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

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Introduction

Qualifications Pack- Solar PV Designer

SECTOR: GREEN JOBS

SUB-SECTOR: RENEWABLE ENERGY

OCCUPATION: DESIGNER

REFERENCE ID: SGJ/Q0110

ALIGNED TO: NCO-2015/ 2143. 01

Brief Job Description: A Solar PV Designer reviews the solar civil and electrical design of the Solar PV power plant & prepares the energy simulation report

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/Q0110**		
Job Role	**Solar PV Designer** [This job role is applicable in both national and international scenarios]		
Credits (NSQF)	**TBD**	**Version number**	**1.0**
Sector	**Green Jobs**	**Drafted on**	**01/09/2016**
Sub-sector	**Renewable Energy**	**Last reviewed on**	**17/05/2017**
Occupation	**Designer**	**Next review date**	**30/09/2019**
NSQC Clearance on	**03/08/2018**		

Job Role	**Solar PV Designer**
Role Description	Solar PV Designer specializes in the designing of solar PV power plant
NSQF level	7
Minimum Educational Qualifications	B. Tech/ B.E. (Solar/ Electrical, Electronics, Civil, Mechanical/ Energy Systems) or M.Tech (Solar/ Renewables/ Energy Studies)
Maximum Educational Qualifications	Not Applicable
Training (Suggested but not mandatory)	N/A
Minimum Job Entry Age	25 years
Experience	3 years of Solar PV experience for B.Tech/ B.E and fresher for M.Tech
Applicable National Occupational Standards (NOS)	**Compulsory:** 1. SGJ/N0128: Review the structural design of solar PV power plant 2. SGJ/N0129: Review the electrical design of solar PV power plant and the energy simulation report 3. SGJ/ N0106: Maintain personal health & safety at solar PV project site 4. SGJ/N0120: Work effectively with others
Performance Criteria	As described in the relevant OS units

Definitions

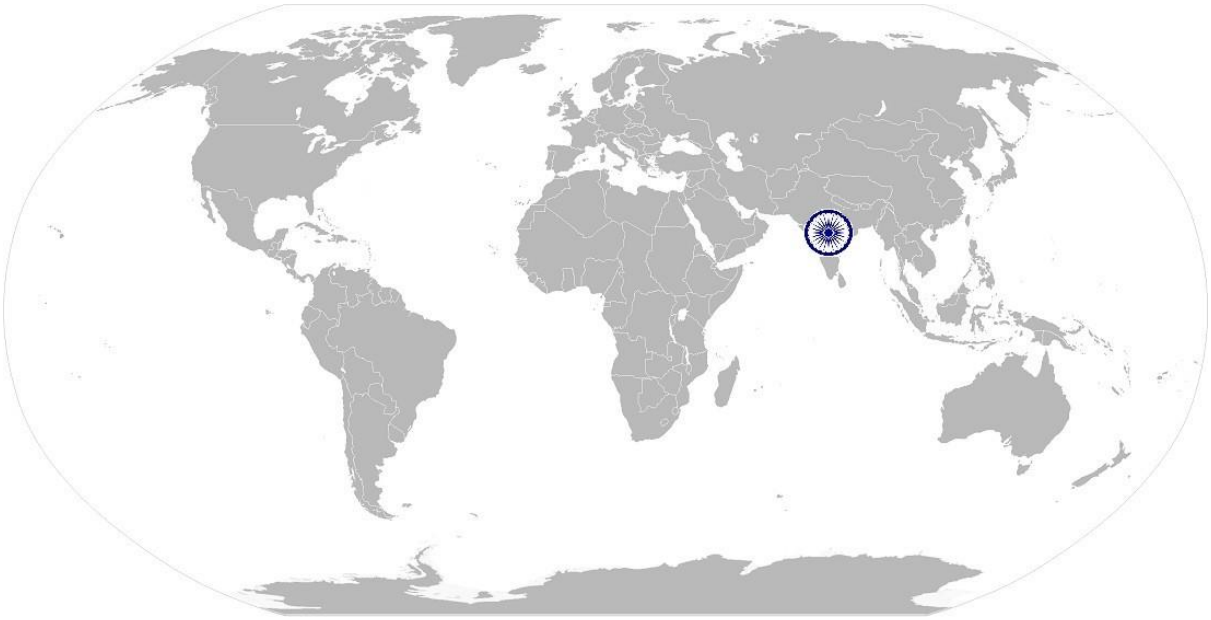
Keywords /Terms	Description
Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further 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.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (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.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OSs, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.
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.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.
Knowledge and Understanding	Knowledge and understanding are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual need to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation 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/ Generic Skills	Core skills or generic skills are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. In the context of the OS, these include communication related skills that are applicable to most job roles.

