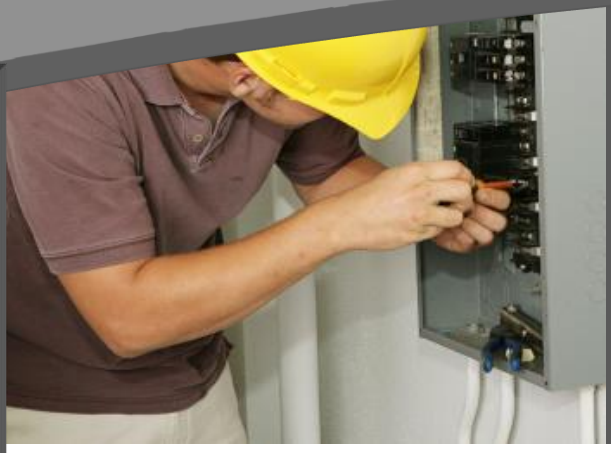
QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR GREEN JOBS



Contents

What are Occupational Standards (OS)?

- OS describe what individuals need to do, know and understand in order to carry out a particular job role or function
- OS are performance standards that individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding

Introduction

Qualifications Pack- Solar PV Installer - Electrical

SECTOR: GREEN JOBS

SUB-SECTOR: Renewable Energy

OCCUPATION: Installation & Commission

REFERENCE ID: SGJ/Q0102

ALIGNED TO: NCO-2004/ NIL

Solar PV Installer - Electrical specializes in electrical installations and commissioning of Solar Photovoltaic Systems.

Brief Job Description: Solar PV Installer - Electrical installs, tests, and commissions' different electrical components of photovoltaic systems, that meet the performance and reliability needs of customers by incorporating quality craftsmanship and complying with all applicable codes, standards, and safety requirements.

Personal Attributes: This job requires the individual to concentrate on the job at hand and complete it without any accidents so diligence and hardworking are desired attributes for individuals performing this role. He must also demonstrate strong work ethics, an ability to communicate courteously with co-workers, and must be good with following instructions of the supervisor.

Job Details

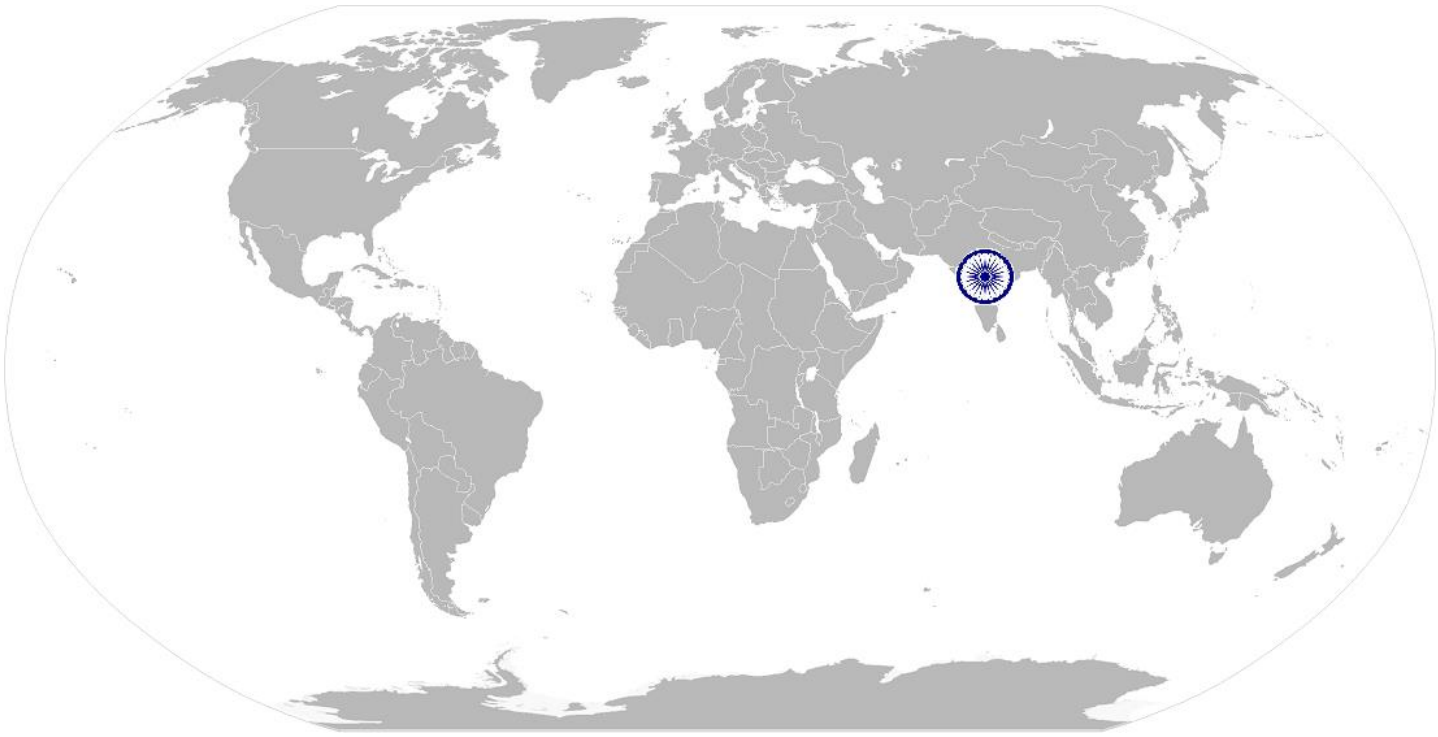
Qualifications Pack Code	**SGJ/Q0102**		
Job Role	**Solar PV Installer - Electrical** **This job role is applicable in both national and international scenarios**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Sector	**Green Jobs**	**Drafted on**	**06/12/2015**
Sub-sector	**Solar Photovoltaic**	**Last reviewed on**	**07/12/2015**
Occupation	**Installation & Commission**	**Next review date**	**01/12/2018**
NSQC Clearance on	**N.A**		

Job Role	**SOLAR PV INSTALLER - ELECTRICAL**
Role Description	Solar PV Installer - Electrical specializes in electrical installations and commissioning of Solar Photovoltaic Systems.
NSQF level	4
Minimum Educational Qualifications	10th pass + ITI / Diploma (Electrical, Electronics)
Maximum Educational Qualifications	Not Applicable.
Training (Suggested but not mandatory)	N/A
Minimum Job Entry Age	18 years.
Experience	Not Required.
Applicable National Occupational Standards (NOS)	**Compulsory:** SGJ/N0101: Site Survey for installation of Solar PV System SGJ/N0104: Install Electrical components of Solar PV System SGJ/N0105: Test and Commission Solar PV System SGJ/N0106: Maintain Personal Health & Safety at project site **Optional:** Not Applicable.
Performance Criteria	As described in the relevant OS units.

