



Australian Government

Assessment Requirements for UEERE0016

Install, configure and commission LV grid-connected photovoltaic power systems

Release: 1

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Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
 - checking tools, materials, equipment and testing devices for correct operation and safety
 - ensuring circuits are isolated
 - terminating wiring correctly and safety
 - testing or measuring low voltage (LV) photovoltaic (PV) power and operating systems safely
 - using risk control measures
- dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- installing and setting up grid-connected PV system, including:
 - applying appropriate array mounting methods for roof sections
 - connecting grid inverter and measuring inverter parameters for various loads
 - placing and securing system components, including PV array
 - reading and interpreting drawings/diagrams related to apparatus locations and circuit connections
- tilting and adjusting angle of roof mounted and free-standing PV array frame construction
- connecting and commissioning at least one PV product in accordance with industry standards and regulations.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- PV array installation requirements, including:
 - WHS/OHS requirements and methods for working on roofs
 - common methods of roof construction (rafters and tile battens) and methods to ensure

- integrity of waterproofing
- common types of roof mounted and free-standing PV array frame construction and methods of tilt angle adjustment
- fixing methods for different roof types
- array mounting methods for north orientation roof sections and non-north facing roof sections
- aesthetic considerations in choosing an appropriate array location and type of mounting
- the mounting and fixing methods for at least one type of commercially available building integrated PV product
- electrical PV array installation requirements, including:
 - methods used in wiring and connecting PV arrays in accordance with relevant industry standards
 - considerations involved in wiring of series connected PV modules to minimise power losses due to shading
 - PV array wiring diagram including the placement of blocking and bypass diodes
 - considerations involved in choosing the location of associated system equipment, including regulators, direct current (d.c.) control board, inverters and inverters for grid-connected systems
 - cable route from PV array/s to inverters to minimise the route length
- system installation and maintenance including:
 - installation work on a PV power system in accordance with relevant industry standards and WHS/OHS guidelines
 - correct isolation and shutdown procedures prior to carrying out maintenance tasks
 - routine maintenance tasks on PV arrays
 - required vegetation control to remove or reduce shading or soiling on a PV array
- inverters, including:
 - types of inverters used in grid-connected systems
 - industry standard symbol for a LV inverter
 - the basic function of an inverter
 - simple block diagram of a typical inverter used in grid-connected system
- inverter operation, including:
 - the basic principle of operation of a single phase inverter (using switch analogue)
 - the operation of a field effect transistor (FET) inverter, an inverter bridge and half-bridge configuration
 - connection of a grid inverter and measurement of the inverter parameters for various loads
- inverter characteristics, including:
 - the characteristics which distinguish inverters suitable for grid-connected PV array application from standard inverters
 - using waveform diagrams, the function of pulse width modulator (PWM) techniques in square wave, modified square wave and synthesised sine wave inverters

- output voltage waveforms for square wave, modified square wave and synthesised sine wave inverters showing typical voltages and periodic times
- the six (6) essential inverter specifications
- PV grid-connected system operation, including:
 - block diagram of a PV grid-connected system
 - operation of grid interactive PV systems, including synchronisation, safety feature, power flow control, passive and active anti-islanding, and metered energy for systems
 - schematic diagrams of common grid-connected inverter circuit configurations, including metering arrangements, isolation and connection with respect to residual current devices (RCDs) in accordance with relevant industry standards
- installation of grid-connected inverters, including:
 - major installation requirements for all system components which will ensure correct operation, long life, safety and ease of maintenance consistent with relevant industry standards and WHS/OHS guidelines
 - selection of a suitable location for the PV array, inverter and other components, at a given installation site in accordance with relevant industry standards
 - typical installation configurations for grid connection of energy systems via inverters
 - the function and operation of a grid protection device as specified by relevant industry standards
 - array wiring plan for series connected modules to minimise power loss due to shading at a particular site
 - installation requirements for a grid-connected system
 - labelling and signage requirements for switchboards supplied with power from grid connected inverters, as set out in the relevant industry standards
 - the additional requirements for UPS systems as specified in the relevant industry standards
 - installation of a PV grid-connected system
- system commissioning and maintenance, including:
 - the isolation procedures required for grid-connected inverters
 - relevant commissioning procedures, including start-up and shutdown procedures for grid-connected inverter systems in accordance with relevant industry standards
 - testing a grid-connected inverter system for correct operation
 - location and rectification of an electrical fault within a PV array/inverter and wiring
 - maintenance schedule for a grid-connected PV power system
 - performing commissioning work on a PV power system in accordance with relevant industry standards.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory

requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>