Acronyms

Keywords /Terms	Description
SCGJ	Skill Council for green jobs
NOS	National Occupational Standards
NSQF	National Skills Qualification Framework
NVEQF	National Vocational Educational Qualification Framework
NVQF	National Vocational Qualification Framework
OS	Occupational Standards
PC	Performance Criteria
QP	Qualification Pack
SSC	Sector Skills Council
DC	Direct Current
AC	Alternating Current
SCADA	Supervisory Control and Data Acquisition
PV	Photovoltaic
O&M	Operation and Maintenance
ERP	Enterprise Resource Planning
OHS	Occupational Health and Safety
CERC	Central Electricity Regulatory Commission
SERC	State Electricity Regulatory Commission

National Occupational Standard



Overview

This unit is about reviewing the structural deisgn of solar PV power plant

National Occupational Standard

Unit Code	SGJ/N0128
Unit Title (Task)	**Review the structural design of Solar PV Power Plant**
Description	This unit is about reviewing the structural design of solar PV power plant
Scope	This unit/task covers the following: • study the site survey and soil test reports • review the design for plant Infrastructure • review the design of solar module mounting system • review the design of foundation for other components • review the design of plant switchyard and power transmission system • review the design of mounting structures for Rooftop / Canal Top Plants
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Study the site survey and soil test reports	To be competent, the user/ individual must be able to: PC1. study the soil test reports, water table depth report and pull test data to ensure the design meets requirement
Review the design for plant Infrastructure	To be competent, the user/ individual must be able to: PC2. review the overall plant layout PC3. review the layout for solar field compound wall /entry gate PC4. review the layout for in plant roads with material specifications PC5. review the design for water distribution network inside the plant PC6. review the design for water drainage system PC7. review the design for pathways between the solar arrays
Review the design of solar module mounting system	To be competent, the user/ individual must be able to: PC8. review the design for the foundation for mounting solar PV panel support structure PC9. review the design for the tilt brackets and mounting frames for solar panels with fastening arrangement
Review the design of foundation for other components	To be competent, the user/ individual must be able to: PC10. document the details of RCC foundation, plan of the inverter room PC11. document the details of the bolt ,base plates etc. used in structure, foundation of inverter and control room PC12. document the transformer foundation details PC13. document the foundation and design details of the control room PC14. review the design plan for earthing pits PC15. review the design plan for lightning arrestor foundation PC16. review the design plan for street light foundation
Review the design of plant switchyard and power transmission system	To be competent, the user/ individual must be able to: PC17. review the structural design for plant switchyard as per the grid code and transmission authority regulations PC18. review the foundation plan for the transmission tower PC19. review the design for structure of the transmission tower PC20. review the design for stub and cleats of transmission tower PC21. review the design for corridor of transmission line
Review the design of mounting structures for Rooftop / Canal Top Plants	To be competent, the user/ individual must be able to: PC22. review the foundation design for module mounting structures such that the dead and dynamic loads on modules are transferred to the beam and columns of the building

