

Model Curriculum

Solar PV Manufacturing Technician

SECTOR: GREEN JOBS
SUB-SECTOR: RENEWABLE ENERGY
OCCUPATION: Manufacturing
REF ID: SGJ/Q0119, 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 Manufacturing Technician**' QP No. '**SGJ/Q 0119 NSQF Level 4**'

Date of Issuance: **October 16th, 2017**

Valid up to: **September 30th, 2019**

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


Authorised Signatory
(Skill Council for Green Jobs)

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Solar PV Manufacturing Technician

CURRICULUM / SYLLABUS

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

Program Name	Solar PV Manufacturing Technician		
Qualification Pack Name & Reference ID.	SGJ/Q0119, v1.0		
Version No.	1.0	Version Update Date	01 th Aug 2017
Pre-requisites to Training	10 th pass preferably		
Training Outcomes	After completing this programme, participants will be able to: <ul style="list-style-type: none"> • Carry out the manufacturing of Solar PV Modules • Maintain personal health & safety at project site • Work effectively with others 		

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

S. No	Module	Key Learning Outcomes	Equipment Required
1	Introduction to Solar PV Sector in India Theory Duration (hh:mm) 12:00 Practical Duration (hh:mm) 12:00 Introduction Module	<ul style="list-style-type: none"> overview of solar PV technology overview of ground mount solar sector in India understand the various market research reports and industrial magazines present in the market type of ground mount PV Power Plants and working principles overview of Rooftop Solar Sector in India type of Rooftop Solar PV Power Plants and working principles 	
2	Carry out of manufacturing Solar PV Modules Theory Duration (hh:mm) 36:00 Practical Duration (hh:mm) 102:00 Corresponding NOS Code SGJ/N0145	<ul style="list-style-type: none"> sort the solar cells using a cell sorter and put use the cells with same specifications for making a cell string monitor the assembly and interconnection of cells with metal ribbons to make a module ensure the testing of solar cells as per standard operating procedures cut EVA using a cutter and place it on the glass substrate monitoring the process of aligning and placing cell strings on EVA sheet at assembler module layup station monitor the process of completing the module laminate circuit at the busing station and provide output leads visually inspect and electrically test the module laminate circuit by measuring its I-V characteristics at an inspection station cut EVA back sheets to length using the cut and place station, and then assemble them with the glass and module circuit monitor the process to laminate the assembly and cure the EVA with the laminator trim the edges of the laminated module panel using cutter attach the junction box and by-pass diodes install an edge gasket 	visit to a solar PV module manufacturing facility for practical learning

		<ul style="list-style-type: none"> monitor the framing of solar module at a frame press station measure the module's performance under simulated sunlight perform the testing of solar modules as per relevant industry standards visually inspect the completed module for quality of materials and workmanship check proper packaging material for module pack modules in properly designed cartons for transportation 	
3	Maintain Personal Health & Safety in manufacturing facility Theory Duration (hh:mm) 06:00 Practical Duration (hh:mm) 06:00 Corresponding NOS Code SGJ/N0147	<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 shoe, Safety belt, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves
4	Work effectively with others Theory Duration (hh:mm) 06:00 Practical Duration (hh:mm) 20:00 Corresponding NOS Code SGJ/N0120	<ul style="list-style-type: none"> accurately pass on information to the authorized persons who require it and within agreed timescale and confirm its receipt assist others in performing tasks in a positive manner where required and possible consult and assist others to maximize effectiveness and efficiency in carrying out tasks display appropriate communication etiquette while working display active listening skills while interacting with others at work demonstrate responsible and disciplined behaviors at the workplace escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict identify the need for common grounds with clients, team members, etc. and negotiate in an effective manner to achieve the same 	

		<ul style="list-style-type: none"> consider and respect the opinions, creativity, values, beliefs and perspectives of others ensure collaboration and group participation to achieve common goals promote a friendly, co-operative environment that is conducive to employee's sense of belonging facilitate an understanding and appreciation of the differences among team members 	
	Theory Duration (hh:mm) 60:00 Practical Duration (hh:mm) 140:00	Safety helmet, Safety shoe, Safety belt, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves, visit to a solar PV module manufacturing facility for practical learning	

Grand Total Course Duration: 200 **Hours, 0 Minutes**

(This syllabus/ curriculum has been approved by **Skill Council for Green Jobs**)

Trainer Prerequisites for Job role: “Solar PV Manufacturing Technician” mapped to Qualification Pack: “SGJ/Q0119, 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/Q0119, 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	Any Graduate.
4a	Domain Certification	Certified for Job Role: “Solar PV Manufacturing Technician” mapped to QP: “SGJ/Q0119, Version 1.0”. Minimum accepted score as per respective as per SCGJ guidelines is 80%.
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q0102” or equivalent. Minimum accepted score as per SSC guidelines is 80%.
5	Experience	Two years of experience in a solar PV module manufacturing plant

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Solar PV Manufacturing Technician

Qualification Pack SGJ/Q0119

Sector Skill Council Green Jobs

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion.
6. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Compulsory NOS			Marks allocation		
Total Marks: 200					
Assessment Outcomes	Assessment Criteria for outcomes	Total Marks	Out of	Theory	Skills Practical
SGJ/N0145 Carry out the manufacturing of solar PV modules	PC1. sort the solar cells using a cell sorter and put use the cells with same specifications for making a cell string	100	6	2	4
	PC2. monitor the assembly and interconnection of cells with metal ribbons to make a module		6	2	4
	PC3. ensure the testing of solar cells as per standard operating procedures		6	3	3
	PC4. cut EVA using a cutter and place it on the glass substrate		6	2	4
	PC5. monitoring the process of aligning and placing cell strings on EVA sheet at assembler module layup station		6	2	4
	PC6. monitor the process of completing the module laminate circuit at the busing station and provide output leads		7	2	5
	PC7. visually inspect and electrically test the module laminate circuit by measuring its I-V characteristics at an inspection station		7	2	5
	PC8. cut EVA back sheets to length using the cut and place station, and then		6	2	4

	assemble them with the glass and module circuit				
	PC9. monitor the process to laminate the assembly and cure the EVA with the laminator		6	2	4
	PC10. trim the edges of the laminated module panel using cutter		4	1	3
	PC11. attach the junction box and by-pass diodes		4	1	3
	PC12. install an edge gasket		4	1	3
	PC13. monitor the framing of solar module at a frame press station		4	1	3
	PC14. measure the module's performance under simulated sunlight		7	2	5
	PC15. perform the testing of solar modules as per relevant industry standards		7	2	5
	PC16. visually inspect the completed module for quality of materials and workmanship		6	2	4
	PC17. check proper packaging material for module		4	1	3
	PC18. pack modules in properly designed cartons for transportation		4	1	3
	TOTAL		100	31	69
SGJ/N0147 Maintain personal health & safety in a manufacturing facility	PC19. identify corporate policies required for workplace safety	50	2	1	1
	PC20. identify requirements for safe work area and create a safe work environment		3	2	1
	PC21. identify contact person when workplace safety policies are violated		1	1	0
	PC22. provide information about incident/violation		1	1	0
	PC23. identify the location of first aid materials and administer first aid		2	1	1
	PC24. identify the personal protection equipment required for specific locations on-site		8	3	5
	PC25. identify expiry dates and wear & tear issues of specified equipment		2	1	1
	PC26. demonstrate safe and accepted practices for personal protection		8	3	5
	PC27. identify environmental hazards associated with the manufacturing facility		4	2	2
	PC28. identify electrical hazards		4	2	2
	PC29. identify personal safety hazards or work site hazards and mitigate hazards		6	3	3
	PC30. select tools, equipment and testing devices needed to carry out the work		4	2	2
	PC31. demonstrate safe and proper use of required tools and equipment		5	2	3

		TOTAL	50	24	26
SGJ/N0120 Work effectively with others	PC1. accurately pass on information to the authorized persons who require it and within agreed timescale and confirm its receipt	50	4	2	2
	PC2. assist others in performing tasks in a positive manner where required and possible		4	2	2
	PC3. consult and assist others to maximize effectiveness and efficiency in carrying out tasks		4	2	2
	PC4. display appropriate communication etiquette while working		6	3	3
	PC5. display active listening skills while interacting with others at work		4	2	2
	PC6. demonstrate responsible and disciplined behaviors at the workplace		4	2	2
	PC7. escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict		3	1	2
	PC8. identify the need for common grounds with clients, team members, etc. and negotiate in an effective manner to achieve the same		3	1	2
	PC9. consider and respect the opinions, creativity, values, beliefs and perspectives of others		4	2	2
	PC10. ensure collaboration and group participation to achieve common goals		6	3	3
	PC11. promote a friendly, co-operative environment that is conducive to employee's sense of belonging		4	2	2
	PC12. facilitate an understanding and appreciation of the differences among team members		4	2	2
	TOTAL		50	24	26