



MCS Company Scheme Criteria for:

Solar PV Nominated Technical Persons Criteria

DRAFT Consultation Document

This document shows the Competence Criteria required to be met by a company undertaking the type of work detailed above.



These competencies have been identified from the current Qualifications Credit Units (QCF) devolved from the National Occupational Standards (NOS) to cover the range of work a Nominated Technical Person (NTP) working in the scope identified on the front page would normally undertake.

Anybody holding:

1. An approved Solar PV Assessment Certificate

Is likely to have met with all of the criteria presented within this document.

An Experienced Workers Route (EWR) will cover all the competencies outlined if taken in support of a EWR covering the same detail as titled on this document.

A full list of Qualifications that have been deemed to have met this criteria can be found at <http://www.microgenerationcertification.org/> along with access to EWR providers.

Please note anybody who has achieved the assessment without holding the correct mandatory Pre-requisites are likely to have to demonstrate further compliance against this company criteria.

Criteria Presentation

The criteria shown below in the following tables has been purposely presented in one of five categories:

1. Health and Safety – HS
2. Technical Skills – TS
3. Soft Skills – SS
4. Other – OT
5. Additional Information - AD

Where any box is blank these are intentionally blank.

By presenting the criteria within this format, it allows evidence to be collated for the Experienced Workers Route (EWR) options of evidencing compliance with the criteria.



Health and Safety Skills			
No.	Objective	No.	Criteria
1	Know the health and safety risks and safe systems of work associated with solar photovoltaic system installation work	1	Confirm which aspects of solar photovoltaic system installation work pose risk of:
		2	Electrocution/electric shock
		3	Burns
		4	A fall from height
		5	Personal injury through component/equipment handling
32	Understand the hazards, risks and mitigating factors associated with solar photovoltaic collectors	1	List the hazards posed by solar PV collectors due to their:
		2	Size
		3	Weight
		4	Fragility
		5	Windage
		6	Electrical properties and outputs
		7	Describe the health, safety and welfare risks associated with each hazard
		8	Describe how each of the risks can be reduced (mitigated)

Technical Skills			
No.	Objective	No.	Criteria
2	Know the requirements of the relevant regulations/standards relating to practical installation, testing and commissioning activities for solar photovoltaic system installation work	1	Interpret building regulation/building standards guidance as relevant to solar photovoltaic system installation work in relation to:
		2	Maintaining the structural integrity of the building
		3	Mandating the fire resistant integrity of the building
		4	The prevention of moisture ingress (building water tightness)
		5	Notification of works
		6	Electrical safety
		7	System installation
		8	Energy conservation
		9	Inspections and testing
		10	Commissioning
		11	Interpret industry recognised electrical wiring regulation requirements as relevant to solar photovoltaic system installation work in relation to:
		12	System installation
		13	Inspection and testing
		14	Commissioning
3	Know the fundamental differences between a.c and d.c circuits within solar photovoltaic systems	1	Confirm the fundamental differences between a.c and d.c circuits within solar photovoltaic systems in relation to:
		2	Voltages
		3	Safe isolation



4	Know the purpose of solar photovoltaic system components	4	Selection of appropriate system components
		1	Confirm the purpose of the following solar photovoltaic system components:
		2	Photovoltaic module
		3	Module mounting systems
		4	D.c. cabling
		5	Pv connectors
		6	Blocking diodes
		7	D.c. isolator
		8	D.c. fuses
		9	D.c junction box
		10	Inverter
		11	A.c isolators
		12	A.c. distribution board
		13	Generation meter
		14	Generation display unit
15	Labels		
5	Know the types, silicon characteristics and typical conversion efficiencies of solar photovoltaic modules	1	Identify the following types of solar photovoltaic module:
		2	On roof photovoltaic module
		3	Thin film photovoltaic module
		4	Silicon-based
		5	Non-silicon based
		6	In roof (slate) photovoltaic module
		7	In roof (tile) photovoltaic module
		8	Building integrated photovoltaic module
		9	Confirm the silicon characteristics of:
		10	Monocrystalline photovoltaic modules
		11	Polycrystalline/multicrystalline photovoltaic modules
		12	Thin film photovoltaic modules
		13	State the relevant manufacturing compliance requirements for:
		14	Crystalline type modules
		15	Thin film type modules
		16	State the typical conversion efficiencies associated with:
		17	Monocrystalline photovoltaic modules
		18	Polycrystalline/multicrystalline photovoltaic modules
		19	Thin film photovoltaic modules
6	Know the fundamental design principles used to determine solar photovoltaic system module array size and position requirements.	1	Confirm the information required to enable solar photovoltaic array design in relation to:
		2	Building design
		3	Building dimensions/angles
		4	Building location and orientation



		5	Building fabric/material details
		6	Confirm how to calculate the nominal power (kwp) per m2 of a given product
		7	Confirm how annual solar photovoltaic electrical output (kwh) can be affected by:
		8	Geographical irradiation levels
		9	The array mounting angle
		10	The array orientation
		11	Over shading of the array or modules within the array
		12	Confirm the potential effect of shading on:
		13	Solar photovoltaic module condition
		14	Solar photovoltaic array condition
		15	Identify the potential benefit(s) of incorporating a solar tracker into the system design
7	Know the preparatory work required for solar photovoltaic system installation work	1	Confirm the requirements of pre-installation checks in relation to:
		2	Authorisation for the work to proceed
		3	The availability of appropriate access to all required work areas
		4	The inspection and testing of existing electrical installations
		5	The proposed siting of key internal system components
		6	The suitability of the building structure in relation to the proposed installation
		7	The suitability of the proposed location and position of the pv modules for optimum collection capacity
		8	The suitability of the building fabric in relation to the installation of the pv modules
8	Know the layouts and the requirements for installing solar photovoltaic module arrays	1	Recognise the following solar photovoltaic system module array layouts:
		2	Single array, single string
		3	Single array, multiple string
		4	Confirm the requirements for handling, moving and storing solar photovoltaic modules
		5	Confirm the requirements for fixing 'on roof' solar photovoltaic modules to pitched roof slopes
		6	Confirm the requirements for fixing 'in roof' solar photovoltaic modules to pitched roof slopes
		7	Confirm the requirements for fixing solar photovoltaic modules using secondary frame structures
		8	Confirm the requirements for ventilation in relation solar photovoltaic modules/module arrays
		9	Confirm how to achieve durable weather-tightness of buildings where array cables pass through the building fabric



		10	State the safety requirements that must be applied when a solar photovoltaic array has been installed prior to the installation of other system components
		11	Confirm the requirements for connecting solar photovoltaic modules in a single string array
		12	Confirm the requirements for connecting solar photovoltaic modules with multiple string array
		13	Confirm how to check that string voltages and currents are suitable for the:
		14	Inverter rating
		15	Overall system installation
		16	Confirm the requirements for cable routing within solar photovoltaic module arrays in relation to:
		17	Avoidance of inductive loops
		18	Other requirements
		19	Propose the correct sequence of work to minimise the risk of injury through electrocution
9	Know solar photovoltaic system d.c and a.c circuit installation layouts within the scope of the relevant Engineering Recommendation for grid tied systems	1	Confirm the industry approved d.c and a.c circuit layout for single array systems connected to single phase installations
		2	Confirm the industry approved d.c. and a.c. circuit layout for single array systems connected to three phase installations
10	Know solar photovoltaic system protection techniques and components	1	Confirm the techniques and components used to protect system and or/building users in relation to:
		2	D.c. circuit over and under voltage protection
		3	D.c. circuit over and under current protection
		4	Confirm the techniques and components used to protect system and or/building users in relation to:
		5	A.c. circuit over and under voltage protection
		6	A.c. circuit over and under frequency protection
		7	A.c. circuit over and under current protection
11	Know the requirements to test and commission solar photovoltaic systems	1	Confirm the pre-commissioning procedures and/or requirements for a solar photovoltaic system in relation to:
		2	Compliance with relevant installation instructions/regulatory requirements
		3	Compliance with the system design
		4	The security and integrity of system components
		5	The provision of adequate ventilation for system components
		6	Electrical safety
		7	Electrical over-current protection arrangements



		8	Confirm the regulatory and industry pre-commissioning test requirements for the a.c circuit within a solar photovoltaic system
		9	Confirm the regulatory and industry pre-commissioning test requirements for the d.c circuit within a solar photovoltaic system
		10	State the conditions that are required to implement commissioning and activities for solar photovoltaic systems
		11	Confirm the regulatory and industry requirements for the commissioning of the a.c circuit within a solar photovoltaic system
		12	Confirm the regulatory and industry requirements for the commissioning of the d.c circuit within a solar photovoltaic system
12	Know the requirements to handover solar photovoltaic systems	1	State the pre-handover checks that need to be carried out for solar photovoltaic systems
		2	Confirm the recommended industry handover procedures for solar photovoltaic systems in relation to the:
		3	Provision of written information
		4	Provision of diagrammatic information
		5	Provision of verbal information/demonstration relating to system operation and use
13	Plan and prepare for the installation of a solar photovoltaic system	1	Undertake pre-installation checks in relation to:
		2	Authorisation for the work to proceed
		3	The availability of appropriate access to all required work areas
		4	The inspection of existing electrical installations
		5	The proposed siting of key internal system components
		6	The suitability of the building structure in relation to the proposed installation
		7	The suitability of proposed location of the pv modules for optimum collection capacity
		8	The suitability of the building fabric in relation to the installation of the pv modules
		9	Confirm that the tools, materials and equipment required for the installation work are available and are in a safe usable condition
14	Install solar photovoltaic system components	1	Install a solar photovoltaic array in accordance with:
		2	Manufacturer's guidance
		3	Regulatory requirements
		4	Industry recognised procedures
		5	To include as a minimum the positioning, fixing and connection of the array



		6	Install a solar photovoltaic d.c. circuit in accordance with manufacturer's guidance, regulatory requirements and industry recognised procedures to include as a minimum the positioning, fixing and connection of the following components:
		7	D.c. isolator
		8	Inverter
		9	D.c. cabling from module(s) to d.c. isolator
		10	D.c. cabling from d.c. isolator to inverter
15	Inspect and test a new solar photovoltaic system installation	1	Inspect and test the a.c. circuit in accordance with the design specification, manufacturer's requirements and the relevant regulatory requirements
		2	Inspect and test the d.c. circuit in accordance with the design specification, manufacturer's requirements and the relevant regulatory requirements
		3	Complete relevant inspection, testing and certification records in accordance with manufacturer's requirements and the relevant regulatory requirements
16	Commission a new solar photovoltaic system installation	1	Undertake relevant pre-commissioning checks in accordance with the design specification, manufacturer's requirements and the relevant regulatory requirements
		2	Identify the design requirements, manufacturer's requirements, client's requirements, regulatory requirements and industry requirements for the commissioning of the system
		3	Confirm that conditions are suitable to implement commissioning procedures
		4	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
		5	Complete relevant documentation to record the commissioning activities in accordance with manufacturer's requirements and the relevant regulatory requirements
17	Handover a new solar photovoltaic system installation	1	Undertake relevant checks to ensure that the system is ready for handover and compliant with manufacturer's guidance, regulatory requirements and industry recognised requirements
		2	Explain and demonstrate to the end user the operation and use of the system using manufacturer's guidance and industry agreed handover procedures
		3	Identify and explain to the end user any aspects of the system that varies from the agreed specifications and requirements
		4	Obtain acceptance by the end user of the system according to the industry agreed handover procedures



		5	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
18	Know the requirements for the routine inspection, service and maintenance of solar photovoltaic system installations	1	State which documentation needs to be available to enable a routine service and maintenance inspection
		2	Confirm the typical routine service and maintenance requirements in relation to:
		3	Visual inspection requirements
		4	Cleaning of components
		5	Safe condition testing
		6	Functional testing
		7	Performance testing
		8	Adjustment of controls/components
19	Know how to diagnose faults in solar photovoltaic system installations	9	Confirm the recording and reporting requirements for routine maintenance work
		1	State the information that needs to be available to enable fault diagnosis
		2	Confirm the work action and sequences required to diagnose the following faults:
		3	Loss of full collection capacity
		4	Loss of output from inverter
		5	Loss of a.c. supply circuit to inverter
		6	No output from d.c. circuit
		7	Broken or damaged solar module
20	Know how to rectify faults in solar photovoltaic systems	8	Cable failure within d.c. circuit
		1	Confirm the work action and sequences required to rectify the following faults:
		2	Loss of full collection capacity
		3	Loss of output from inverter
		4	Loss of a.c. supply circuit to inverter
		5	No output from d.c. circuit
		6	Broken or damaged solar module
21	Undertake the routine service and maintenance of a solar photovoltaic system installation	7	Cable failure within d.c. circuit
		1	Obtain the relevant information required to enable the work
		2	Undertake, using safe systems of work, a visual service and maintenance inspection to include checks in relation to:
		3	Compliance with manufacturer's installation instructions
		4	Compliance with statutory regulations
		5	The condition of system components
		6	The correct positioning of system components
		7	The security of fixing of system components
8	The provision of adequate ventilation of system components		



		9	Undertake using safe systems of work, routine servicing of relevant system components to include:
		10	Cleaning of systems components
		11	Checking/adjustment of system controls
		12	Undertake, using safe systems of work, routine service and maintenance tests to include:
		13	Tests required under statutory regulations
		14	Tests to confirm the correct operation of system safety devices
		15	Tests to confirm the correct operation of system controls
		16	Checks/actions to confirm the optimum performance of the pv array(s)
		17	Complete the relevant service and maintenance records in accordance with industry recognised procedures
22	Undertake fault diagnosis work on a solar photovoltaic system installations	1	Obtain the relevant information required to enable the work
		2	Identify using safe systems of work, the cause of a minimum of four separate faults from the following list:
		3	Loss of full collection capacity
		4	Loss of output from inverter
		5	Loss of a.c. supply circuit to inverter
		6	No output from d.c. circuit
		7	Broken or damaged solar pv module
		8	Cable failure within d.c. circuit
		9	Agree with the relevant person(s) fault rectification procedures for the faults identified
23	Undertake fault rectification work on solar photovoltaic system installations	1	Take relevant precautionary actions to prevent unauthorised use of the system prior to or during the fault rectification work
		2	Take relevant precautionary actions to minimize the risk of injury to self or others during the fault rectification work
		3	Rectify, using safe systems of work, a minimum of two separate faults from the following list:
		4	Loss of full collection capacity
		5	Loss of output from inverter
		6	Loss of a.c. supply circuit to inverter
		7	No output from d.c. circuit
		8	Broken or damaged solar pv module
		9	Cable failure within d.c. circuit
		10	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



24	Interpret the given information relating to the work and resources when installing solar collectors to roofs.	1	Interpret and extract relevant information from drawings, specifications, schedules, method statements, risk assessments and manufacturers' information.
		2	Comply with information and/or instructions derived from risk assessments and method statements.
		3	State the organisational procedures developed to report and rectify inappropriate information and unsuitable resources and how they are implemented.
		4	Describe different types of information, their source and how they are interpreted in relation to:
		5	Drawings, specifications, schedules, method statements, risk assessments, manufacturers' information and regulations governing buildings.
25	Know how to comply with relevant legislation and official guidance when installing solar collectors to roofs.	1	Describe their responsibilities under current legislation and official guidance whilst working:
		2	In the workplace, below ground level, in confined spaces, at height, with tools and equipment, with materials and substances, with movement/storage of materials and by manual handling and mechanical lifting.
		3	Describe the organisational security procedures for tools, equipment and personal belongings in relation to site, workplace, company and operative.
		4	Explain what the accident reporting procedures are and who is responsible for making reports.
26	Maintain safe working practices when installing solar collectors to roofs.	1	Use health and safety control equipment and access equipment safely to carry out the activity in accordance with legislation and organisational requirements when installing solar collectors to roofs.
		2	Explain why and when health and safety control equipment, identified by the principles of protection, should be used, relating to installing solar collectors to roofs, and the types, purpose and limitations of each type, the work situation and general work environment, in relation to:
		3	Collective protective measures
		4	Personal protective equipment (PPE)
		5	Respiratory protective equipment (RPE)
		6	Local exhaust ventilation (LEV).
		7	Describe how the relevant health and safety control equipment should be used in accordance with the given instructions.
		8	State how emergencies should be responded to in accordance with organisational authorisation and personal skills when involved with fires, spillages, injuries and other task-related hazards.



27	Select the required quantity and quality of resources for the methods of work to install solar collectors to roofs.	1	Select resources associated with own work in relation to materials, components, fixings, tools and equipment.
		2	Describe the characteristics, quality, uses, sustainability, limitations and defects associated with the resources in relation to:
		3	Solar collector installation kits
		4	Hand and/or powered tools and equipment.
		5	Describe how the resources should be used correctly and how problems associated with the resources are reported.
		6	Explain why the organisational procedures have been developed and how they are used for the selection of required resources.
		7	Describe any potential hazards associated with the resources and method of work.
		8	Describe how to calculate quantity, length, area and wastage associated with the method/procedure to install solar collectors to roofs.
28	Minimise the risk of damage to the work and surrounding area when installing solar collectors to roofs.	1	Protect the work and its surrounding area from damage in accordance with safe working practices and organisational procedures.
		2	Minimise damage and maintain a clean work space.
		3	Dispose of waste in accordance with legislation.
		4	Describe how to protect work from damage and the purpose of protection in relation to general workplace activities, other occupations and adverse weather conditions.
		5	Explain why the disposal of waste should be carried out safely in accordance with environmental responsibilities, organisational procedures, manufacturers' information, statutory regulations and official guidance.
29	Complete the work within the allocated time when installing solar collectors to roofs.	1	Demonstrate completion of the work within the allocated time.
		2	State the purpose of the work programme and explain why deadlines should be kept in relation to:
		3	Types of progress charts, timetables and estimated times
		4	Organisational procedures for reporting circumstances which will affect the work programme.
30	Comply with the given contract information to installing solar collectors to roofs to the required specification.	1	Demonstrate the following work skills when installing solar collectors to roofs:
		2	Removing, measuring, marking out, cutting, fitting, fixing, positioning, securing and replacing.
		3	Prepare for and install solar collectors to roof to given working instructions for one of the following:
		4	Integrated photo voltaic
		5	Mounted photo voltaic



		6	Integrated solar thermal		
		7	Mounted solar thermal.		
		8	Reinstate roof coverings to given working instructions.		
		9	Safely use and handle materials.		
		10	Safely use hand tools, portable power tools and ancillary equipment.		
		11	Safely store the materials, tools and equipment used when installing solar collectors to roofs.		
		12	Describe how to apply safe work practices, follow procedures, report problems and establish the authority needed to rectify them, to:		
		13	Assess the installation area		
		14	Check the direction the roof is facing		
		15	Remove or leave out waterproofing elements		
		16	Mark out for installation using given templates or dimensions		
		17	Prepare and weatherproof penetrations		
		18	Fix additional supports		
		19	Secure fixtures, fittings and collector.		
		20	Describe how to apply safe work practices, follow procedures, report problems and establish the authority needed to rectify them, to:		
		21	Reinstate roof covering including flashings		
		22	Install solar collectors during construction and as retrofit to existing buildings		
		23	Use hand tools, power tools and equipment		
		24	Work at height		
		25	Use access equipment.		
		26	Describe the needs of other occupations and how to effectively communicate within a team when installing solar collectors to roofs.		
		27	Describe how to maintain the tools and equipment used when installing solar collectors to roofs.		
		31	Understand basic photovoltaic technologies and systems	1	List the components in a typical solar photovoltaic (PV) system
				2	List the different types of solar PV collector
				3	Outline how solar PV collector electrical outputs vary with:
				4	Azimuth (direction)
				5	Angle of inclination
		6	Shading		
		7	Outline the physical limitations of solar PV collectors with respect to:		
		8	Corrosion		
		9	load-bearing properties		



		10	Describe at least two types of mounting system used to locate and mount solar PV systems on at least two different types of roof covering for both sloping and flat roofs and also building-integrated PV (BIPV) systems, including:
		11	brackets, rails and fixings
		12	specialist tools
		13	Describe the electrical cabling and connections fitted to solar PV collectors
		14	Explain the ways in which individual collectors may be electrically connected to form a solar PV array
		15	Describe the testing that should be carried out on a solar PV array before, during and after installation and handover to the customer
33	Understand the factors that affect the installation of solar photovoltaic collectors	1	Describe three types of pitched and flat roof construction and covering
		2	Explain the implications of installing solar collectors on each of these types of roof
		3	List the building and planning regulations that may impact on the installation of a solar PV array for:
		4	A listed property
		5	Property in conservation areas
		6	Permitted development rights for solar PV
		7	Outline the contents of company-prepared plans to be followed relating to:
		8	Roof/collector/BIPV layout
		9	Flat roof loading calculations/approval
		10	Windage calculations
		11	Describe the requirements of the current certification scheme for solar PV installations (e.g. Microgeneration Certification Scheme (MCS))
		12	Explain the impact of the certification scheme on own and organisation's work in terms of:
		13	Quality of work
		14	Materials used
		15	Information recorded
		16	Describe the purpose of incentive schemes as they apply to solar PV installations (e.g. Feed in Tariff (FIT))

Soft Skills			
No.	Objective	No.	Criteria
Intentionally Blank			



Other			
No.	Objective	No.	Criteria
Intentionally Blank			

Additional Guidance	
Intentionally Blank	

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