Definitions

Keywords/Terms	Description
Sector	Sector is a conglomeration of different business operations having similar businesses and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/related set of functions in an industry.
Function	Function is an activity necessary for achieving the key purpose of the sector, occupation or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of OS.
Job Role	Job role defines a unique set of functions that together form a unique employment opportunity in an organization
OS	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and understanding they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria	Performance Criteria are statements that together specify the standard of performance required when carrying out a task.
NOS	NOS are Occupational Standards which apply uniquely in the Indian context.
Qualifications Pack Code	Qualifications Pack Code is a unique reference code that identifies a qualifications pack
Qualifications Pack	Qualifications Pack comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A Qualifications Pack is assigned a unique qualification pack code.
Unit Code	Unit Code is a unique identifier for an Occupational Standard, which is denoted by an 'N'.
Unit Title	Unit Title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Knowledge and Understanding	Knowledge and Understanding are statements which together specify the technical, generic, professional and organizational specific knowledge that an individual needs in order to conform to the required standard.
Organizational Context	Organizational Context includes the way the organization is structured And how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical Knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills or Generic Skills	Core Skills or Generic Skills are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.

National Occupational Standard



Overview

This unit is about doing survey for installation of Solar PV system and its Plant Components.

National Occupational Standard

SGJ/ N 0101 **Site Survey for Installation of Solar PV System**

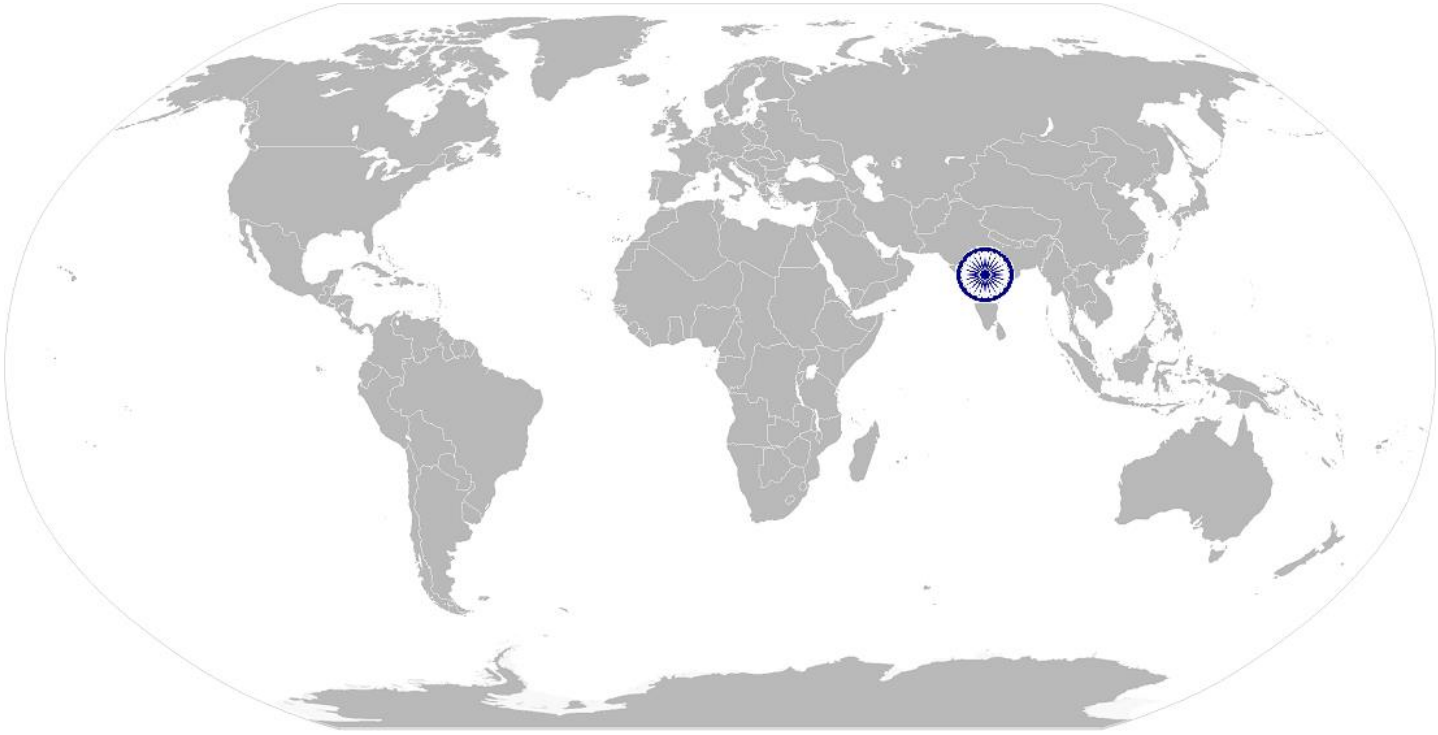
Unit Code	**SGJ / N0101**
Unit Title (Task)	**Site Survey for Installation of Solar PV System**
Description	This unit is about Solar Photovoltaic Technology and Plant Components.
Scope	This unit/task covers the following: • Assess the site condition • Identify load to be connected to Solar PV System
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Assess the site conditions	To be competent, the user/ individual must be able to: PC1. Understand the location of installations and optimize the route plan PC2. Assess the site level pre-requisites for solar panel installation PC3. Check for any shading obstacles PC4. Decide on the type of mounting to be constructed PC5. Inform the customer for any civil construction to be undertaken for installing the panels PC6. Prepare a site map of the location where installation has to be carried out
Identify load to be connected to Solar PV System	PC7. Assess the load to be run on Solar Power Plant PC8. Prepare a load profile PC9. Document the site survey variables and complete the checklist/site survey form
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company /organization and its processes)	The user/individual on the job needs to know and understand: KA1. Company's Installation Policy. KA2. Company's Customer Support Policy. KA3. Company's documentation policy. KA4. Document information using appropriate corporate forms. KA5. Obtain authorization from specified field safety officer and supervisor. KA6. Company's reporting structure. KA7. Organization culture. KA8. Company's different department and concerned authority.
B. Technical Knowledge	The individual on the job needs to know and understand the following aspects: KB1. Definition of the terms: energy and power, cell, module, string, array, mono-crystalline, poly-crystalline, amorphous silicon. KB2. Basic concepts of Trigonometry and coordinate geometry KB3. Units and symbols for irradiation and irradiance. KB4. Effect on array output of current and voltage based on series / parallel connections of modules, tilt angle, orientation and shading. KB5. Perform simple calculations to derive the power and energy received from solar radiation in a given area.
	KB7. Efficiency, cost and typical specifications, functioning and operating principle of different types of Solar Photovoltaic Plants, commercially available PV modules, inverters, charge controllers, battery, mounting structures, cables, junction boxes and other components. KB8. Mechanical and electrical features necessary for the long life of the PV Power Plant under a wide range of operating conditions.

SGJ/ N 0101 **Site Survey for Installation of Solar PV System**

Skills	
A. Core Skills / Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. Fill up documentation applicable to one's role.
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA2. Read vernacular/English language. SA3. Read and understand manuals, health and safety instructions, memos, other company documents. SA4. Ability to read from different sources- books, screens in machines and signage. SA5. Understand the various colour codes, as per standard electrical, mechanical and civil nomenclature.
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA6. Express statements or information clearly so that others can hear and understand. SA7. Participate in and understand the main points of simple discussions. SA8. Respond appropriately to any queries. SA9. Communicate with supervisor.
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. Follow organization rule-based decision making process. SB2. Take decision with systematic course of action and/or response.
	Plan and Organize
	The user/individual on the job needs to know and understand how to : SB3. Planning and organization of work to meet deadlines. SB4. Work constructively and collaboratively with others.
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB5. Follow code of conduct. SB6. Manage relationships with customers with intent on satisfying its requirements for service delivery.
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB7. Recognize problems and search for solutions. SB8. Choose best methods to complete assigned tasks. SB9. Approach relevant authority when required.
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB10. Apply domain knowledge, observations and data to select course of action to perform tasks related to Solar Photovoltaic Systems.
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB11. Critically evaluate information obtained from customers, supervisor and co-workers to perform day to day activities. SB12. Ask questions for better understanding.

NOS Version Control

NOS Code	SGJ/N0101		
Credits (NSQF)	TBD	Version number	1.0
Industry Sector	Green Jobs	Drafted on	26/06/2015
Industry Sub-sector	Solar Photovoltaic	Last reviewed on	20/11/2015
Occupation	Site Survey	Next review date	01/10/2018



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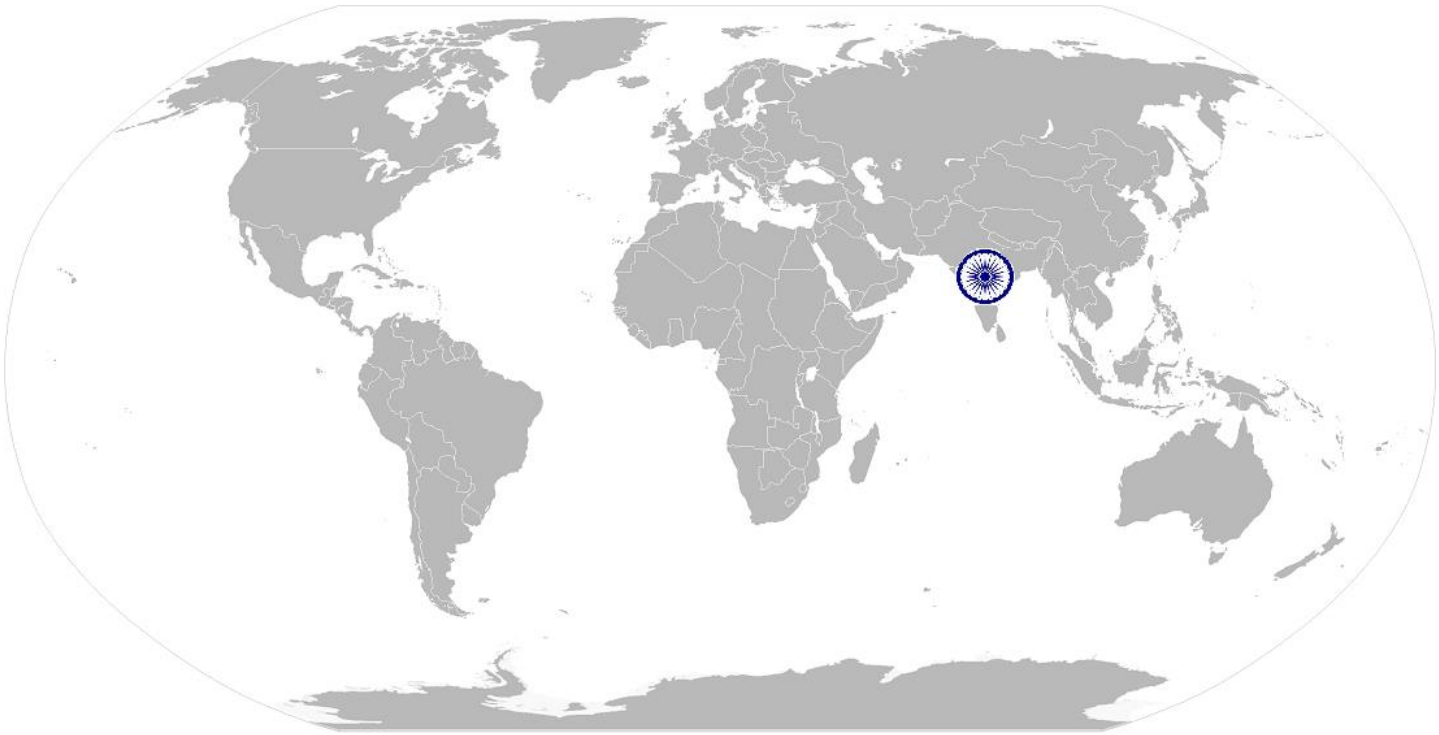


Overview

This unit is about installation of electrical components of Solar Photovoltaic Power Plant

National Occupational Standard

SGJ/ N 0104 **Install electrical components of Solar PV system**

Unit Code	**SGJ / N0104**
Unit Title (Task)	**Install electrical components of Solar PV system**
Description	This unit is about installation of electrical components of the Photovoltaic system.
Scope	This OS unit/task covers the following: • Prepare for Solar Installation. • Install Electrical Components. • Install Conduits and cables. • Get the Grounding Systems installed • Install Battery bank (as required)
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Prepare for Solar Installation	To be competent ,the user/individual on the job must be able to: PC1. Implement the site safety plan and Maintain clear work area. PC2. Clarify the maximum working voltage PC3. Select required Personal Protective Equipment (PPE) PC4. Measure current and voltage on equipment before proceeding with work PC5. Inspect and demonstrate the use of electrical installation toolkit PC6. Inspect and maintain safety equipment PC7. Inspect and maintain testing equipment PC8. Demonstrate situational awareness
Install Electrical Components	PC9. Select the location of DC combiner box PC10. Install DC combiner box along with disconnect protections PC11. Install DC energy meters PC12. Confirm battery bank location and Install batteries. PC13. Prepare battery terminals and Install battery interconnection cables. PC14. Terminate fine stranded cables. PC15. Test final assembled battery polarity and voltage. PC16. Install charge controller (if required) PC17. Install inverter PC18. Install utility required disconnects PC19. Install AC combiner box PC20. Connect the solar system to the Distribution box or Transformer. PC21. Proper labeling of the components
Install Conduits and Cables	PC22. Prepare conduit and cable routing plan PC23. Select the correct cable type, color, and gauge. PC24. Support and secure conduit. PC25. Install the cables for modules, inverter and other components PC26. Terminate cables. PC27. Check cables for continuity PC28. Proper labeling of conduits and cables
Get the Grounding Systems installed	PC29. Locate underground hazards, if any PC30. Determine grounding conductor size. PC31. Get the grounding system installed for modules/mounting system and inverters PC32. Get the Bonding done for all electrical equipment's and apply anti – oxidant material

