

**THE REPUBLIC OF KENYA**

**NATIONAL OCCUPATIONAL STANDARDS**

**FOR**

**SOLAR PV SYSTEMS INSTALLER**

**KNQF LEVEL 4**

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

# ACRONYMS

EHS Environment, Health and Safety

IET Institute of Electrical and electronics Engineers

OSHA Occupational Safety and Health Act

PPE Personal Protective Equipment

PV Photo Voltaic

TVET Technical and Vocational Education and Training

# KEY TO UNIT CODE



# TABLE OF CONTENT

[ACRONYMS ii](#_Toc195610606)

[KEY TO UNIT CODE iii](#_Toc195610607)

[TABLE OF CONTENT iv](#_Toc195610608)

[OVERVIEW 5](#_Toc195610609)

[CORE UNITS OF COMPETENCY 6](#_Toc195610610)

[PERFORM ELECTRICAL INSTALLATION 6](#_Toc195610611)

[INSTALL DC SOLAR PV SYSTEMS 11](#_Toc195610612)

[INSTALL SOLAR WATER PUMP SYSTEM 15](#_Toc195610613)

[PERFORM ELECTRICAL INSTALLATION 18](#_Toc195610614)

[INSTALL SOLAR PV SYSTEMS 23](#_Toc195610615)

[INSTALL SOLAR WATER PUMP SYSTEM 27](#_Toc195610616)

# OVERVIEW

The solar PV system installer Level 4 occupational standard describes competences required by a person to install solar PV systems. Competences in this standard include ability to perform electrical installation, install solar PV systems and install solar water pump systems.

The solar PV system installer at this level carries out solar work using a given design and customer’s requirements. He or she applies electrical drawings prepared by an electrical technician. The size and quantity of materials and speciﬁcations necessary to install the electrical systems are determined by the electrical technician.

**SUMMARY OF UNITS OF COMPETENCY**

|  |  |
| --- | --- |
|  | |
| **CORE UNITS OF COMPETENCY** | |
| **Unit Code** | **Unit Title** |
| 0713 251 04A | Perform Electrical Installation |
| 0713 251 05A | Install DC Solar PV Systems |
| 0713 251 06 A | Install Solar Water Pump System |
| 0713 351 07A | Perform Electrical Installation |
| 0713 351 08A | Install Solar PV Systems |
| 0713 351 09A | Install Solar Water Pump System |

# CORE UNITS OF COMPETENCY

## PERFORM ELECTRICAL INSTALLATION

**UNIT CODE:** **0713 251 04A**

**UNIT DESCRIPTION**

This unit specifies competences required for performing electrical installation. The competences include identifying electrical installation components, installing electrical system and maintaining electrical installation.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |  |  |
| --- | --- | --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***(Bold and italicised terms are elaborated in the Range)*** | |
| 1. Identify electrical installation components | * 1. Electrical symbols are identified as per installation drawing.   2. Materials for electrical installation are prepared as per installation drawing.   3. Electrical route is identified as per installation drawing | |
| 1. Install electrical system | * 1. Safety Procedures are applied as per work requirement.   2. ***Tools*** and ***equipment*** are assembled as per work plan.   3. ***Materials*** are assembled as per work plan   4. ***Cable management system*** is installed as per IEC standards   5. ***Protection devices*** are installed as per IEC standards   6. Accessories are installed as per working drawing and IET regulations.   7. ***Housekeeping practice*** is performed as per work requirement. | |
| 1. Maintain electrical installation | * 1. Electrical equipment and system is inspected as per IET regulations.   2. Materialsandtools are assembled as per work requirement.   3. Maintenance is carried out as per work requirement.   4. Maintenance report is prepared as per work procedure. | |

**RANGE**

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

| **Variable** | **Range** |
| --- | --- |
| 1. Tools and equipment include but is not limited to: | * Fixing tools * Cutting tools * Measuring tools * Holding tools * Power tools * Multimeter * Hydrometer * Inclinometer * Compass |
| 1. Materials include but is not limited to: | * Cables * Accessories |
| 1. Cable management systems include but is not limited to: | * Cable duct * Sheath/surface * Conduits * Trunking |
| 1. Protection devices include but is not limited to: | * Circuit breakers * Fuses |
| 1. Housekeeping practiceinclude but is not limited to: | * Waste disposal * Recycle * Reuse * Reduce |

**REQUIRED KNOWLEDGE**

The individual needs to demonstrate knowledge of:

* Electrical tools and equipment
* Work safety requirements
* IEE regulations
* solar energy
* Electrical building codes

**FOUNDATION SKILLS**

* Communication skills
* Negotiation skills
* Work ethics
* Waste disposal
* Work safety

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Identified Electrical symbols as per installation drawing. 2. Installed electrical system as per work plan. 3. Assembled Materialsandtools as per work requirement. 4. Carried out Maintenance as per work requirement. |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place.   2. Access to relevant work environments.   3. Resources relevant to the proposed activities or task. |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Project   2. practical   3. Portfolio of evidence   4. Third party report   5. Written assessment   6. Oral assessment |
| 1. Context of Assessment | * + 1. Competency may be assessed in a work place or a simulated work place. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## INSTALL DC SOLAR PV SYSTEMS

**UNIT CODE:** **0713 251 05A**

**UNIT DESCRIPTION**

This unit covers competences required in installing solar PV systems. The competences include constructing DC solar PV support structures, installing DC solar PV system components and maintaining DC solar PV system.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |  |  |
| --- | --- | --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***(Bold and italicised terms are elaborated in the Range)*** | |
| 1. 1. Construct DC Solar PV support structures | | * 1. Safety procedures are applied as per work requirements.   2. Solar PV module structure is constructed as per design requirement.   3. solar PV batteries structures is constructed as per design requirement. | |
| 1. 2. Install DC Solar PV system components | | * 1. ***Solar PV module*** is mounted as per work layout   2. Charger controller is mounted as per work layout   3. ***Solar PV battery*** is installed as per work layout   4. Cables are joined as per work layout.   5. ***Lightening arrestor*** is installed as per work layout   6. ***Housekeeping practice*** is performed as per work requirement. | |
| 1. 3. Maintain DC Solar PV System | | * 1. Maintenance materials are prepared as per work requirement.   2. ***Maintenance*** iscarried out as per IET regulations   3. Maintenance report is prepared as per work procedure. | |

**RANGE**

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

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Solar PV module may include but is not limited to: | * Mono crystalline * Poly crystalline * Amorphous * Single module up to 300 wp |
| 1. Solar PV batteries may include but is not limited to: | * Maintenance free * Flooded type * Single battery 12V |
| 1. Lightening arrestor may include but is not limited to: | * Rod gap arrester * Earth Rod * Surge arrestor (SPD) |
| 1. Housekeeping practicemay include but is not limited to: | * Waste disposal * Recycle * Reuse * Reduce |
| 1. Maintenance may include but is not limited to: | * Cleaning the modules * Cleaning battery terminals * Applying jelly/grease on battery terminals * Checking states of electrolytes |

**REQUIRED KNOWLEDGE**

The individual needs to demonstrate knowledge of:

* Electrical tools and equipment
* Work safety requirements
* IEE regulations
* solar energy
* Electrical building codes

**FOUNDATION SKILLS**

* Communication skills
* Negotiation skills
* Work ethics
* Waste disposal
* Work safety

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   * 1. Budgeted Personal finance as per financial procedures and standards   2. Developed culture of Saving as per personal goals   3. Identified sources of personal and business finance as per financial procedures and standards   4. Undertook business planning as per resource implications and regulatory framework   5. Constructed DC Solar PV support structures as per work requirement.   6. Mounted Solar PV module as per work layout   7. Mounted Charger controller as per work layout   8. Installed Solar PV battery as per work layout   9. Joined Cables as per work layout.   10. Performed Housekeeping practiceas per work requirement. |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place.   2. Access to relevant work environments.   3. Resources relevant to the proposed activities or task. |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Project   2. practical   3. Portfolio of evidence   4. Third party report   5. Written assessment   6. Oral assessment |
| 1. Context of Assessment | Competency may be assessed in a work place or a simulated work place. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## INSTALL SOLAR WATER PUMP SYSTEM

**UNIT CODE:** **0713 251 06A**

**UNIT DESCRIPTION**

This unit covers competences required in install solar water pump system. The competences include constructing solar PV module system support structures, installing solar water pump system components and maintaining solar water pump system.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |  |
| --- | --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***(Bold and italicised terms are elaborated in the Range)*** | |
| 1. Construct Solar PV module system support structures | | * 1. Safety procedures are applied as per work requirements.   2. Solar PV module mounting structures are constructed as per design requirement.   3. Solar PV water pump mounting structures are constructed as per design requirement. |
| 1. Install Solar water pump system components | | * 1. ***Solar PV module*** is mounted as per layout   2. ***Solar PV water pump*** is installed as per layout   3. Cables are jointed as per system layout.   4. Lightening arrestor is installed as per design   5. ***Housekeeping practice*** is performed as per work requirement. |
| 1. Maintain solar water pump system | | * 1. ***Materials*** for solar water pump are prepared as per system requirement.   2. Solar PV water pump system is tested as per IET regulations.   3. ***Maintenance activities*** are carried out as per IET regulations.   4. Maintenance report is prepared as per work procedure. |

**RANGE**

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

| **Variable** | **Range** |
| --- | --- |
| 1. Solar PV module may include but is not limited to: | 1. Mono crystalline 2. Poly crystalline 3. Amorphous 4. Single panel up to 300 wp |
| 1. Solar PV water pump may include but is not limited to: | 1. Surface/submersible Single-phase water pump |
| 1. Housekeeping practicemay include but is not limited to: | 1. Waste disposal 2. Recycle 3. Reuse 4. Reduce |
| 1. Material may include but is not limited to: | 1. Cables 2. Cable ties 3. Accessories 4. Grease |
| 1. Maintenance activity may include but is not limited to: | 1. Cleaning module 2. Removal of silt |

**REQUIRED KNOWLEDGE**

The individual needs to demonstrate knowledge of:

* Electrical tools and equipment
* Work safety requirements
* IEE regulations
* solar energy
* Electrical building codes

**FOUNDATION SKILLS**

* Communication skills
* Negotiation skills
* Work ethics
* Waste disposal
* Work safety

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   * 1. Constructed Solar PV module system support structures as per layout   2. Mounted Solar PV module as per layout.   3. Installed Solar PV water pump as per layout.   4. Joined Cables as per work requirement.   5. Maintained solar water pump system as per layout. |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place.   2. Access to relevant work environments.   3. Resources relevant to the proposed activities or task. |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Project   2. practical   3. Portfolio of evidence   4. Third party report   5. Written assessment   6. Oral assessment |
| 1. Context of Assessment | Competency may be assessed in a work place or a simulated work place. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## 

## PERFORM ELECTRICAL INSTALLATION

**UNIT CODE:0713 351 07A**

**UNIT DESCRIPTION**

This unit specifies competences required for performing electrical installation. The competences include producing electrical drawings, interpreting electrical installation drawing, installing electrical system, testing electrical installation and maintaining electrical installation.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |  |  |
| --- | --- | --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***(Bold and italicised terms are elaborated in the Range)*** | |
| 1. Produce electrical drawings | * 1. Electrical symbols meaning are interpreted according to BS 3939   2. Electrical drawings are produced in accordance with BS 3939   3. Electrical symbols and abbreviations are used as per job requirement. | |
| 1. Interpret electrical installation drawing | * 1. Electrical symbols are identified as per installation drawing   2. Wiring diagram is prepared as per work procedure.   3. Materials are listed as per installation drawing | |
| 1. Install electrical system | * 1. Safety Procedures are applied as per work requirements.   2. ***Tools, equipment*** and ***materials*** are assembled as per work plan.   3. ***Cable management system*** is installed as per work requirement   4. ***Earthing and protection system*** is installed as per IEEE regulations   5. Accessories are installed as per working drawing   6. ***Housekeeping practice*** is performed as per work requirement. | |
| 1. Test electrical installation | * 1. Electrical installation are ***visually inspected*** as per IET regulations.   2. Continuity test is carried out as per IET regulation   3. Polarity test is carried out as per IET regulations.   4. Insulation resistance test is carried out as per IET regulations. | |
| 1. Maintain electrical installation | * 1. Electrical equipmentis inspected as per IET regulations.   2. Maintenance materials and tools are assembled as per work requirement.   3. ***Maintenance activities*** is carried out as per IET regulations.   4. System tests are carried out as per IET regulations.   5. Maintenance report is recorded as per work procedure. | |

**RANGE**

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

| **Variable** | **Range** |
| --- | --- |
| 1. Tools, equipment and materials include but is not limited to: | 1. Fixing tools 2. Cutting tools 3. Measuring tools 4. Holding tools 5. Power tools 6. Multimeter 7. Hydrometer 8. Inclinometer 9. Compass 10. Cables 11. Accessories |
| 1. Cable management systems include but is not limited to: | * Cable duct  1. Sheath/surface 2. Conduits 3. Trunking |
| 1. Earthing and protection system include but is not limited to: | * IT * TNC * TNS * TT * TNCS/PME/PEN/CNE * Circuit breakers * Fuses * ELCBs/RCD |
| 1. Housekeeping practiceinclude but is not limited to: | 1. Waste disposal 2. Recycle 3. Reuse 4. Reduce |
| 1. Visually inspected include but is not limited to: | 1. Color code 2. Firmness 3. Level 4. Neatness |
| 1. Maintenance activities include but is not limited to: | 1. Faulty lamps 2. Faulty accessories |

**REQUIRED KNOWLEDGE**

The individual needs to demonstrate knowledge of:

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

**FOUNDATION SKILLS**

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

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Produced electrical drawings in accordance with BS 3939 2. Interpreted electrical installation drawing as per work requirement 3. Installed electrical system as per work requirement. 4. Tested electrical installation as per IET regulations. 5. Carried out maintenance as per IET regulations. |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place.   2. Access to relevant work environments.  1. Resources relevant to the proposed activities or task. |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Project   2. practical   3. Portfolio of evidence   4. Third party report   5. Written assessment  1. Oral assessment |
| 1. Context of Assessment | * + 1. Competency may be assessed in a work place or a simulated work place. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## INSTALL SOLAR PV SYSTEMS

**UNIT CODE: 0713 351 08A**

**UNIT DESCRIPTION**

This unit covers the competences required in Install Solar PV Systems. Competences include; applying electrical concepts, constructing Solar PV support structures, installing Solar PV system components and maintaining solar PV system.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |  |  |
| --- | --- | --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***(Bold and italicised terms are elaborated in the Range)*** | |
| 1. Apply basic electrical concepts | | * 1. ***Electrical fundamental principles*** are applied according to circuit network requirements   2. ***Electrical passive components*** are used according to AC circuit network requirements   3. ***Electromagnetic induction machines*** are used as per work requirement | |
| 2. Construct Solar PV support structures | | * 1. Safety procedures are applied as per work requirements.   2. solar PV module structure is constructed as per design requirement.   3. Solar PV batteries structures is constructed as per design requirement. | |
| 3. Install Solar PV system components | | * 1. ***Solar PV module*** is mounted as per layout   2. Charger controller is mounted as per layout   3. ***Solar PV batteries*** are installed as per layout   4. Inverter is installed as per layout   5. Cables are jointed as per system layout.   6. ***Lightening arrestor*** is installed as per design   7. ***Housekeeping practice*** is performed as per work requirement. | |
| 4. Maintain Solar PV System | | * 1. Materials are prepared as per work requirement.   2. ***Solar PV system test*** is performed as per IET regulations.   3. ***Maintenance*** iscarried out as per IET regulations   4. Maintenance report is prepared as per work procedure. | |

**RANGE**

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

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. ***Electrical fundamental principles*** include but not limited to: | * Ohms law * DC and AC current principles |
| 1. Solar PV module may include but is not limited to: | * Mono crystalline * Poly crystalline * Amorphous * Series connection up to 1000 wp * Parallel connection up to 1000 wp * Series-parallel connection up to 1000 wp |
| 1. Solar PV batteries may include but is not limited to: | * Maintenance free * Flooded type * Series connection up to 24v * Parallel connection up to 24v * Series-parallel connection up to 24v |
| 1. Lightening arrestor may include but is not limited to: | * Rod gap arrester * Earth Rod * Surge arrestor (SPD) |
| 1. Housekeeping practicemay include but is not limited to: | * Waste disposal * Recycle * Reuse * Reduce |
| 1. Solar PV system test may include but is not limited to: | * Short circuit systems (Isc) * Open circuit voltage (Voc) * Battery voltage * Battery current |
| 1. Maintenance may include but is not limited to: | * Cleaning the modules * Cleaning battery terminals * Applying jelly/grease on battery terminals * Checking states of electrolytes |

**REQUIRED KNOWLEDGE**

The individual needs to demonstrate knowledge of:

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

**FOUNDATION SKILLS**

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

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   * 1. Applied electrical fundamental principles as per work requirement   2. Constructed Solar PV support structures   3. Mounted Solar PV module as per layout   4. Mounted Charger controller as per layout   5. Installed Solar PV batteries as per layout   6. Installed Inverter as per layout   7. Joined Cables as per system layout   8. Maintained Solar PV System |
| 1. Resource Implications | The following resources must be provided:  Resources same as that of workplace are advised to be applied  including   1. Measuring tools 2. Cutting tools 3. Fastening tools 4. PPE 5. Accessories and cables |
| 1. Methods of Assessment | Competency may be assessed through:   1. Practical demonstration 2. Projects 3. Written tests 4. Oral test |
| 1. Context of Assessment | Competency may be assessed in a work place or a simulated work place. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## INSTALL SOLAR WATER PUMP SYSTEM

**UNIT CODE:** **0713 351 09A**

**UNIT DESCRIPTION**

This unit covers the competences required in Install Solar Water Pump System. Competences include; managing electrical workshop, constructing Solar PV module system support structures, Installing Solar water pump system components, maintaining solar water pump system.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***(Bold and italicised terms are elaborated in the Range)*** |
| 1. Manage electrical workshop | | * 1. Safety procedures are applied as work requirement   2. ***Workplace hazards*** mitigation measures are applied as per work requirement   3. ***Workplace accidents*** and incidents response is carried out as per workplace procedures   4. Safe handling of materials is carried out as per work requirements   5. ***Engineering materials*** are used as per work requirement   6. Engineering material wastes are disposed as per work requirement |
| 1. Construct Solar PV module system support structures | | * 1. Safety procedures are applied as per work requirements.   2. Solar PV module mounting structures are constructed as per design requirement.   3. Solar PV water pump mounting structures are constructed as per design requirement. |
| 1. Install Solar water pump system components | | * 1. ***Solar PV module*** is mounted as per layout   2. ***Solar PV water pump*** is installed as per layout   3. Cables are jointed as per system layout.   4. Lightening arrestor is installed as per design   5. ***Housekeeping practice*** is performed as per work requirement. |
| 1. Maintain solar water pump system | | * 1. materials are prepared as per system requirement.   2. Solar PV water pump system is tested as per IET regulations.   3. Maintenance is carried out as per IET regulations.   4. Maintenance report is prepared as per work procedure. |

**RANGE**

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

| **Variable** | **Range** |
| --- | --- |
| 1. Workplace hazards may include but not limited to: | * Physical * Biological * Chemical * Ergonomics * Electrical |
| 1. Workplace accidents may include but not limited to: | * cuts and bleeds * fracture * fainting * electric shock * fire * pinch |
| 1. Engineering materials may include but not limited to: | * metals * polymers * composites * ceramic |
| 1. Solar PV module may include but is not limited to: | * Mono crystalline * Poly crystalline * Amorphous * Series connection up to 1000 wp * Parallel connection up to 1000 wp * Series-parallel connection up to 1000 wp |
| 1. Solar PV water pump may include but is not limited to: | * Surface/submersible Single phase water pump |
| 1. Housekeeping practicemay include but is not limited to: | * Waste disposal * Recycle * Reuse * Reduce |

**REQUIRED KNOWLEDGE**

The individual needs to demonstrate knowledge of:

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

**FOUNDATION SKILLS**

* Communication skills
* Occupational safety and health practices
* Interpret electrical drawing
* Identification and proper use of electrical tools

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   * 1. Applied workplace hazards mitigation measures as per work requirement   2. Carried out workplace accidents and incidents response as per workplace procedures   3. Disposed waste engineering materials as per work requirement   4. Constructed Solar PV module system support structures   5. Mounted Solar PV module as per layout.   6. Installed Solar PV water pump as per layout.   7. Joined Cables as per system layout.   8. Maintained solar water pump system. |
| 1. Resource Implications | The following resources must be provided:  Resources same as that of workplace are advised to be applied  including   * 1. Measuring tools   2. cutting tools   3. fastening tools   4. PPE   5. accessories and cables |
| 1. Methods of Assessment | Competency may be assessed through:   1. Practical demonstration 2. Projects 3. Written tests 4. Oral test |
| 1. Context of Assessment | Competency may be assessed in a work place or a simulated work place. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |