APEX Training

Powered by The Verdancy Group

Award in the Installation and Maintenance of Small Scale Solar Photovoltaic Systems (SPV)

LCL Awards at Level 3: 4 Credits

Qualification Specification

The purpose of this qualification is for learners wishing to achieve a regulated qualification in the Installation and Maintenance of SPV.

LCL AWARDS

Contents

Introduction to Apex Training

Apex Training is the training arm of The Verdancy Group, delivering accredited green skills programmes across Scotland and the wider UK. We specialise in practical, industry-focused learning that supports individuals and organisations to develop the knowledge required for the transition to a low-carbon built environment.

Delivery through our Apex Training Centres and partner venues, with options for employer-based delivery where suitable. All programmes are led by practising industry specialists to ensure alignment and compliance with current standards, regulations and sector expectations.

About The Verdancy Group and LCL Awards

The Verdancy Group is a specialist provider of green skills training, consultancy, sustainability education, and workforce development. Our programmes are designed to meet emerging industry needs and support national and regional net zero goals.

LCL Awards is one of the Building Services Engineering (BSE) sectors foremost awarding organisation and certification bodies, offering qualifications and training courses via a network of approximately 160 approved centres located nationwide.

Installation and Maintenance of Small Scale Solar Photovoltaic Systems

Overview

The qualification opens opportunities to diversify your skills in the renewable energy and building services sector, particularly in the fast-growing area of solar PV. It is ideal for experienced electricians looking to expand their services into solar installation and maintenance.

Duration

The award has a total notional learning time of 35 hours, comprising:

→ Guided learning: approximately 35 hours

Delivery offered at our Apex Training Centres or a training centre convenient to you.

Materials And Certification

Learners will be provided with access to learning materials but will need to bring their Codes of Practice and Regulation books.

Learners who successfully meet the assessment requirements will receive a certificate of achievement issued by LCL Awards, confirming the award's LCL Awards Level 3 status and 4 credit points.

Assessment

This qualification will be assessed by an externally set, and assessed, multiple choice examination and a centre marked practical assessment.

This has been designed to assess the knowledge, understanding and skills of the learner.

Progression After This Course

This qualification is an excellent gateway into the wider renewable energy and low-carbon technologies sector. After completion, you may wish to progress to further specialist training, e.g., battery storage, or the installation of electric vehicle charging points to broaden your renewable skills.

Who Is This Qualification For?

This course is suitable for practicing electricians who are 18+. On application for the qualification, an initial assessment of the learner's capability to complete the qualification will be carried out. Prior to registering for the qualification, learners must provide evidence to the AC that they meet the qualification pre-requisites by holding a:

- Level 3 Award in the Requirements for Electrical Installations BS 7671 (current edition).

And one of the following:

- Level 3 NVQ Diploma in Installing Electrotechnical Systems and Equipment (Buildings, Structures and the Environment)
- Level 3 NVQ Diploma in Electrotechnical Services (Electrical Installation or Maintenance)
- Level 3 Electrotechnical Apprenticeship Qualification
- Level 3 NVQ in Electrotechnical Services Experienced Worker
- Level 3 Electrotechnical Experienced Worker Qualification
- Level 3 Electrotechnical in Dwellings Experienced Worker Qualification
- Building Services Engineering (Level 3) Electrotechnical Installation Qualification
- SVQ in Electrical Installation at SCQF level 7
- Equivalent Qualifications. See Tables A4.7 and A4.8 of the EAS Qualifications Guide
- Current ECS Gold Card issued by the JIB or SJIB – Installation Electrician, Approved Electrician, Maintenance Electrician or Domestic Elec.

By building on this qualification, you can position yourself for long-term opportunities in renewable energy, whether as a specialist installer, a contractor expanding services, or a professional moving into compliance and project management roles.

Qualification Structure and Module Content

There are four modules comprising of:

Module 1

Know the requirements to install, commission and handover small scale solar photovoltaic systems

Learning Outcome 1

The learner will know the health and safety risks and safe systems of work associated with solar photovoltaic (SPV) system work.

Learning Outcome Content

Which aspects of solar photovoltaic system work pose risk of:

- Electrocution/electric shock
- Burns
- Fall from height
- Injury though component/equipment handling

Safe systems of work for solar photovoltaic system work in relation to prevention of:

- Electrocution/electric shock
- Burns
- Fall from height
- Injury though component/equipment handling

Learning Outcome 2

The learner will know the requirements of the relevant regulations and standards relating to the installation, testing and commissioning activities of SPV system installation work.

Learning Outcome Content

Building regulations and building standards guidance as relevant to solar photovoltaic system installation work in relation to:

- Maintaining the structural integrity of the building
- Maintaining the fire-resistant integrity of the building
- The prevention of moisture ingress (building integrity)
- Notification of works
- Electrical safety
- Energy conservation

Electrical wiring regulation requirements relevant to solar photovoltaic system work in relation to:

- System installation
- Inspection and testing
- Commissioning

Learning Outcome 3

The learner will know the fundamental differences between AC and DC circuits within SPV systems.

Learning Outcome Content

The fundamental differences between AC and DC circuits within solar photovoltaic systems in relation to:

- Voltage
- Current
- Safe isolation
- Selection of appropriate system components

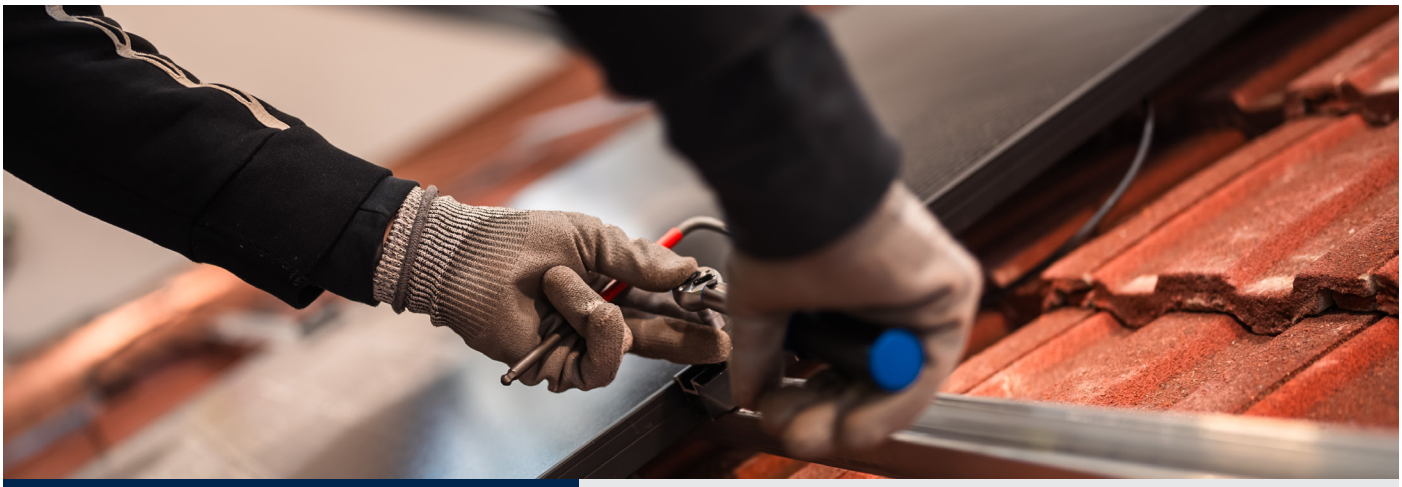
Learning Outcome 4

The learner will know the purpose of SPV system components.

Learning Outcome Content

The purpose and function of the following solar photovoltaic system components:

- Photovoltaic module
- Module mounting systems
- DC cables and wiring systems
- PV connectors
- DC isolator
- Inverter
- AC isolators
- AC cables and wiring systems
- AC distribution board
- Generation meter
- Warning notices and labels



Learning Outcome 5

The learner will know the types, characteristics and typical conversion efficiencies of SPV modules.

Learning Outcome Content

The following types of solar photovoltaic module:

- Non-integrated photovoltaic module
- Thin film photovoltaic module
- Integrated (slate or tile) photovoltaic module
- Building integrated photovoltaic module

The characteristics of:

- Monocrystalline photovoltaic modules
- Polycrystalline and multicrystalline photovoltaic modules
- Thin film photovoltaic modules

The relevant manufacturing compliance requirements for:

- Crystalline type modules
- Thin film type modules

The typical conversion efficiencies associated with:

- Monocrystalline photovoltaic modules
- Polycrystalline/multicrystalline photovoltaic modules
- Thin film photovoltaic modules

Learning Outcome 6

The learner will know the fundamental design principles used to determine SPV system module array size and position requirements.

Learning Outcome Content

The information required to enable solar photovoltaic array design in relation to:

- Building design
- Building dimensions and angles
- Building location and orientation
- Building fabric and material details

How to calculate the nominal power (kWp) per m2 of a given product

How annual solar photovoltaic electrical output (kWh) can be affected by:

- Geographical irradiation levels
- The array mounting angle
- The array orientation
- Shading of the array or modules within the array

The potential effect of shading on:

- Solar photovoltaic module condition
- Solar photovoltaic array condition

The potential benefit(s) of incorporating a solar tracker into the system design

Learning Outcome 7

The learner will know the preparatory work required for SPV system installation work

Learning Outcome Content

The requirements of pre-installation checks in relation to:

- Authorisation for the work to proceed
- The availability of appropriate access to all required work areas
- The inspection and testing of existing electrical installations
- The proposed siting of key internal system components
- The suitability of the building structure in relation to the proposed installation
- The suitability of the proposed location and position of the PV modules for optimum collection capacity
- The suitability of the building fabric in relation to the installation of the PV modules

Learning Outcome 8

The learner will know the preparatory work required for SPV system installation work

Learning Outcome Content

The following solar photovoltaic system module array layouts:

- Single array, single string
- Single array, multiple string
- Multiple array, multiple string

- The requirements for handling, moving and storing solar photovoltaic modules
- The requirements for fixing 'on roof' solar photovoltaic modules to pitched roof slopes
- The requirements for fixing 'in roof' solar photovoltaic modules to pitched roof slopes
- The requirements for fixing solar photovoltaic modules using secondary frame structures
- The requirements for ventilation in relation solar photovoltaic modules/ module arrays
- How to achieve durable weather-tightness of buildings where array cables pass through the building fabric
- The safety requirements that must be applied when a solar photovoltaic array has been installed prior to the installation of other system components
- The requirements for connecting solar photovoltaic modules in a single string array
- The requirements for connecting solar photovoltaic modules with multiple string array

- How to check that string voltages and currents are suitable for the:
  - Inverter rating
  - Overall system installation

- The requirements for cable routing within solar photovoltaic module arrays in relation to:
  - Avoidance of inductive loops
  - Other requirements

- The correct sequence of work to minimise the risk of injury through electrocution

Learning Outcome 9

The learner will know SPV system DC and AC circuit installation layouts within the scope of the relevant Engineering Recommendations for grid tied systems.

Learning Outcome Content

- The industry approved DC and AC circuit layout for single array systems connected to single-phase installations
- The industry approved DC and AC circuit layout for single array systems connected to polyphase installations

Learning Outcome 10

The learner will know SPV system protection methods and components.

Learning Outcome Content

- The methods and components used to protect the DC system and users of, against:
  - Electric shock
  - Overcurrent
  - Overvoltage
  - Frequency variations
- The methods and components used to protect the AC system and users of, against:
  - Electric shock
  - Overcurrent
  - Overvoltage
  - Frequency variations

Learning Outcome 11

The learner will know the requirements to test and commission SPV systems.

Learning Outcome Content

- The pre-commissioning procedures and/or requirements for a solar photovoltaic system in relation to:
  - Compliance with relevant installation instructions/regulatory requirements
  - Compliance with the system design
  - The security and integrity of system components
  - The provision of adequate ventilation for system components
  - Electrical safety
  - Electrical overcurrent protection arrangements
- The regulatory and industry pre-commissioning test requirements for the AC circuit within a solar photovoltaic system
- The regulatory and industry pre-commissioning test requirements for the DC circuit within a solar photovoltaic system
- The conditions that are required to implement commissioning and activities for solar photovoltaic systems
- The regulatory and industry requirements for the commissioning of the AC circuit within a solar photovoltaic system
- The regulatory and industry requirements for the commissioning of the DC circuit within a solar photovoltaic system

Learning Outcome 12

The learner will know the requirements to handover SPV systems.

Learning Outcome Content

- The pre-handover checks that need to be carried out for solar photovoltaic systems
- The recommended industry handover procedures for solar photovoltaic systems in relation to the:
  - Provision of written information
  - Provision of diagrammatic information
  - Provision of verbal information/demonstration relating to system operation and use.

Module 2

Install, Commission and Handover Small Scale Solar Photovoltaic Systems

Learning Outcome 1

The learner will plan and prepare for the installation of a SPV system.

Learning Outcome Content

- Undertake pre-installation checks in relation to:
  - Authorisation for the work to proceed
  - The availability of appropriate access to all required work areas
  - The inspection of existing electrical installations
  - The proposed siting of key internal system components
  - The suitability of the building structure in relation to the proposed installation
  - The suitability of proposed location of the PV modules for optimum collection capacity
  - The suitability of the building fabric in relation to the installation of the PV modules.
  - Confirm that the tools, materials and equipment required for the installation work are available and are in a safe usable condition

Learning Outcome 2

The learner will be able to install SPV system components

Learning Outcome Content

- Install a solar photovoltaic array in accordance with:
  - Manufacturer's requirements and guidance
  - Regulatory requirements
  - Industry recognised procedures
  - Building Regulations/Standards
- Install a solar photovoltaic DC circuit in accordance with manufacturer's requirements and guidance, regulatory requirements and industry recognised procedures to include connection of the following components:
  - DC isolator
  - Inverter
  - DC cabling from PV module(s) to DC isolator
  - DC cabling from DC isolator to inverter

Learning Outcome 3

The learner will be able to inspect and test a new SPV system installation

Learning Outcome Content

- Inspect and test the AC circuit in accordance with the design specification, manufacturer's requirements and the relevant regulatory requirements
- Inspect and test the DC circuit in accordance with the design specification, manufacturer's requirements and the relevant regulatory requirements
- Complete relevant inspection, testing and certification records in accordance with manufacturer's requirements and the relevant regulatory requirements

Learning Outcome 4

The learner will be able to commission a new SPV system installation.

Learning Outcome Content

- Undertake relevant pre-commissioning checks in accordance with the design specification, manufacturer's requirements and the relevant regulatory requirements
- Identify the design requirements, manufacturer's requirements, client's requirements regulatory requirements and industry requirements for the commissioning of the system
- Confirm that conditions are suitable to implement commissioning procedures
- Commission the system in accordance with design requirements, manufacturer's requirements, client's requirements, regulatory requirements and industry requirements for the commissioning of the system
- Complete relevant documentation to record the commissioning activities in accordance with manufacturer's requirements and the relevant regulatory requirements

Learning Outcome 5

The learner will be able to hand over a new SPV system installation

Learning Outcome Content

- Explain and demonstrate to the end user the operation and use of the system using manufacturer's guidance and industry agreed handover procedures
- Identify and explain to the end user any aspects of the system that varies from the agreed specifications and requirements
- Obtain acceptance by the end user of the system according to the industry agreed handover procedures
- Ensure that all relevant handover documentation is correctly completed and recorded in the appropriate information systems and passed to the end user in accordance with manufacturer's guidance and industry recognised procedures

Module 3

Know the Requirements to Inspect, Service and Maintain Small Scale Solar Photovoltaic Systems

Learning Outcome 1

The learner will know the requirements for the routine inspection, service and maintenance of SPV system installations.

Learning Outcome Content

- The documentation needed to enable a routine service and maintenance inspection
- The typical routine service and maintenance requirements in relation to:
  - Visual inspection requirements
  - Cleaning of components
  - Safe condition testing
  - Functional testing
  - Performance testing
  - Adjustment of controls/components
- The recording and reporting requirements for routine maintenance work

Learning Outcome 2

The learner will know how to diagnose faults in SPV system installations.

Learning Outcome Content

- The information that needs to be available to enable fault diagnosis
- The work actions and sequences required to diagnose the following faults:
  - Loss of full collection capacity
  - Loss of output from inverter
  - Loss of AC supply circuit to inverter
  - No output from DC circuit
  - Broken or damaged PV module
  - Cable failure within DC circuit

Learning Outcome 3

The learner will know how to rectify faults in SPV systems.

Learning Outcome Content

- The work actions and sequences required to rectify the following faults:
  - Loss of full collection capacity
  - Loss of output from inverter
  - Loss of AC supply circuit to inverter
  - No output from DC circuit
  - Broken or damaged PV module
  - Cable failure within DC circuit

Module 4

Inspect, Service and Maintain Small Scale Solar Photovoltaic Systems

Learning Outcome 1

The learner will know how to rectify faults in SPV systems.

Learning Outcome Content

- Obtain the relevant information required to enable the work
- Undertake, a visual service and maintenance inspection to include checks in relation to:
  - Compliance with manufacturer's installation instructions
  - Compliance with statutory regulations
  - The condition of system components
  - The correct positioning of system components
  - The security of fixing of system components
  - The provision of adequate ventilation of system components
- Undertake, routine servicing of relevant system components to include:
  - Cleaning of systems components
  - Checking and adjustment of system controls
- Undertake routine service and maintenance tests to include:
  - Tests required under statutory regulations
  - Tests to confirm the correct operation of system safety devices
  - Tests to confirm the correct operation of system controls
  - Checks and actions to confirm the optimum performance of the PV array(s)
- Complete the relevant service and maintenance records in accordance with industry recognised procedures

Learning Outcome 2

The learner will be able to undertake fault diagnosis work on SPV system installations

Learning Outcome Content

- Identify the information that needs to be available to enable fault diagnosis
- Identify using safe systems of work, the cause of a range of separate faults from the following list:
  - Loss of full collection capacity
  - Loss of output from inverter
  - Loss of AC supply circuit to inverter
  - No output from DC circuit
  - Broken or damaged solar PV module
  - Cable failure within DC circuit
- Agree with the relevant person(s) fault rectification procedures for the faults identified

Learning Outcome 3

The learner will be able to undertake fault diagnosis work on SPV system installations

Learning Outcome Content

- Take relevant precautionary actions to prevent unauthorised use of the system prior to or during the fault rectification work
- Take relevant precautionary actions to minimize the risk of injury to self or others during the fault rectification work
- Rectify, using safe systems of work, a range of separate faults from the following list:
  - Loss of full collection capacity
  - Loss of output from inverter
  - Loss of AC supply circuit to inverter
  - No output from DC circuit
  - Broken or damaged solar PV module
  - Cable failure within DC circuit
- Undertake post-rectification tests in accordance with manufacturer's guidance, regulatory requirements and industry recognised procedures to confirm that the system is in a safe, functional and efficient condition

Version History

Version	Date	Summary of Changes	Actioned By	Reviewed / Approved By
Version 1.0	April 2026	First publication of the Qualification Specification for the Award in the Installation and Maintenance of Small Scale Solar Photovoltaic Systems	Apex Training (Author)	Verdancy QA Lead

Document Control Statement

This document is maintained by Apex Training, part of The Verdancy Group. All updates are recorded through internal quality assurance procedures. The most recent version of this specification supersedes all previous versions.

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