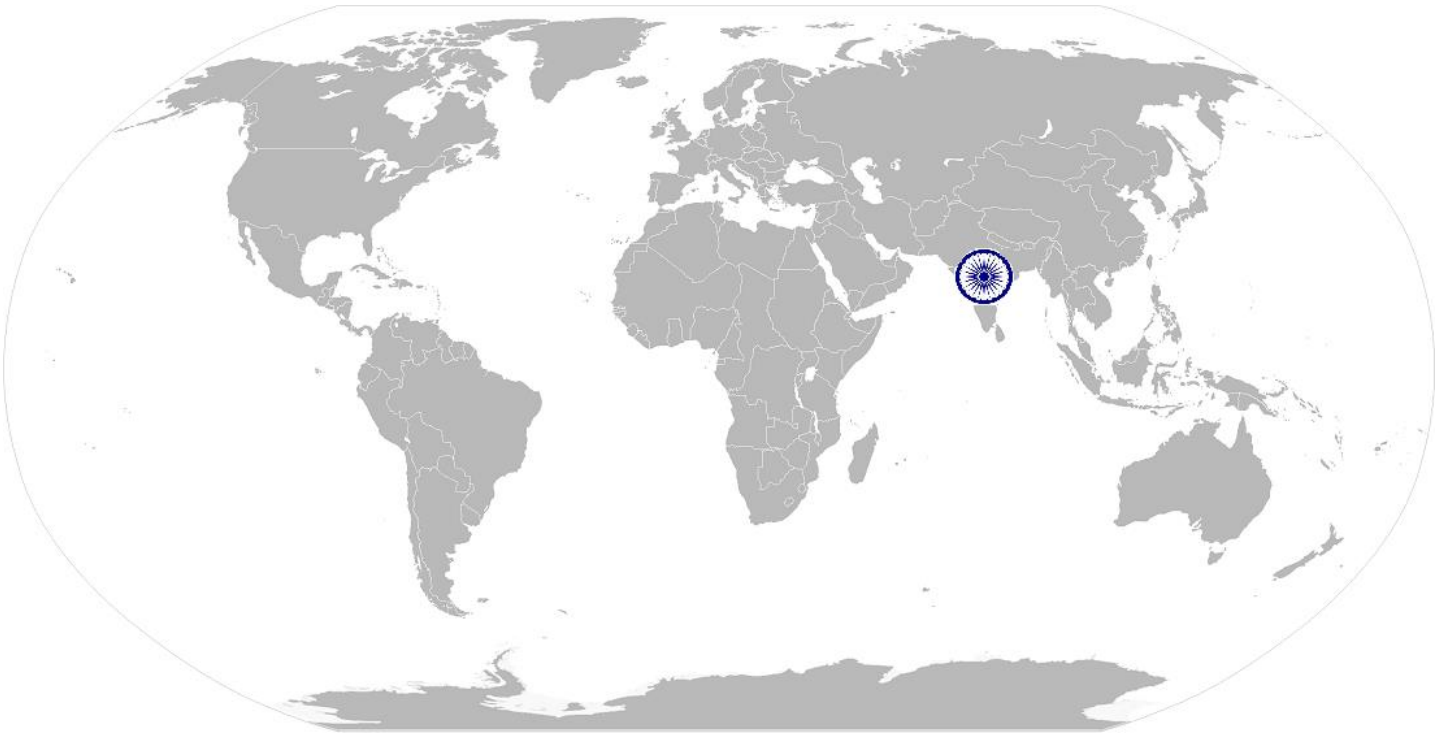
Install Battery Bank (as required)	PC33. Confirm and install battery bank enclosure/racks. PC34. Install battery spill containment (if required). PC35. Install batteries and Prepare battery terminals (e.g., clean). PC36. Install battery interconnection cables and apply anti-oxidant material PC37. Terminate fine stranded cables.
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. Government/Corporate policies and guidelines on: workplace safety, identification and mitigation of safety hazards, work procedures and guidelines for working at height. KA2. Document information using appropriate corporate forms. KA3. Obtain authorization from specified field safety officer and supervisor. KA4. Legislative, organization, site requirements and procedures. KA5. Diagnostic/fault finding techniques. KA6. The environmental requirements. KA7. Work in varying weather conditions. KA8. Isolation procedures.
B. Technical Knowledge	The user/individual on the job needs to know and understand how to: KB1. Knowhow of Tools & Tackles required for installation. KB2. Effect on array output of current and voltage based on series / parallel connections of modules, tilt angle, orientation and shading. KB3. Efficiency, cost, typical specifications, functioning and operating principle of different types of commercially available PV modules, inverters, charge controllers, battery, cables, junction boxes and other electrical components. KB4. Mechanical and electrical features necessary for the long life of the PV system under a wide range of operating conditions. KB5. DO's and Don'ts of material handling and storage. KB6. Determining whether any shading will occur and estimate its effect on the system. KB7. Determining the cabling route and estimate the length of cable required. KB8. Determining where the array junction box (if required) and inverter will be located. KB9. Measuring solar irradiance with a pyranometer. KB10. Determining, using field measurements and a sun path diagram, the times and dates when a PV array will be shaded by obstacles at a particular site. KB11. Observe how current and voltage of a module varies w.r.t load. KB12. Effect of blocking and bypass diodes. KB13. Basic functioning and Operation of different types of inverters and other electrical components. KB14. Do's and don'ts of DC wiring and installation of other electrical components. KB15. Connection of the Solar Power Plant to the distribution box/ LT Panel and switchover along with precautions based on different types of plants KB16. Installation work on a Solar power system in accordance with relevant stan and regulations KB17. Occupational health and safety (OHS) standards and associated risks when working on that particular site.

SGJ/ N 0104 **Install electrical components of Solar PV system**

Skills	
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. Fill up documentation applicable to one's role.
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA2. Read English and/or vernacular language. SA3. Read and understand manuals, health and safety instructions, memos, other company documents. SA4. Ability to read from different sources- books screens in machines and signage. SA5. Understand the various color codes, as per standard electrical, mechanical
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA6. Express statements or information clearly so that others can hear and understand. SA7. Participate in and understand the main points of simple discussions. SA8. Respond appropriately to any queries. SA9. Communicate with supervisor.
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. Follow organization rule-based decision making process. SB2. Take decision with systematic course of actions and/or response.
	Plan and Organize
	The user/individual on the job needs to know and understand how to : SB3. Planning and organization of work to meet deadlines. SB4. Work constructively and collaboratively with others.
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB5. Follow code of conduct. SB6. Manage relationships with customers with intent on satisfying its requirements for service delivery.
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB7. Recognize problems and search for solutions. SB8. Choose best methods to complete assigned tasks. SB9. Approach relevant authority when required.
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB10. Apply domain knowledge, observations and data to select course of action to perform tasks related to Solar Photovoltaic Systems.
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB11. Critically evaluate information obtained from customers, supervisor and co-workers to perform day to day activities. SB12. Ask questions for better understanding.

NOS Version Control

NOS Code	SGJ/N0104		
Credits (NSQF)	TBD	Version number	1.0
Industry Sector	Green Jobs	Drafted on	26/06/2015
Industry Sub-sector	Solar Photovoltaic	Last reviewed on	21/10/2015
Occupation	Electrical Installation	Next review date	01/10/2018



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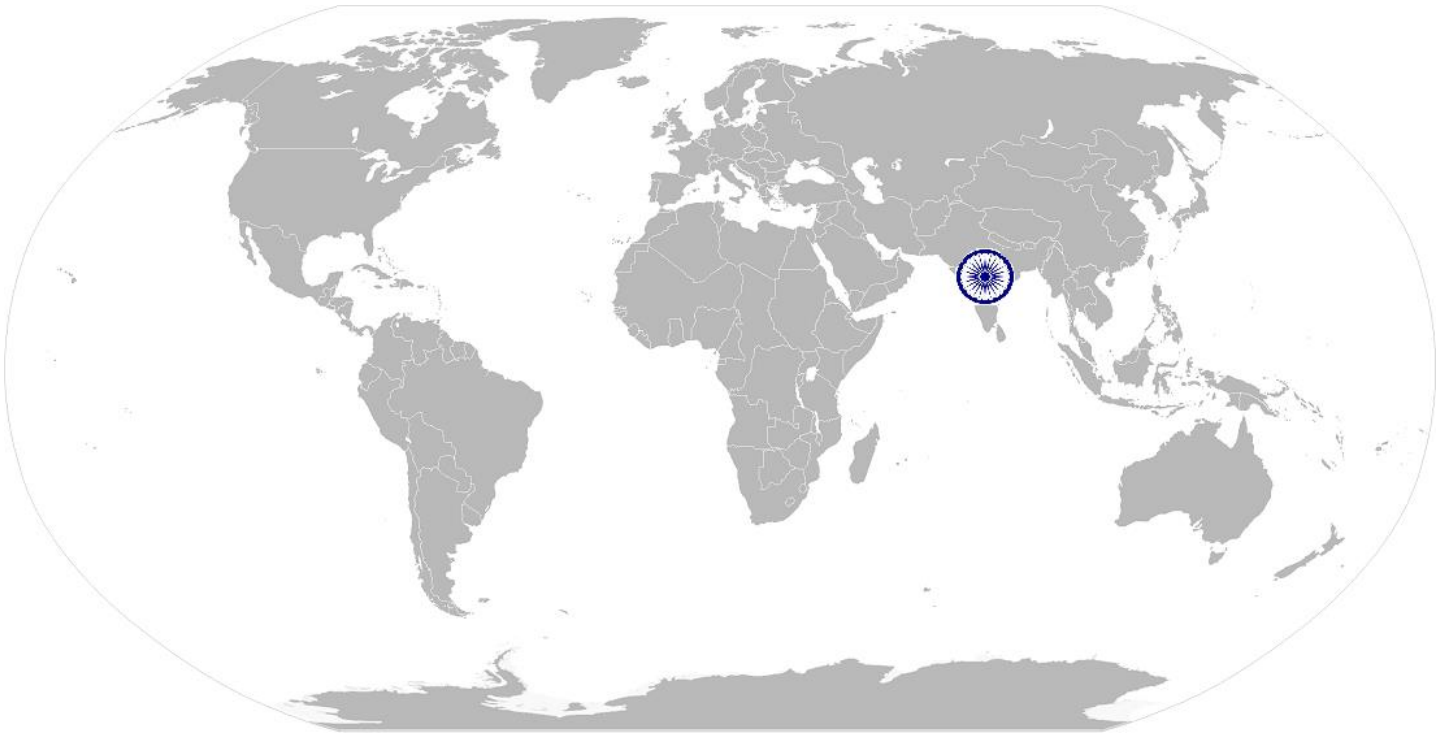

Overview

This unit is about Testing and Commissioning of Solar PV System.

National Occupational Standard

Unit Code	**SGJ / N0105**
Unit Title (Task)	**Test and Commission Solar PV System**
Description	This unit is about Testing, and Commissioning of electrical components of Photovoltaic System.
Scope	This OS unit/task covers the following: • Test the System. • Commission the System.
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Test the System	To be competent, the user/ individual must be able to: PC1. Perform visual inspection. PC2. Inspect mechanical, civil and electrical installation components. PC3. Verify system grounding and measure insulation resistance PC4. Check continuity of the system and Verify polarity. PC5. Measure DC voltages and currents for each string and array for proper operation of the system PC6. Verify inverter operation including anti-islanding performance and measure AC system values. PC7. Verify calibration of Data Acquisition System. PC8. Verify workmanship and demonstrate proficiency in using tools PC9. Preparation of the Inspection report and take appropriate action
Commission the System	PC10. Verify labeling of solar PV system. PC11. Initiate startup procedures as per manufacturer instructions and record energy meter reading at startup PC12. Measure and record voltage of energy storage system PC13. Record and repair any anomalous conditions. PC14. Document design changes, if any
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / Organization and Its processes)	The user/individual on the job needs to know and understand: KA1. Government/Corporate policies and guidelines on: workplace safety, identification and mitigation of safety hazards, work procedures and guidelines for working at height. KA2. Document information using appropriate corporate forms. KA3. Obtain authorization from specified field safety officer and supervisor. KA4. Legislative, organization, site requirements and procedures. KA5. Diagnostic/fault finding techniques. KA6. The environmental requirements.

SGJ/ N 0105	Test and Commission Solar PV System
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Definition of the terms: energy and power, cell, module, string, array, mono-crystalline, poly-crystalline, amorphous silicon KB2. Units and symbols for irradiation and irradiance KB3. Know-how of Tools & Tackles required for inspection and commissioning of the plant KB4. Effect on array output of current and voltage based on series / parallel connections of modules, tilt angle, orientation and shading KB5. Perform simple calculations to derive the power and energy received from solar radiation in a given area KB6. Efficiency, cost, typical specifications, functioning and operating principle of different types of commercially available PV modules, inverters, charge controllers, battery, cables, junction boxes and other electrical components. KB7. Mechanical and electrical features necessary for the long life of the PV system under a wide range of operating conditions KB8. Determine the type of mounting structure required depending on the type of roof KB9. Determine the type of footing and fixtures required depending on the type of roof KB10. DO's and Don'ts of material handling and storage KB11. Determining whether any shading will occur and estimate its effect on the system. KB12. Determining the cabling route and estimate the length of cable required. KB13. Determining where the array junction box (if required) and inverter will be located. KB14. Measuring solar irradiance with a pyranometer. KB15. Determining, using field measurements and sun path diagram, the times and dates when a PV array will be shaded by obstacles KB16. Observe how current and voltage of a module varies w.r.t load KB17. Effect of blocking and bypass diodes KB18. Basic functioning and Operation of different types of inverters and other electrical components KB19. Do's and don'ts of DC wiring and installation of other electrical components KB20. Connection of the Solar Power Plant to the distribution box/ LT Panel and switchover along with precautions based on different types of plants KB21. Installation work on a PV power system in accordance with relevant standards and regulations KB22. Testing and commissioning activities and its interpretation - visual inspection, continuity of wiring, Earthing, polarity check, insulation and voltage drop KB23. Measurement of losses in a PV system at different points and interpretation of the results KB24. Typical faults, their causes and resolution for all system components KB25. Occupational health and safety (OHS) standards and associated risks when working on that particular site.
Skills	
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. Fill up documentation applicable to one's role.

	Reading Skills
	The user/individual on the job needs to know and understand how to: SA2. Read English and/or vernacular language. SA3. Read and understand manuals, health and safety instructions, memos, other company documents. SA4. Ability to read from different sources- books screens in machines and signage. SA5. Understand the various color codes, as per standard electrical,
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA6. Express statements or information clearly so that others can hear and understand. SA7. Participate in and understand the main points of simple discussions. SA8. Respond appropriately to any queries.
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. Follow organization rule-based decision making process. SB2. Take decision with systematic course of actions and/or response.
	Plan and Organize
	The user/individual on the job needs to know and understand how to : SB3. Planning and organization of work to meet deadlines. SB4. Work constructively and collaboratively with others.
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB5. Follow code of conduct. SB6. Manage relationships with customers with intent on satisfying its requirements for service delivery.
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB7. Recognize problems and search for solutions. SB8. Choose best methods to complete assigned tasks. SB9. Approach relevant authority when required.
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB10. Apply domain knowledge, observations and data to select course of action to perform tasks related to Solar Photovoltaic Systems.
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB11. Critically evaluate information obtained from customers, supervisor and co-workers to perform day to day activities. SB12. Ask questions for better understanding.

NOS Version Control

NOS Code	SGJ/N0105		
Credits (NSQF)	TBD	Version number	1.0
Industry Sector	Green Jobs	Drafted on	26/06/2015
Industry Sub-sector	Solar Photovoltaic	Last reviewed on	21/10/2015
Occupation	Testing & Commissioning	Next review date	01/10/2018

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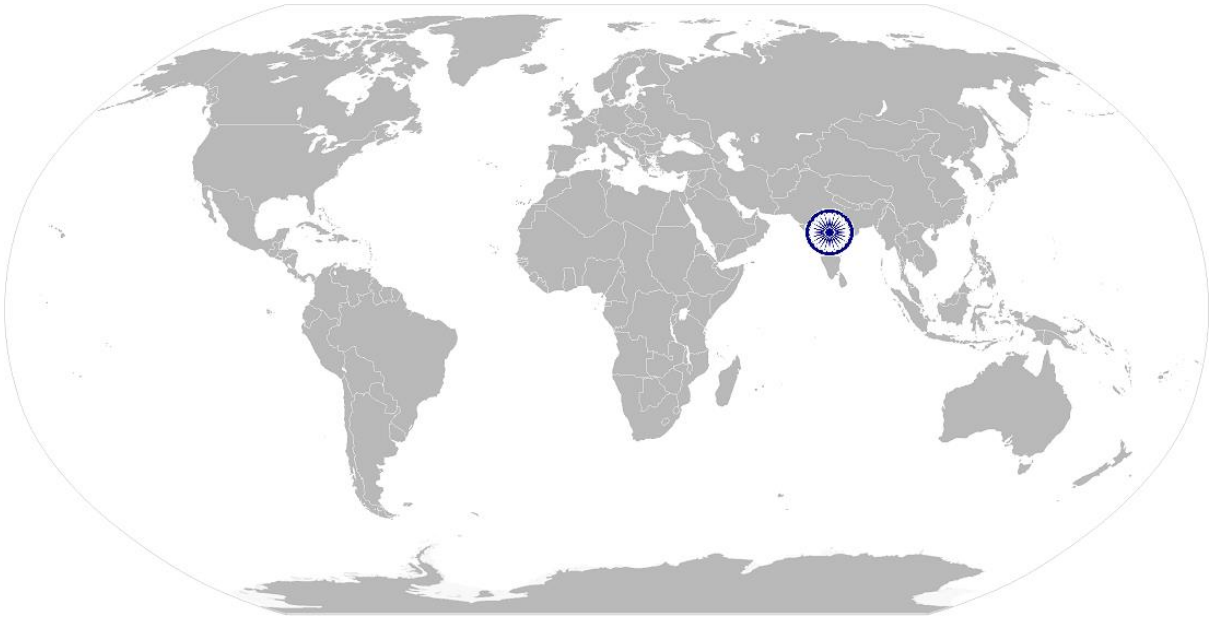
SGJ/ N 0106 **Maintain Personal Health & Safety at project site**

National Occupational Standard



Overview

This unit is about maintaining Personal Health & Safety at project site.

SGJ/ N 0106 **Maintain Personal Health & Safety at project site**

National Occupational Standard

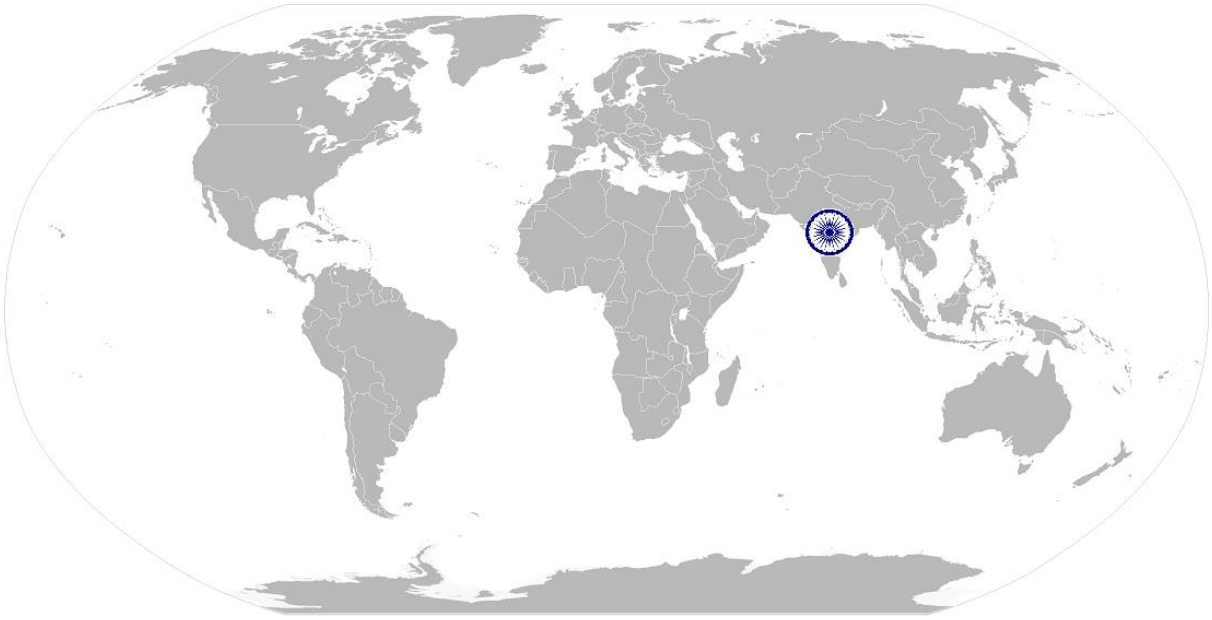
Unit Code	SGJ / N0106
Unit Title (Task)	Maintain Personal Health & Safety at project site
Description	This unit is about maintaining Work Safety for Solar Photovoltaic Power Plants.
Scope	This unit/task covers the following: • Establish and follow safe work procedure • Use and maintain personal protective equipment. • Identify and mitigate safety hazards. • Demonstrate safe and proper use of required tools and equipment. • Identify work safety procedures and instructions for working at height.
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Establish and Follow safe work procedure	To be competent, the user/individual on the job must be able to: PC1. Identify corporate policies required for workplace safety. PC2. Identify requirements for safe work area and create a safe work environment. PC3. Identify contact person when workplace safety policies are violated. PC4. Provide information about incident/violation. PC5. Identify the location of First Aid materials and administer first aid
Use and maintain personal protective equipment	PC6. Identify the personal protection equipment required for specific locations on-site PC7. Identify expiry dates and wear & tear issues of specified equipment. PC8. Demonstrate safe and accepted practices for personal protection.
Identify and mitigate safety hazards	PC9. Identify environmental hazards associated with the projects site. PC10. Identify electrical hazards. PC11. Identify personal safety hazards or work site hazards and Mitigate hazards.
Demonstrate safe and proper use of required tools and equipment	PC12. Select tools, equipment and testing devices needed to carry out the work. PC13. Demonstrate safe and proper use of required tools and equipment.
Identify work safety procedures and instructions for working at height.	PC14. Check access from ground to work area to ensure it is safe and in accordance with requirements. PC15. Reassess risk control measures, as required, in accordance with changed work practices and/or site conditions and undertake alterations. PC16. Inspect/install fall protection and perimeter protection equipment ensuring adequacy for work and conformance to regulatory requirements. PC17. Identify approved methods of moving tools and equipment to work area and minimize potential hazards associated with tools at heights PC18. Select and install appropriate signs and barricades PC19. Place tools and materials to eliminate or minimize the risk of items being knocked down. PC20. Dismantle the plant safely in accordance with sequence and remove from worksite to clear work area.

