

Annex 18 – Solar Photovoltaic

Annex 18 – Common Minimum Technical Competency Requirements for Solar Photovoltaic Systems Installation Work				
Routes to demonstrating required competence				
Route	Qualifications/Certification	Experience / Evidence	Inspection / Assessment	
			On –Site	Off-Site
1	Level 3 Award in the Installation of Small Scale Solar Photovoltaic Systems (QCF); or Level 3 Award in the Installation and Maintenance of Small Scale Solar Photovoltaic Systems (QCF); or SQA Certificate in Environmental Technology Systems (Installation) including F8XL 04 - Install, Test, Commission and Handover Solar Photovoltaic Systems	Must have evidence of work carried out to be able to demonstrate their practical competence for the scope for which they have applied in accordance with the competence requirements stated in this annex.	Yes	No
2	Alternative certification that has been mapped to the competence requirements within this Annex and agreed by SummitSkills as aligning with the competence requirements within this annex and aligning with the related requirements for acceptance as alternative certification		Yes	No
3	Registered with a Building Regulations Competent Person Scheme or certificated by another a UKAS Accredited Certification Body for the type of work covered in this annex		Yes	No
4	Qualifications/certification other than above or no formal Qualification		Minimum of 3 years verifiable relevant experience covering the competence requirements stated in this annex and successful completion of the Experienced Worker Assessment*	Yes
In addition – all applicants will require the following recognised certificates				

NOTES

Route 4 - Experienced Worker Assessments will be conducted by the registering Scheme Operator or Certification Body who shall assess the Enterprise's evidence of meeting the underpinning knowledge and practical competence requirements as stated in this annex. Note: Experienced worker assessment enable the competences within this annex to be assessed and demonstrated but do not lead to the award of a qualification.

Area of Competence		Solar Photovoltaic Systems Installation Work		Annex 18
Competence requirement The installer must:		Context/Scope	NOS Ref.	Further Guidance
1	Know the health and safety risks and safe systems of work associated with solar photovoltaic system installation work	Health and safety risks and safe systems of work associated with: <ul style="list-style-type: none"> • electrocution/electric shock • burns • a fall from height • personal injury though component/equipment handling 	SUMEVTS1, K3	
2	Know the requirements of relevant regulations/standards relating to practical installation, testing and commissioning activities for solar photovoltaic system installation work	Building regulation/building standards guidance/requirements in relation to: <ul style="list-style-type: none"> • maintaining the structural integrity of the building • mandating the fire resistant integrity of the building • the prevention of moisture ingress (building watertightness) • notification of works • electrical safety • system installation • energy conservation • inspections and testing • commissioning 	SUMEVTS1, K2	
		Industry recognised electrical wiring regulation requirements as relevant to solar photovoltaic system installation work in relation to: <ul style="list-style-type: none"> • system installation • inspection and testing • commissioning 	SUMEVTS1, K2	

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Competence requirement The installer must:		Context/Scope	NOS Ref.	Further Guidance
3	Know the fundamental differences between a.c and d.c circuits within solar photovoltaic systems	<p>The fundamental differences between a.c and d.c circuits within solar photovoltaic systems in relation to:</p> <ul style="list-style-type: none"> • voltages • safe isolation • selection of appropriate system components 	SUMEVTS1, K2	
4	Know the purpose of solar photovoltaic system components	<ul style="list-style-type: none"> • photovoltaic module • module mounting systems • d.c. cabling • PV connectors • blocking diodes • d.c. isolator • d.c. fuses • d.c junction box • Inverter • a.c isolators • a.c. distribution board • generation meter • generation display unit • labels 	SUMEVTS3, K3 SUMEVTS4, K8	
5	Know the types, silicon characteristics and typical conversion efficiencies of solar photovoltaic modules	<p>Identify the following types of solar photovoltaic module:</p> <ul style="list-style-type: none"> • 'On roof' photovoltaic module • thin film photovoltaic module <ul style="list-style-type: none"> - silicon-based - non-silicon based • 'In roof' (slate) photovoltaic module • 'In roof' (tile) photovoltaic module • building integrated photovoltaic module 	linked to SUMEVTS2, K3	

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Competence requirement The installer must:		Context/Scope	NOS Ref.	Further Guidance
6	Know the types, silicon characteristics and typical conversion efficiencies of solar photovoltaic modules (continued)	Know the silicon characteristics of: <ul style="list-style-type: none"> • monocrystalline photovoltaic modules • polycrystalline/Multicrystalline photovoltaic modules • thin film photovoltaic modules 	No specific NOS ref.	
		Know the relevant manufacturing compliance requirements for: <ul style="list-style-type: none"> • crystalline type modules • thin film type modules 	No specific NOS ref.	
		Know the typical conversion efficiencies associated with: <ul style="list-style-type: none"> • Monocrystalline photovoltaic modules • Polycrystalline/Multicrystalline photovoltaic modules • thin film photovoltaic modules 	Linked to SUMETS8, K9	
7	Know the fundamental design principles used to determine solar photovoltaic system module array size and position requirements.	Know the information required to enable solar photovoltaic array design in relation to: <ul style="list-style-type: none"> • building design • building dimensions/angles • building location and orientation • building fabric/material details 	Linked to SUMETS8, K8, K9	
		Confirm how to calculate the nominal power (kWp) per m ² of a given product	SUMETS8, K9	
		Know how annual solar photovoltaic electrical output (kWh) can be affected by:: <ul style="list-style-type: none"> • geographical irradiation levels • the array mounting angle • the array orientation • over shading of the array or modules within the array 	SUMETS8, K8, K9	

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Competence requirement The installer must:		Context/Scope	NOS Ref.	Further Guidance
8	Know the fundamental design principles used to determine solar photovoltaic system module array size and position requirements. (continued)	Know the potential benefit(s) of incorporating a solar tracker into the system design	SUMETS8, K8	
		Know the potential effect of shading on: <ul style="list-style-type: none"> • solar photovoltaic module condition • solar photovoltaic array condition 	SUMETS8, K8	
9	Know the preparatory work and be able to undertake the preparatory work required for solar photovoltaic system installation work	Know the requirements of and be able to undertake pre-installation checks in relation to: <ul style="list-style-type: none"> • authorisation for the work to proceed • the availability of appropriate access to all required work areas • the inspection & 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 	SUMEVTS1 K4, K5 SUMEVTS1 P1,P6,P9	
10	Know the layouts and the requirements for installing solar photovoltaic module arrays	Know the following solar photovoltaic system module array layouts: <ul style="list-style-type: none"> • single array, single string • single array, multiple string 	SUMEVTS2 K3, K4	
		Know the requirements for handling, moving and storing solar photovoltaic modules	SUMEVTS2 K2, K5	
		Know the requirements for fixing 'on roof' solar photovoltaic modules to pitched roof slopes	SUMEVTS2 K3	
		Know the requirements for fixing 'in roof' solar photovoltaic modules to pitched roof slopes	SUMEVTS2 K3	

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Competence requirement The installer must:		Context/Scope	NOS Ref.	Further Guidance
11	Know the layouts and the requirements for installing solar photovoltaic module arrays (continued)	Know the requirements for fixing solar photovoltaic modules using secondary frame structures	SUMEVTS2, K3	
		Know the requirements for ventilation in relation solar photovoltaic modules/module arrays	SUMEVTS2, K3	
		Know how to achieve durable weather-tightness of buildings where array cables pass through the building fabric.	SUMEVTS2, K3	
		Know the safety requirements that must be applied when a solar photovoltaic array has been installed prior to the installation of other system components	SUMEVTS2, K2	
		Confirm the requirements for connecting solar photovoltaic modules in a single string array	SUMEVTS2, K2, K3	
		Know the requirements for connecting solar photovoltaic modules with multiple string array	SUMEVTS2, K2, K3	
		Confirm how to check that string voltages and currents are suitable for the: <ul style="list-style-type: none"> • inverter rating • overall system installation 	SUMEVTS2, K2, K3	
		Know the requirements for cable routing within solar photovoltaic module arrays in relation to: <ul style="list-style-type: none"> • avoidance of inductive loops • other requirements 	SUMEVTS2, K2, K3	
		Know the correct sequence of work to minimize the risk of injury through electrocution	SUMEVTS2, K2	

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Competence requirement The installer must:		Context/Scope	NOS Ref.	Further Guidance
12	Know solar photovoltaic system d.c and a.c circuit installation layouts within the scope of the relevant Engineering Recommendation for grid tied systems	Know the industry approved d.c and a.c circuit layout for single array systems connected to single phase installations	SUMEVTS2, K2, K3, K4	
		Know the industry approved d.c and a.c circuit layout for single array systems connected to three phase installations	SUMEVTS2, K2, K3, K4	
13	Know solar photovoltaic system protection techniques and components	Know the techniques and components used to protect system and or/building users in relation to: <ul style="list-style-type: none"> d.c. circuit over and under voltage protection d.c. circuit over and under current protection 	SUMEVTS2, K2, K3	
		Know the techniques and components used to protect system and or/building users in relation to: <ul style="list-style-type: none"> a.c. circuit over and under voltage protection a.c. circuit over and under frequency protection a.c. circuit over and under current protection 	SUMEVTS2, K2, K3	
14	Be able to install solar photovoltaic system components	Install a solar photovoltaic systems in accordance with: <ul style="list-style-type: none"> manufacturer's guidance regulatory requirements industry recognised procedures 	SUMEVTS2, P 6,P7,P8,P9, P10	

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Competence requirement The installer must:		Context/Scope	NOS Ref.	Further Guidance
15	Know how to and be able to test and commission solar photovoltaic systems installations	Know the requirements of and be able to undertake the pre-commissioning procedures and/or requirements for a solar photovoltaic system in relation to: <ul style="list-style-type: none"> • 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 over-current protection arrangements 	SUMEVTS3, K2 SUMEVTS3, P1,P2, P3,P4	
		Know the requirements of and be able to undertake regulatory and industry pre-commissioning inspection and test requirements for the a.c circuit within a solar photovoltaic system	SUMEVTS3, K1, K2, K3 SUMEVTS3, P1, P2, P3, P4	
		Know the requirements of and be able to undertake regulatory and industry pre-commissioning inspection and test requirements for the d.c circuit within a solar photovoltaic system	SUMEVTS3, K1, K2, K3	
		Be able to complete relevant inspection, testing and certification records in accordance with manufacturer's requirements and the relevant regulatory requirements	Linked to SUMEVTS3, P1, P2, P3, P4	

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Competence requirement The installer must:		Context/Scope	NOS Ref.	Further Guidance
16	Know how to and be able to test and commission solar photovoltaic systems installations (continued)	Know the conditions that are required to implement commissioning and activities for solar photovoltaic systems	SUMEVTS4, K2	
		Know the requirements of and be able to undertake regulatory and industry requirements for the commissioning of the a.c circuit within a solar photovoltaic system	SUMEVTS4, K2,K3, K6	
		Know the requirements of and be able to undertake regulatory and industry requirements for the commissioning of the d.c circuit within a solar photovoltaic system	SUMEVTS4, K2,K3,K6	
		Be able to complete relevant documentation to record the commissioning activities in accordance with manufacturer's requirements and the relevant regulatory requirements	Related to SUMEVTS4, P3,P4	
17	Know how to and be able to handover a solar photovoltaic systems installations	Know the pre-handover checks that need to be carried out for solar photovoltaic systems	SUMEVTS4, K7	
		Know the recommended industry handover procedures for solar photovoltaic systems in relation to the: <ul style="list-style-type: none"> • provision of written information • provision of diagrammatic information • provision of verbal information/demonstration relating to system operation and use 	SUMEVTS4, K7	
		Be able to handover solar photovoltaic system installation in accordance with industry handover procedures	SUMEVTS4, P5	

Annex 18 - Technical Reference Document Requirements

The Enterprise shall hold or have access to current editions, including all amendments, of the documents (or recognised equivalent documents) listed in the following table

Technical Reference Documents for Solar Photovoltaic Systems Installation Work
Building Regulations Approved Document to support Regulation 7 (1999 Edition incorporating 2000 amendments or any subsequent edition)
Building Regulations Approved Document P (2006 edition or any subsequent edition)
Engineering Recommendation G83/1-1 Recommendations For The Connection Of Small-Scale Embedded Generators (Up To 16 A Per Phase) In Parallel With Public Low-Voltage Distribution Networks (2008 edition or subsequent edition)
Engineering Recommendation G.59/2-1 Recommendations for the Connection of Generating Plant to the Distribution Systems of Licensed Distribution Network Operators.(2011 edition or subsequent edition)
BS 7671:2008 Requirements for electrical installations. IEE Wiring Regulations (Seventeenth edition or any subsequent edition)
BS EN 62446:2009 Grid Connected Solar Photovoltaic Systems – Minimum requirements for system documentation, tests and inspections
DTI Photovoltaics in Buildings - Photovoltaics in Buildings Guide to the installation of PV systems (2nd Edition or any subsequent edition)