Relevant Occupation/trade title: Electrician	**SAQA ID:** 91761	
Learning Area 16: Understand and apply basic renewable energy technologies in electrical installations	**Total Hours:**	**56**
Learning Project 3: Install stand-alone photovoltaic power systems	**Total Hours:**	**16**
Requisite learning areas/projects to be in place (Pre-requisite and co-requisite):	• Phase 2 completed • LA 16 LP 1-2	
Learning project description: Apprentices are required to install a stand-alone photovoltaic power system with all its relevant components.		

Activity phase	Practical Skills Modules Content	Underpinning Knowledge Module Content	Work Experience Module Content (Exposure to be given)	Didactical-methodological advice	Learning materials/Tools and Equipment
Reference to QCTO Curriculum	PM-None	KM-07 (KT01 02, 04, 05) KM-08 (KT01) KM-09 (KT01)	WM-01 (WE1-3) WM-02 (WE1-3) WM-03 (WE1-3) WM-04 (WE01, 02, 03) WM-05 (WE01, 02,03)		
Planning/ Preparation	**Provide access to (Given):** Photovoltaic panels, batteries, invertors, controller, DC and AC circuit breakers, cabling, specialized connectors, distribution board. **Apprentices must be able do/perform the following (hard and soft) skills:** • Wear correct PPE • Design and draw the PV generation system • Perform necessary calculations (conductor sizes) • Complete necessary documentation • Conduct risk assessment • Select the correct tools and equipment • Transport all materials and equipment safely to workstation • Determination the orientation of the roof structure to ensure maximum electricity yield	**Knowledge of:** • Relevant regulations • Operating principles of a photovoltaic cell • Series and parallel connections of photovoltaic panels • Functions of controllers and invertors • Calculate conductor sizes • Different types of photovoltaic panels including advantages and disadvantages of each	**Under supervision:** *If the workplace allows for this exposure:* • Install photovoltaic panels • Connect the photovoltaic panels to each other • Wire the photovoltaic system to the batteries/invertor/distribution board and controller • Commission the system for functionality	Lecture, presentations DVDs, audio-visual Group work/individual, Internet Solar trainer and solar kit.	**Print materials, electronic files, software applications incl.:** • Training manuals for trainers and apprentices incl. multimedia software • Set of presentation aids (videos, slides) for overhead or LED/LCD projectors **Tools, equipment and materials incl.:** Electrical toolbox **Equipment** • Invertors • Batteries • Distribution board • Photovoltaic panels

	• Evaluate shading to determine its impact on the solar panel				• Charge controller, • DC and AC circuit breakers, cabling • Specialized connectors • Step ladder • Safety harness • scaffolding • Protective devices • AC and DC loads **Tools** • Radiation meter • Multi-meter **PPE:** • Safety overall • Safety boots
Implementation/ Execution	• Install photovoltaic panels • Connect the photovoltaic panels to each other • Wire the photovoltaic system to the batteries/invertor/distribution board and controller • Commission the system for functionality				
Evaluation/ Documentation/ Housekeeping	• Test the photovoltaic system to ensure that it is working correctly (functionality test) • Report work progress to appropriate personnel • Inspect and clean tools • Store and secure tools and materials • Complete applicable work documentation				
Total	Hours: 16				
Specialisation additions					

Assessment guidance

- **Self-assessment**
- **Group assessment**
- **Theory test**

Criteria for assessment:

- Correct PPE is worn
- Risk assessment undertaken
- Necessary documentation completed
- Lock out and safety procedures are followed
- Photovoltaic system installed and tested to ensure functionality
- Task is completed as per job card
- Housekeeping performed