SGJ/ N 0106 **Maintain Personal Health & Safety at project site**

Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. Company's Installation Policy. KA2. Company's work safety policy KA3. Company's Customer Support Policy. KA4. Company's documentation policy. KA5. Obtain authorization from specified field safety officer and supervisor. KA6. Company's reporting structure and Organization culture. KA7. Company's different department and concerned authority.
B. Technical Knowledge	The individual on the job needs to know and understand the following aspects: KB1. The individual on the job needs to know and understand: KB2. Relevant Personal protective equipment's required for installation KB3. Relevant standards and regulations for installation of Solar Photovoltaic Power Plant in India KB4. Occupational health and safety (OHS) standards for installation of Solar Photovoltaic Power Plant KB5. Risk identification and mitigation procedure for safe installation of Solar Photovoltaic Power Plant KB6. Knowhow of tools & tackles required to carry out the work.
Skills	
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. Fill up documentation applicable to one's role.
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA2. Read English and/or vernacular language. SA3. Read and understand manuals, health and safety instructions, memos, other company documents. SA4. Ability to read from different sources- books screens in machines and signage. SA5. Understand the various color codes, as per standard electrical, mechanical
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA6. Express statements or information clearly so that others can hear and understand. SA7. Participate in and understand the main points of simple discussions. SA8. Respond appropriately to any queries. SA9. Communicate with supervisor.
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. Follow organization rule-based decision making process. SB2. Take decision with systematic course of actions and/or response.
	Plan and Organize
	The user/individual on the job needs to know and understand how to : SB3. Planning and organization of work to meet deadlines. SB4. Work constructively and collaboratively with others.
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB5. Follow code of conduct. SB6. Manage relationships with customers with intent on satisfying its requirements for service delivery.

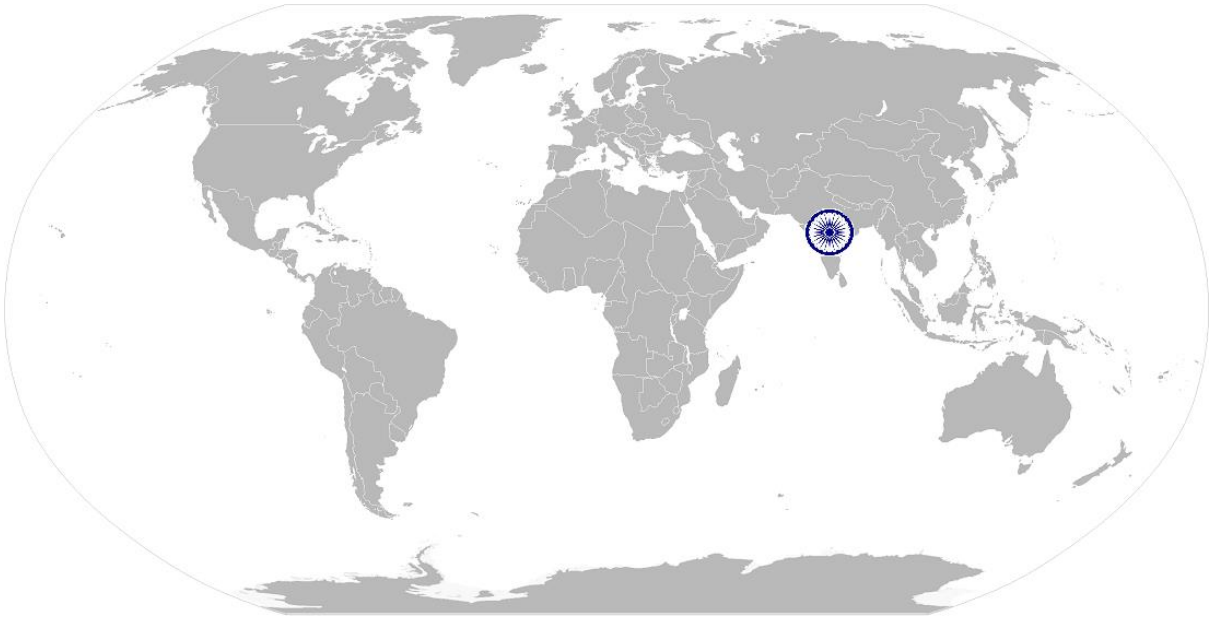
SGJ/ N 0106 **Maintain Personal Health & Safety at project site**

	Problem Solving
	The user/individual on the job needs to know and understand how to: SB7. Recognize problems and search for solutions. SB8. Choose best methods to complete assigned tasks. SB9. Approach relevant authority when required.
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB10. Apply domain knowledge, observations and data to select course of action to perform tasks related to Solar Photovoltaic Systems.
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB11. Critically evaluate information obtained from customers, supervisor and co-workers to perform day to day activities. SB12. Ask questions for better understanding.



NOS Version Control

NOS Code	SGJ/N0106		
Credits (NSQF)	TBD	Version number	1.0
Industry Sector	Green Jobs	Drafted on	26/06/2015
Industry Sub-sector	Solar Photovoltaic	Last reviewed on	21/10/2015
Occupation	Health & Safety	Next review date	01/10/2018

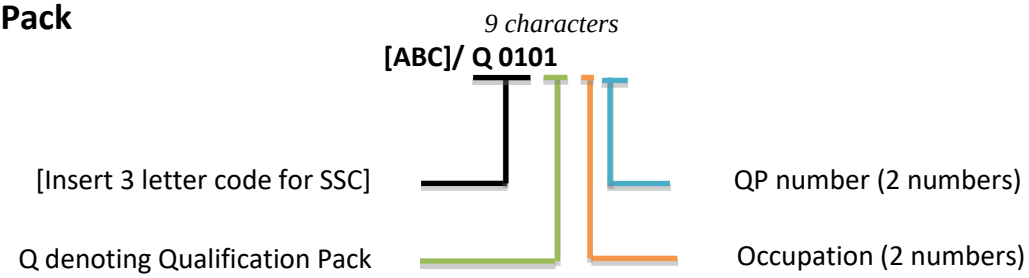


Back to NOS List:

Annexure

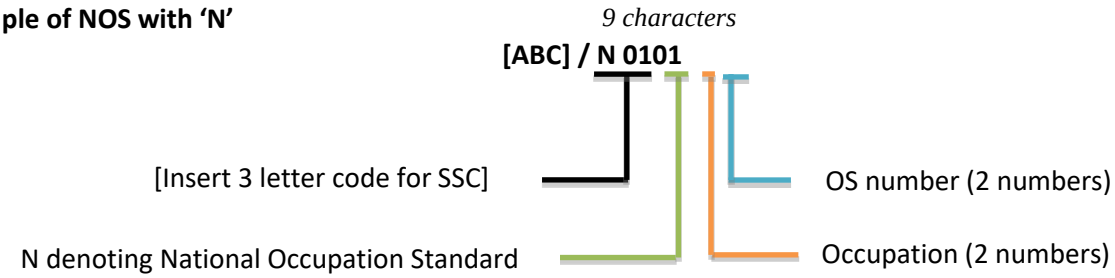
Nomenclature for QP and NOS

Qualifications Pack



Occupational Standard

An example of NOS with 'N'



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The following acronyms/codes have been used in the nomenclature above:

Sub-sector	Range of Occupation numbers
Solar Photovoltaic	01-05
Solar Thermal	06-10
Wind	11-15
Hydro	16-20
Biomass	21-25
Geothermal	26-30
All Renewables (Cross-cutting/ Enabling Activities)	31-35
Alternative Fuel Transportation	36-40
Bio-fuels and Farming	40-45
Environmental Compliance and Sustainability Planning	46-50
Green Buildings	51-55
Energy Efficiency	56-60
Waste Management	61-65
Water and Wastewater Management	66-70
Co-generation	71-75
Other Green Jobs	76-99

Sequence	Description	Example
Three letters	Industry name	SGJ
Slash	/	/
Next letter	Whether **Q**P or **N**OS	N
Next two numbers	Occupation code	01
Next two numbers	OS number	01

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CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Solar PV Installer - Electrical

Qualification Pack SGJ/Q0102

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. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria
5. To pass the Qualification Pack, every trainee should score a minimum of 70% in every NOS
6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack

		Marks Allocation			
NOS	**Performance Criteria**	Total Mark	Out Of	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
		TOTAL	30	16	14

SGJ/N0104 Install Electrical Components of Solar PV System	PC1. Implement the site safety plan and Maintain clear work area.	90	2	1	1
	PC2. Clarify the maximum working voltage		1	1	
	PC3. Select required Personal Protective Equipment (PPE)		2	1	1
	PC4. Measure current and voltage on equipment before proceeding with work		2	1	1
	PC5. Inspect and demonstrate the use of electrical installation toolkit		4	1	3
	PC6.Demonstrate situational awareness		3	1	2
	PC7.Select the location of DC combiner box		2	1	1
	PC8. Install DC combiner box along with disconnect protections		4	1	3
	PC9. Install DC energy meters		2	1	1
	PC10. Confirm battery bank location and Install batteries.		2	1	1
	PC11. Prepare battery terminals and Install battery interconnection cables.		2	1	1
	PC12. Terminate fine stranded cables.		2	1	1
	PC13. Test final assembled battery polarity and voltage.		2	1	1
	PC14. Install charge controller (if required)		2	1	1
	PC15. Install inverter		4	1	3
	PC16. Install utility required disconnects		3	1	2
	PC17. Install AC combiner box		2	1	1
	PC18. Connect the solar Power Plant to the Distribution box or Transformer.		4	1	3
	PC19. Proper labeling of the components		2	1	1
	PC20. Prepare conduit and cable routing plan		4	2	2
	PC21. Select the correct cable type, color, and gauge.		4	2	2
	PC22. Ensure that the conduits are properly supported and secured		2	1	1
	PC23. Install the cables for modules, inverter and other components		4	1	3
	PC24. Terminate cables.		3	1	2
	PC25. Check cables for continuity		2	1	1
	PC26. Proper labeling of conduits and cables		2	1	1
	PC27. Locate underground hazards, if any		2	1	1
	PC28. Get the grounding Power Plant installed for modules/mounting Power Plant and inverters		4	2	2
	PC29. Get the Bonding done for all electrical equipment and apply anti – oxidant material		4	2	2
	PC30. Confirm and install battery bank enclosure/racks.		4	2	2
	PC31. Install battery spill containment (if required).		2	1	1
	PC32. Install batteries and Prepare battery terminals (e.g., clean).		4	2	2
	PC33. Install battery interconnection cables and apply anti-oxidant material		2	1	1
		TOTAL	90	39	51

SGJ/N0105 Test and Commission Solar PV system.	PC1. Perform visual inspection.	50	4	2	2
	PC2. Inspect mechanical civil and electrical installation components.		4	2	2
	PC3. Verify Power Plant grounding and measure insulation resistance		4	1	3
	PC4. Check continuity of the Power Plant and Verify polarity.		4	2	2
	PC5. Measure DC voltages and currents for each string and array for proper operation of the system		4	2	2
	PC6. Verify inverter operation including anti-islanding performance and measure AC system values.		6	3	3
	PC7. Verify calibration of Data Acquisition System.		1	1	
	PC8. Verify workmanship and demonstrate proficiency in using tools		6	2	4
	PC9. Preparation of the Inspection report and take appropriate action		3	2	1
	PC10. Verify labeling of Solar PV system.		2	1	1
	PC11. Initiate startup procedures as per manufacturer instructions and record energy meter reading at startup		6	3	3
	PC12. Measure and record voltage of energy storage system		2	1	1
	PC13. Record and repair any anomalous conditions.		2	1	1
	PC14. Document design changes, if any		2	1	1
		TOTAL	50	24	26
SGJ/N0106 Maintain Personal Health & Safety at project site	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
	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 the project site.		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 plant safely in accordance with sequence and remove from worksite to clear work area.		2	1	1
		TOTAL	50	29	21

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SSC	QPCode	Name of the QP	NSQF Level	Equipment Name	Minimum number of Equipment required (per batch of 30 trainees)	Unit Type	Is this a mandatory Equipment to be available at the Training Center (Yes/No)	Dimension/Specification/Description of the Equipment/ ANY OTHER REMARK
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Solar Photovoltaic Power Plant	1	kilowatt	Yes	1 kW
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Solar Photovoltaic Inverter	1	kilowatt	Yes	1 kW
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Battery	2	Ampere-hours	Yes	75 Ah
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Clampmeter	1	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Multimeter	1	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Earth Tester	1	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Spirit Level / Water Level	1	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Pyranometer	1	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Drill Machine	1	pieces	Yes	NA

Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Spanner	2	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Pliers	2	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Screwdriver	1	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Torque Wrench	1	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Wire Stripper	1	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Measuring Tape	1	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Line Dori	1	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Vernier Calliper	1	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Plumb bob	1	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Safety Helmet	5	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Safety Hand-gloves	5	pieces	Yes	NA

Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Safety Goggles	5	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Safety Harness	5	pieces	Yes	NA
Green Jobs	SGJ/Q 0102	Solar PV Installer - Electrical	4	Reflective Jacket	5	pieces	Yes	NA