SGJ/N0128 **Review the structural design of Solar PV Power Plant**

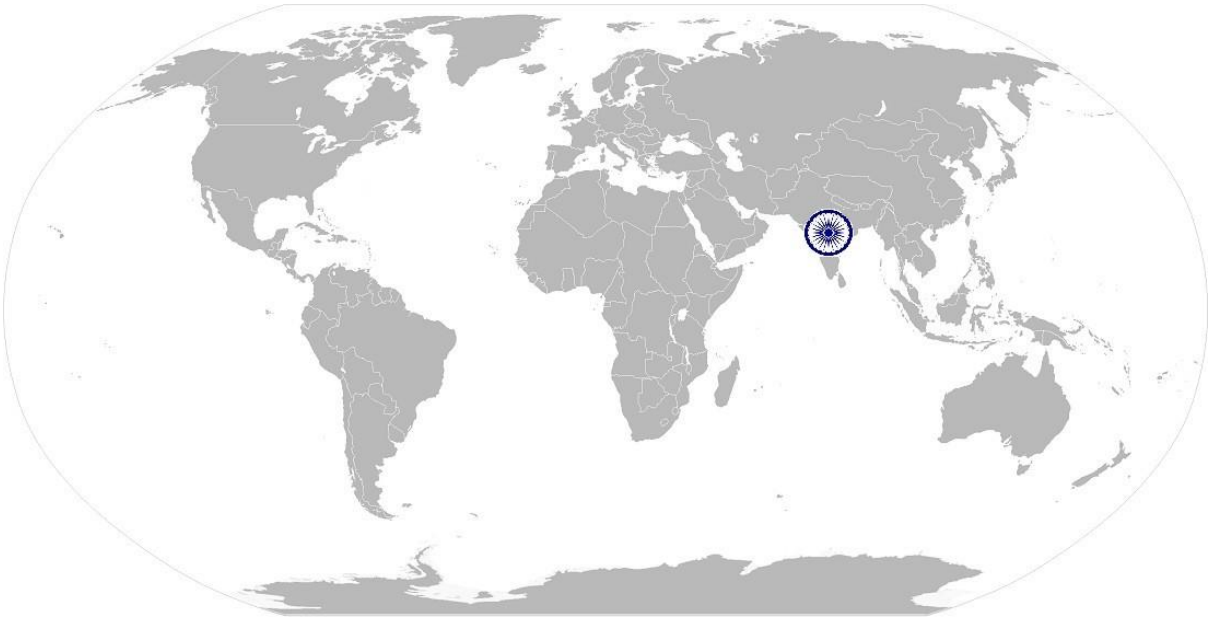
	PC23. review the design for walk ways for maintenance of modules and system PC24. review the design for movable mounting structure for canal top plant to increase output
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the organization and its processes)	The user/individual on 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 superiors KA4. legislative, organization, site requirements and procedures
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. site survey reports , availability of shadow free space for installation of solar power plant KB2. solar resource assessment including terms like DNI, DHI,GHI and albedo and their interpretation KB3. structural designs for the foundations for module structures/ inverters / transformers prepared by the structural design engineer/civil engineer KB4. design/ drawing of the module mounting structure KB5. solar cells/ modules / module technologies KB6. shading analysis and its importance and effect on solar PV power plant KB7. efficiency, cost and typical specifications, functioning and operating principle of different types of Solar PV Plants, commercially available PV modules, inverters, transformers, charge controllers, battery, mounting structures, cables, junction boxes and other components KB8. solar irradiation including GHI, DHI and DNI KB9. mechanical and electrical features necessary for the long life of the PV Power Plant under a wide range of operating conditions KB10. solar PV Power Plant design software such as PVSYST and PV*SOL etc.
Skills (S)	
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. prepare documentation as per relevant industry standards SA2. present information in a logical and organized way
	Reading Skills
	The user/individual on the job needs to know and understand: SA3. advanced level of english language SA4. how to intrepret manuals, health and safety instructions, memos, other company documents SA5. how to read and interpret data from various sources
	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 peers, superiors and sub-ordinates
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to:

SGJ/N0128 **Review the structural design of Solar PV Power Plant**

	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. plan and organize work to meet deadlines SB4. plan to utilise time and equipment effectively SB5. work constructively and collaboratively with others
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB6. follow organisation code of conduct SB7. 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: SB8. generate solutions to specific problems for a wide range of activities SB9. choose best methods to complete assigned tasks
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB10. apply wide range of factual and theoretical knowledge to select the right course of action to perform tasks related to solar photovoltaic power plant
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB11. use reasoning skills to identify and resolve basic problems SB12. use intuition to detect any potential problems which could arise during operations SB13. use acquired knowledge of the process for identifying and handling issues

NOS Version Control

NOS Code	SGJ/ N0128		
Credits (NSQF)	TBD	Version number	1.0
Industry	Green Jobs	Drafted on	01/09/2016
Industry Sub-sector	Renewable Energy	Last reviewed on	17/05/2017
Occupation	Designer	Next review date	30/09/2019



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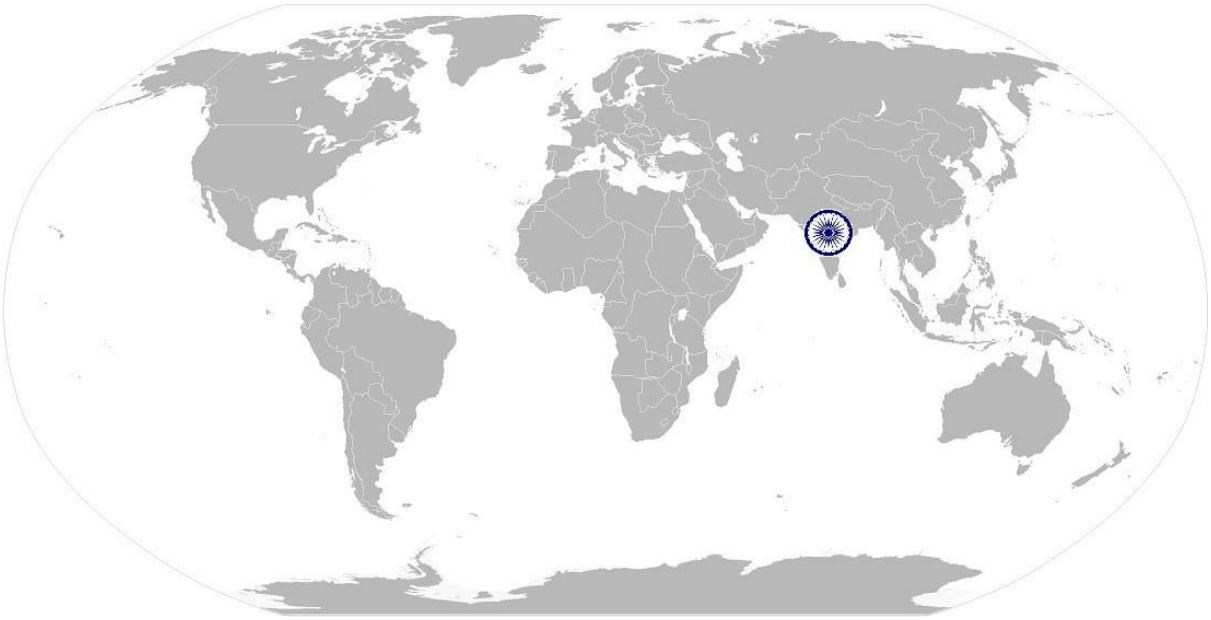


Overview

This unit is about reviewing the electrical design of solar PV power plant and preparation of energy generation report

SGJ/N0129 Review the electrical design of solar PV power plant and the energy simulation report

National Occupational Standard

Unit Code	SGJ/N0129
Unit Title (Task)	**Review the electrical design of solar PV power plant and the energy simulation report**
Description	This unit is about reviewing the electrical design of solar PV power plant and preparation of energy generation report
Scope	This unit/task covers the following: • workout the capacity of solar power plant • review the design and selection of solar modules • review the design and selection of inverters • review the design and selection of strings • review the design and selection of combiner boxes and switchgear • prepare energy simulation report • selection of batteries for rooftop off grid solar power plant
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Workout the capacity of solar power plant	To be competent, the user/ individual must be able to: PC1. analyze the availability of shadow free space available PC2. analyze the global solar irradiation at the site PC3. workout the capacity of the solar power plant
Review the design and selection of solar modules	To be competent, the user/ individual must be able to: PC4. select solar module technology and size, based on analysis of cost, power output, quality, climatic conditions of the site, global and diffused irradiance ratio at the site etc PC5. workout the total numbers of modules based on the total capacity of the plant and the capacity of selected modules PC6. review the earthing design of solar module arrays
Review the design and selection of inverters	To be competent, the user/ individual must be able to: PC7. select inverter, based on compatibility with module technology, compliance with grid code and other applicable regulations, reliability, system availability, serviceability, quality, cost, DC TO AC conversion efficiency PC8. in case of a roof top power plant, decide on specifications of the inverter to power the AC loads in the building PC9. decide on number of inverters to be used based on the capacity and specifications of the inverter selected PC10. finalize the inverter layout and inverter locations on the basis of total capacity PC11. review the earthing design of inverters
Review the design and selection of strings	To be competent, the user/ individual must be able to: PC12. workout number of modules in a string based on the input voltage and MPPT voltage range of the inverter PC13. workout number of strings connected to a combiner box based on minimum run of DC connecting cables to minimized DC losses PC14. finalize the inter row distance between the solar modules on the basis of minimum inter row shading, adequate space for cleaning and maintenance of solar modules and the tilted to south at an angle that optimizes the annual energy yield

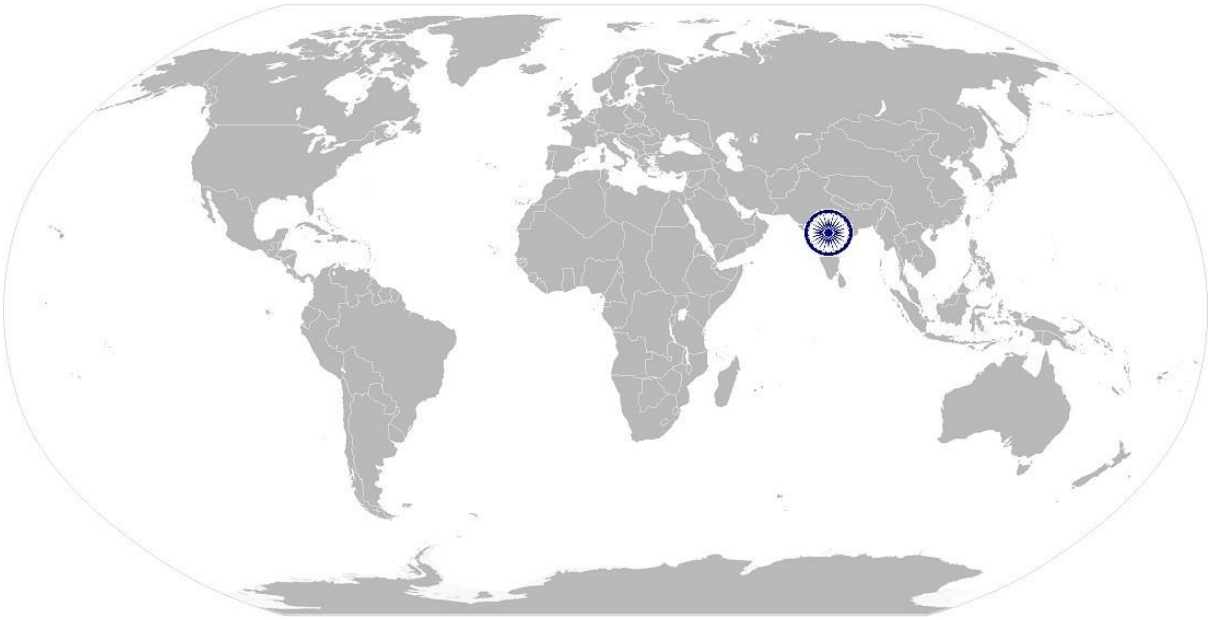
SGJ/N0129 Review the electrical design of solar PV power plant and the energy simulation report

