria of Unit of Competency):			
	<b>YES</b>	<b>NO</b>	
1. Plan work activities in accord with project plan/design.			
2. Calculate project cost in accord with project plan/design.			
3. Perform electrical supply loading and distribution.			
4. Mount photovoltaic array in accord with design plan.			
5. Install and commission solar photovoltaic array following design and workplace requirements.			
6. Perform corrective maintenance in accord with unit supplier specification.			
7. Perform preventive maintenance as per plan.			
<b>Candidate's performance was:</b>	<b>COMPETENT</b>		<b>NOT YET COMPETENT</b>
<b>Feedback to Candidate:</b>			
<b>Candidate's Signature:</b>			Date:
<b>Assessor's Signature:</b>			Date:

## Oral Questions Checklist: Install and Maintain Solar Power System

Candidate's name:	
Assessor's name:	
Date of Assessment:	
Assessment Venue:	
Unit of Competency:	Install and Maintain Solar Power System
Reference Standard:	<b>Electrical Installation and Maintenance</b>

**The List of Questions below must be pegged to the competency demonstration test and may involve related specs for each Unit of Competency tested. Underpinning skills for Knowledge may also be reviewed for Competent/Not Yet Competent designation.**

<b>List of Questions</b>	<b>Satisfactory Response</b>
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<b>Indicate Y or N in the box provided</b>	<b>YES</b>	<b>NO</b>
1. What elements are involved in calculating project costs?	<input type="checkbox"/>	<input type="checkbox"/>
2. What is meant by "electrical supply loading and distribution"?	<input type="checkbox"/>	<input type="checkbox"/>
3. To what extent is planning work activities in accord with project plan/design important and why?	<input type="checkbox"/>	<input type="checkbox"/>
4. How are the elements of preventive maintenance determined?	<input type="checkbox"/>	<input type="checkbox"/>
5. Can you describe the procedure for mounting a photovoltaic array?	<input type="checkbox"/>	<input type="checkbox"/>

**Feedback to Candidate:**

The Candidate's overall performance was (circle):      Satisfactory/ Not Satisfactory

The Candidate's underpinning knowledge was (circle): Satisfactory/ Not Satisfactory

Assessor Signature:	Date:
Candidate Signature:	Date: