

Model Curriculum

Solar PV Maintenance Technician - Electrical (Ground Mount)

SECTOR: GREEN JOBS
SUB-SECTOR: RENEWABLE ENERGY
OCCUPATION: Operation & Maintenance
REF ID: SGJ/Q0115, 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 Maintenance Technician – Electrical (Ground Mount)**'

QP No. '**SGJ/Q 0115 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 Maintenance Technician – Electrical (Ground Mount)

CURRICULUM / SYLLABUS

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

Program Name	Solar PV Maintenance Technician – Electrical (Ground Mount)		
Qualification Pack Name & Reference ID.	SGJ/Q0115, v1.0		
Version No.	1.0	Version Update Date	04 th August 2017
Pre-requisites to Training	ITI - Electrical and Electronics		
Training Outcomes	After completing this programme, participants will be able to: <ul style="list-style-type: none"> • Carry out electrical maintenance of the ground mount solar PV power plant • Maintain personal health & safety at solar PV power plant • Work effectively with others 		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of “Solar PV Maintenance 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 and 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 overview of off grid Solar Sector in India type of off grid Solar PV Power devices and their working principles system components and operating principles basics of electrical concepts like voltage, current, power, energy, etc. solar energy and power sector landscape in the country benefits of solar energy over conventional sources of energy typical specifications, functioning, operating principle, maintenance requirements, handling procedures and warranties of different types of solar PV plant components like PV modules, inverters, cables, junction boxes, monitoring system and other components understand various financial institutions and banks involved in solar power projects as well as their terms & conditions associated with loans 	
2	Carry out electrical maintenance of the ground mount solar PV power plant Theory Duration (hh:mm) 42:00 Practical Duration (hh:mm) 78:00 Corresponding NOS Code SGJ/N0137	<ul style="list-style-type: none"> verify the connections, cables and junction boxes as per the design/ working drawings measure the string current and verify the connections between modules in each string periodically, if no monitoring of the strings at junction box/combiner box level has been designed check the integrity and working condition of all connections, fuses and circuit breakers within junction boxes/combiner boxes check the continuity of cables and wires to ensure proper electrical connections throughout the solar PV power plant up to the inverter input troubleshoot the identified faults and escalate the issue to superiors if faults cannot be identified or rectified 	Solar PV power plant maintenance kit, 1kWp solar PV power plant, Site Visit for practical learning

		<ul style="list-style-type: none"> • verify the earthing and lightening protection systems as per the as-built drawings and report in case of any discrepancies • measure the resistance of earthing systems and identify the earth pits where the resistance exceeds design norms • check the continuity of the earthing system • troubleshoot the identified issues and escalate the issue to superiors if faults cannot be rectified • ensure proper cleaning of modules as per schedule and standard procedure and remove any shadowing objects • check the module frame for any deformation or defect • check the integrity of module terminal box and interconnections • check and record any defects in the modules to report it to the supervisor • measure and record the readings from the inverter and the monitoring system • clean /replace inverter cooling fan filters, removal of dust from electronic components and any other maintenance activity recommended by the manufacturer • inform the supervisor or the appropriate supplier if there is any abnormal functioning of the inverter or the monitoring system • clean the work area after completing the maintenance activity • remove all the tools, consumables used from the work area • complete the documentation and get the signature of the superior/ client 	
3	<p>Maintain personal health & safety at solar PV power plant</p> <p>Theory Duration (hh:mm) 10:00</p> <p>Practical Duration (hh:mm) 20:00</p> <p>Corresponding NOS Code SGJ/N0121</p>	<ul style="list-style-type: none"> • identify corporate policies required for workplace safety • identify requirements for safe work area and create a safe work environment • identify contact person when workplace safety policies are violated • provide information about incident/violation • identify the location of first aid materials and administer first aid • identify the personal protection equipment required for specific locations on-site • identify expiry dates and wear & tear issues of specified equipment • demonstrate safe and accepted practices for personal protection 	<p>Safety helmet, Safety souse, Safety belt, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves</p>

		<ul style="list-style-type: none"> identify environmental hazards associated with the project site identify electrical hazards identify personal safety hazards or work site hazards and mitigate hazards select tools, equipment and testing devices needed to carry out the work demonstrate safe and proper use of required tools and equipment 	
4	<p>Work effectively with others</p> <p>Theory Duration (hh:mm) 06:00</p> <p>Practical Duration (hh:mm) 20:00</p> <p>Corresponding NOS Code SGJ/N0120</p>	<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 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 	
	<p>Theory Duration (hh:mm) 70:00</p> <p>Practical Duration (hh:mm) 130:00</p>	Solar PV power plant maintenance kit, 1kWp solar PV power plant, Safety helmet, Safety souse, Safety belt, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves, Site Visit 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 Maintenance Technician – Electrical (Ground Mount) mapped to Qualification Pack: “SGJ/Q0115, 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/Q0115, 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 Maintenance Technician – Electrical (Ground Mount)” mapped to QP: “SGJ/Q0115, 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 is 80%.
5	Experience	Two years of experience in Operation & Maintenance of Solar PV power plants

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Solar PV Maintenance Technician – Electrical (Ground Mount)

Qualification Pack SGJ/Q0115

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 center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center 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			Out of	Theor y	Skills Practic al
Assessment Outcomes	Assessment Criteria for outcomes	Total Marks			
SGJ/N0137 Carry out electrical maintenance of solar PV power plant	PC1. verify the connections, cables and junction boxes as per the design/ working drawings	100	4	2	2
	PC2. measure the string current and verify the connections between modules in each string periodically, if no monitoring of the strings at junction box/combiner box level has been designed		6	2	4
	PC3. check the integrity and working condition of all connections, fuses and circuit breakers within junction boxes/combiner boxes		6	2	4
	PC4. check the continuity of cables and wires to ensure proper electrical connections throughout the solar PV power plant upto the inverter input		6	3	3
	PC5. troubleshoot the identified faults and escalate the issue to superiors if faults cannot be identified or rectified		8	3	5
	PC6. verify the earthing and lightening protection systems as per the as-built drawings and report in case of any discrepancies		6	2	4
	PC7. measure the resistance of earthing		6	3	3

	systems and identify the earth pits where the resistance exceeds design norms				
	PC8. check the continuity of the earthing system		6	3	3
	PC9. troubleshoot the identified issues and escalate the issue to superiors if faults cannot be rectified		8	3	5
	PC10. ensure proper cleaning of modules as per schedule and standard procedure and remove any shadowing objects		2	1	1
	PC11. check the module frame for any deformation or defect		6	2	4
	PC12. check the integrity of module terminal box and interconnections		6	2	4
	PC13. check and record any defects in the modules to report it to the supervisor		6	2	4
	PC14. measure and record the readings from the inverter and the monitoring system		6	2	4
	PC15. clean /replace inverter cooling fan filters, removal of dust from electronic components and any other maintenance activity recommended by the manufacturer		8	2	6
	PC16. inform the supervisor or the appropriate supplier if there is any abnormal functioning of the inverter or the monitoring system		4	2	2
	PC17. clean the work area after completing the maintenance activity		2	1	1
	PC18. remove all the tools, consumables used from the work area		2	1	1
	PC19. complete the documentation and get the signature of the superior/ client		2	1	1
		TOTAL	100	39	61
SGJ/N0121 Maintain personal health & safety at solar PV power plant	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	0
	PC5. identify the location of first aid materials and administer first aid		2	1	1
	PC6. identify the personal protection equipment required for specific locations on-site		8	3	5

	PC7. identify expiry dates and wear & tear issues of specified equipment		2	1	1
	PC8. demonstrate safe and accepted practices for personal protection		8	3	5
	PC9. identify environmental hazards associated with the project site		4	2	2
	PC10. identify electrical hazards		4	2	2
	PC11. identify personal safety hazards or work site hazards and mitigate hazards		6	3	3
	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		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 behaviours 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