

Model Curriculum

Solar PV Installer - Civil

SECTOR: GREEN JOBS
SUB-SECTOR: RENEWABLE ENERGY
OCCUPATION: SOLAR PV INSTALLATIONS
REF ID: SGJ/Q0103, V1.0
NSQF LEVEL: 4



Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

SKILL COUNCIL FOR GREEN JOBS

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/Qualification Pack: 'Solar PV Installer - Civil' QP No. 'SGJ/Q 0103 NSQF Level 4'

Date of Issuance: **November 11th, 2015**

Valid up to: **October 1st, 2018**

* Valid up to the next review date of the Qualification Pack


Authorised Signatory
(Skill Council for Green Jobs)

TABLE OF CONTENTS

1. Curriculum	01
2. Trainer Prerequisites	06
3. Annexure: Assessment Criteria	07

Solar PV Installer- Civil

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Solar PV Installer- Civil”, in the “Green Jobs” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Solar PV Installer – Civil		
Qualification Pack Name & Reference ID. ID	SGJ/Q0103, v1.0		
Version No.	1.0	Version Update Date	31 st December 2015
Pre-requisites to Training	ITI / Diploma (Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation, Welder)		
Training Outcomes	After completing this programme, participants will be able to: <ul style="list-style-type: none">• Carry out the site survey for installation of Solar PV system• Install the Civil/Mechanical components of a Solar PV system• Maintain personal Health & Safety at project site		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of “Solar PV Installer - Civil” Qualification Pack issued by “Skill Council for Green Jobs”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	Introduction to Solar PV Installer Civil Course Theory Duration (hh:mm) 03:00 Practical Duration (hh:mm) 03:00 Corresponding NOS Code SGJ/No101	<ul style="list-style-type: none"> • Demonstrate general Discipline in the class room and during the training program; • Understand the role of Solar PV Installer and job opportunities; • Understand the advantages of doing this course; • Acquire basic skills of communication; • Acquire basic reading capabilities to enable reading of signs, notices and/or cautions at site. 	
2	Basics of Solar Photovoltaic systems and its components. Theory Duration (hh:mm) 18:00 Practical Duration (hh:mm) 27:00 Corresponding NOS Code SGJ/No101	<ul style="list-style-type: none"> • Explain and understand DNI, GHI and Diffused Irradiance & Irradiation; • Understand the movement of the sun and its effect on the performance of the plant; • Understand terminology used in solar industry. • Explain and understand DNI, GHI and Diffused Irradiance & Irradiation; • Assess the movement of the sun and its effect on the performance of the plant; • Understand Terminology used in the Solar Industry; • Understand and acquire know-how of different Types, sizes and specifications of modules; • Read and Interpret the manufacturing data specification sheets • Understand and acquire know-how of different Types, sizes and specifications of foundations/footings; • Select the right footing/foundation as per site location including suitability of roof condition or suitability of soil • Understand and acquire know-how of different Types, sizes and specifications of mounting structures and other accessories; • Read and Interpret the manufacturing data specification sheets 	Pyranometer, Multimeter, Clamp meter,

Sr. No.	Module	Key Learning Outcomes	Equipment Required
3	<p>Tools and tackles used for installation of solar PV system</p> <p>Theory Duration (hh:mm) 03:00</p> <p>Practical Duration (hh:mm) 09:00</p> <p>Corresponding NOS Code SGJ/NQ0103,</p>	<ul style="list-style-type: none"> Identify and acquire the know-how of the different tools & tackles used for specific purpose in an installation of Solar PV system 	Tool kit, Double ended flat spanner, Double ended ring spanner, Combination pliers, Side cutting pliers, Nose pliers, Hack saw ,frame with blade, Screw driver, Water level Measuring tape, Centre punch, Standard wire gauge, Vanier calliper, Line Dori, Chisel, Drill m/c, Plumb bob, Sprit level, Flat file, Round file, Triangle file, Hand saw, PVC mallet, Ball pin, hammer, Safety helmet, Safety souse, Safety belt, Nose mask, Safety goggles, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves
4.	<p>Site Survey for Solar PV Installation</p> <p>Theory Duration (hh:mm) 06:00</p> <p>Practical Duration</p>	<ul style="list-style-type: none"> Understand how to observe Sun path diagram and shading analysis; Understand and assess the site conditions for safe installation of Solar PV system; Identify the load to be connected to the Solar PV system; 	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	(hh:mm) 17:00 Corresponding NOS Code SGJ/No101	<ul style="list-style-type: none"> Prepare load profile 	
5	Install Civil and mechanical parts of solar PV system Theory Duration (hh:mm) 20:00 Practical Duration (hh:mm) 37:00 Corresponding NOS Code SGJ/No103	<ul style="list-style-type: none"> Read and Interpret the Single Line Diagram, Layout Diagrams, Civil/Mechanical and Electrical Drawings Understand the DO's and Don'ts of material handling; Read and interpret the Bill of Material to verify with the delivery of components on-site. Understand and acquire know-how of installing the mounting structure along with structural supports and accessories for safe & weatherproof installation as per site conditions; Identify Tools & Tackles used for civil/mechanical installation 	Tool kit, 1kWp Solar PV system, Double ended flat spanner, Double ended ring spanner, Combination pliers, Side cutting pliers, Nose pliers, Hack saw ,frame with blade, Screw driver, Water level Measuring tape, Centre punch, Standard wire gauge, Vanier calliper, Line Dori, Chisel, Drill m/c, Plumb bob, Sprit level, Flat file, Round file, Triangle file, Hand saw, PVC mallet, Ball pin, hammer, Safety helmet, Safety souse, Safety belt, Nose mask, Safety goggles, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves

Sr. No.	Module	Key Learning Outcomes	Equipment Required
6	Maintain Personal Health & Safety at project site Theory Duration (hh:mm) 03:00 Practical Duration (hh:mm) 09:00 Corresponding NOS Code SGJ/No106	<ul style="list-style-type: none"> Identify the requirements for safe work area; Administer first aid; Identify the personal protective equipment used for the specific purpose; Identify the hazards associated with photovoltaic installations; Identify work safety procedures and instructions for working at height; Understand Occupational health & Safety standards and regulations for installation of Solar PV system 	Safety helmet, Safety souse, Safety belt, , Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves
7	Communication & Soft Skills Theory Duration (hh:mm) 05:00 Practical Duration (hh:mm) 15:00 Corresponding NOS Code SGJ/No101, SGJ/No103, SGJ/No106	<ul style="list-style-type: none"> Oral/spoken communication skill & testing – voice and accent, voice clarity Development Etiquette and manners Study of different pictorial expression of non-verbal communication and its analysis Barriers to Communication- Int. & Ext Barriers like Intrinsic Motivation, Perception, Language, Fear Power of speech etc. Importance of Listening, Good and bad listening Non-Verbal Communication – its importance and Nuances like Facial Expression, Posture, Gesture, eye contact, Appearance (Dress Code), etc. Handling Interview Situations 	
	Total Duration Theory Duration 58:00 Practical Duration 117:00	Unique Equipment Required: Tool kit, Double ended flat spanner, Double ended ring spanner, Combination pliers, Side cutting pliers, Nose pliers, Wire stripper, Electrician knife, Hack saw frame with blade, Hand crimping tools, Cable cutter, Screw driver, Water level, Measuring tape, Centre punch, Standard wire gauge ,Vanier calliper, Line Dori, Chisel, Drill m/c , Plumb bob, Sprit level , Flat file, Round file, Triangle file, Hand saw, PVC mallet, Ball pin hammer, Fuse puller, Safety helmet, Safety souse, Safety belt, Nose mask, Safety goggles, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Clamp meter, MULTIMETER, Megger, Earth tester, Water testing instrument (TDS meter), Earthing Rod, Soldering Iron & Flux, Phase Sequence Meter, Safety Gloves , Pyranometer	

Grand Total Course Duration: 175Hours, 0 Minutes

(This syllabus/ curriculum has been approved by [Skill Council for Green Jobs](#))

Trainer Prerequisites for Job role: “Solar PV Installer- Civil” mapped to Qualification Pack: “SGJ/Q0103, v1.0”

Sr. No.	Area	Details
1	Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack “SGJ/Q0103, Version 1.0”.
2	Personal Attributes	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field.
3	Minimum Educational Qualifications	ITI /Diploma Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation, welder, mason or B.Tech (Civil/Mechanical /Electrical/ Instrumentation / Electronics / Electrical and Electronics Eng.) or The education qualification can be relaxed in case of extraordinary relevant field experience.
4a	Domain Certification	Certified for Job Role: “Solar PV Installer - Civil” mapped to QP: “SGJ/Q0103, Version 1.0”. Minimum accepted score as per respective SSC guidelines. Minimum accepted score as per SCGJ is 80%.
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “SSC/1402”. Minimum accepted score as per SCGJ is 70%.
5	Experience	Minimum 3 years of relevant industry experience for ITI /Diploma (Electrical, Electronics, Civil, Mechanical, Fitter, and Instrumentation) or Minimum 2 years of relevant industry experience for B.Tech (Civil/Mechanical /Electrical/ Instrumentation / Electronics / Electrical and Electronics Eng.)

Annexure: Assessment Criteria

Assessment Criteria for Solar PV Installer – Civil	
Job Role	Solar PV Installer - Civil
Qualification Pack	SGJ/Qo103, Version 1.0
Sector Skill Council	Green Jobs

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for Qualification Pack has been created based on the NOSs and performance criteria by SCGJ. Each Performance Criteria (PC) has been assigned marks proportional to its importance within NOS and weightages have also been given among the NOSs accordingly. SCGJ has laid down the proportion of marks for Skills, Theory/Knowledge and Behaviour / Attitudes for each PC.
2	The assessment of the theory/knowledge will be based on written test/viva-voce or both while skill test shall be hands on practical. Behaviour and attitude will be assessed while performing the task.
3	The assessment shall be done as per the assessment sheets devised by SCGJ and accordingly the assessment agencies in consultation with SCGJ will create unique question papers for theory/knowledge and attitude for each candidate at each SCGJ accredited testing centres (as per assessment criteria below)
4	The assessment agencies will conduct the assessment as per the guidelines given by SCGJ having unique evaluations for skill practical for every student at each SCGJ accredited testing centre based on this criteria
5	To pass the Qualification Pack, every trainee should score a minimum of 70% in the overall assessment.
6	The marks are allocated PC wise; however, every NOS will carry a weight age in the total marks allocated to the specific QP

Assessable Outcome (NOS)	Assessment Criteria	Total Mark	Out Of	Marks Allocation	
				Theory	Skills Practical
SGJ/N0101 Site Survey for Installation of Solar PV System	PC1. Understand the location of Installation and optimize the route plan.	30	4	1	3
	PC2. Asses the site level pre-requisites for solar panel installation		3	2	1
	PC3. Check for any shading obstacles.		2	1	1
	PC4. Decide the type of mounting to be constructed.		2	2	
	PC5. Inform the customer for any civil construction to be undertaken for installing the panels		2	1	1
	PC6. Prepare a site map of the location where installation has to be carried out.		5	2	3
	PC7. Assess the load to be run on Solar Power Plant		5	2	3
	PC8. Prepare a load profile		3	3	
	PC9. Document the site survey variables and complete the checklist/site survey form		4	2	2

Assessable Outcome (NOS)	Assessment Criteria	Total Mark	Out Of	Marks Allocation	
				Theory	Skills Practical
	NOS Total Marks	TOTAL	30	16	14
SGJ/N0103 Install Civil and Mechanical parts of Solar PV Power Plant	PC1. Identify type of footing required	60	3	2	1
	PC2. Locate structural footings		1	1	
	PC3. Arrange for tools and consumables required for civil/mechanical installation		4	2	2
	PC4. Get the concrete forms constructed to design specifications		4	1	3
	PC5. Install mounting posts, roof attachments and anchors		1	1	
	PC6. Locate structural roof members and install structural attachments		1	1	
	PC7. Install module support/racking frame		4	1	3
	PC8. Plumb and Level array structure		2	1	1
	PC9. Install supplementary structural supports		2	1	1
	PC10. Apply corrosion protection to cut surfaces		2	1	1
	PC11. Apply Weatherproofing to avoid any seepage and penetrations		2	1	1
	PC12. Install tracking Power Plant		4	2	2
	PC13. Unpack photovoltaic modules		2	1	1
	PC14. Inspect module for physical damage		2	1	1
	PC15. Test photovoltaic modules' electrical output		2	1	1
	PC16. Install the modules as per layout diagrams		7	2	5
	PC17. Secure module wiring		4	1	3
	PC18. Fasten modules to structure		2	1	1
	PC19. Torque module fasteners		2	1	1
	PC20. Install battery bank stand and battery spill containment as per drawings / manuals		6	2	4
	PC21. Install inverter stand as per drawings / manuals		3	1	2
	NOS Total Marks	TOTAL	60	26	34
SGJ/N0106 Maintain work Safety of Solar PV System	PC1. Identify corporate policies required for workplace safety.	50	2	1	1
	PC2. Identify requirements for safe work area and create a safe work environment.		3	2	1
	PC3. Identify contact person when workplace safety policies are violated.		1	1	0
	PC4. Provide information about incident/violation.		1	1	
	PC5. Identify the location of First Aid materials and administer first aid		2	1	1

Assessable Outcome (NOS)	Assessment Criteria	Total Mark	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC6. Identify the personal protection equipment required for specific locations on-site		3	2	1
	PC7. Identify expiry dates and wear & tear issues of specified equipment.		2	1	1
	PC8. Demonstrate safe and accepted practices for personal protection.		3	2	1
	PC9. Identify environmental hazards associated with photovoltaic installations.		2	1	1
	PC10. Identify electrical hazards.		4	2	2
	PC11. Identify personal safety hazards or work site hazards and Mitigate hazards.		4	2	2
	PC12. Select tools, equipment and testing devices needed to carry out the work.		4	2	2
	PC13. Demonstrate safe and proper use of required tools and equipment.		4	2	2
	PC14. Check access from ground to work area to ensure it is safe and in accordance with requirements.		2	1	1
	PC15. Reassess risk control measures, as required, in accordance with changed work practices and/or site conditions and undertake alterations.		2	2	0
	PC16. Inspect/install fall protection and perimeter protection equipment ensuring adequacy for work and conformance to regulatory requirements.		4	2	2
	PC17. Identify approved methods of moving tools and equipment to work area and minimize potential hazards associated with tools at heights		2	1	1
	PC18. Select and install appropriate signs and barricades		2	1	1
	PC19. Place tools and materials to eliminate or minimize the risk of items being knocked down.		1	1	
	PC20. Dismantle safety Power Plant in accordance with sequence and remove from worksite to clear work area.		2	1	1
	NOS Total Marks	TOTAL	50	29	21
	QP Total Marks	TOTAL	140		



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