	PC15. specify DC cabling material, size, type of PVC for cables connecting modules, junction boxes to the combiner boxes and combiner boxes to the inverter panels etc. PC16. review the specification of DC connectors (plugs and sockets) to be used
Review the design and selection of combiner boxes and switchgear	To be competent, the user/ individual must be able to: PC17. review the design specifications for junction boxes/combiner including IP number PC18. review the specifications for disconnects/switches PC19. workout number of combiner boxes connected to one panel of the inverter based on the input current rating of the inverter PC20. review islanding facility for grid connected power plant, in case of non-availability of grid PC21. protect incorrect polarity, over-voltage and overload for the DC cables
Prepare energy simulation report	To be competent, the user/ individual must be able to: PC22. decide on specification of charge controller/ inverter to the control the overcharging/ discharging of batteries PC23. select the suitable simulation software PC24. feed the parameters in the software basis on the electrical design PC25. prepare the energy simulation report PC26. analyse the energy simulation report and provide to superiors
Selection of batteries for rooftop off grid solar power plant	To be competent, the user/ individual must be able to: PC27. decide the battery storage capacity (AH) based on the number of days autonomy required (KWH/WH) and the depth of discharge of the battery bank PC28. decide on the specifications for the charge controller/ inverter to control the overcharging/discharging of the batteries, prepare energy generation report using simulation software
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the 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
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. efficiency, cost and typical specifications, functioning and operating principle of different types of solar PV plants, commercially available PV cells and modules, inverters, transformers, charge controllers, battery, mounting structures, cables, junction boxes and other components KB2. site survey reports , availability of shadow free space for installation of solar power plant KB3. the survey equipment and the methodology of survey KB4. electrical designs for the module/ inverters and balance of system KB5. solar irradiation including GHI, DHI and DNI KB6. mechanical and electrical features necessary for the long life of the PV Power Plant under a wide range of operating conditions

SGJ/N0129 Review the electrical design of solar PV power plant and the energy simulation report

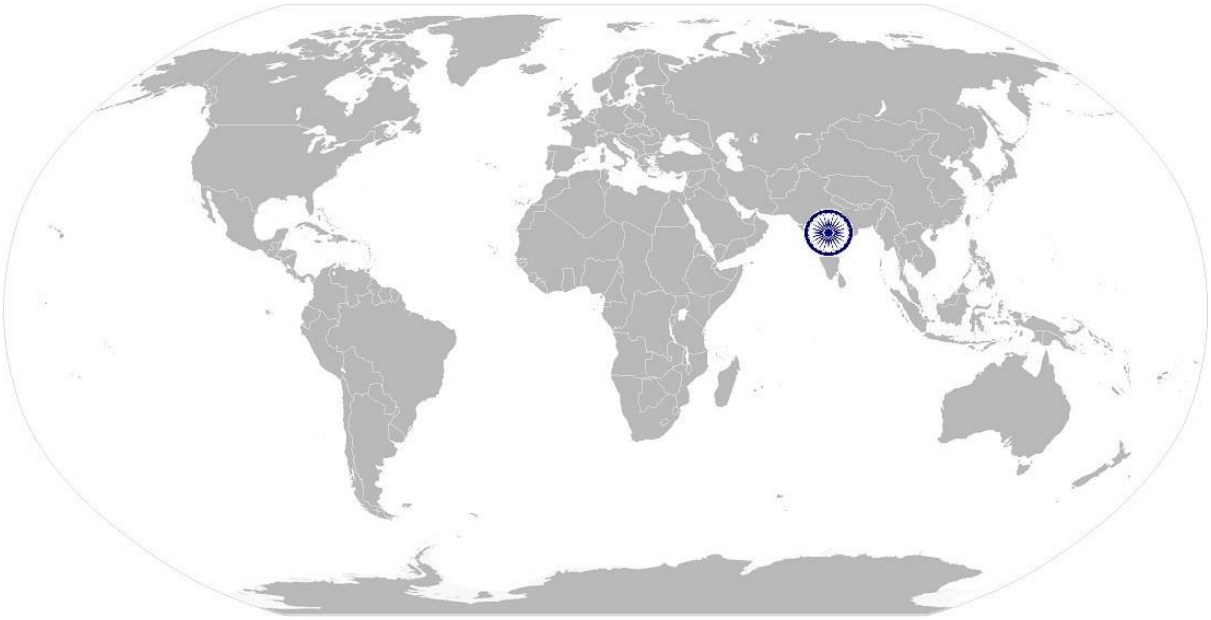
	KB7. solar PV Power Plant design software such as PVSYST and PV*SOL etc. KB8. energy simulation report and its parameters and effect on solar PV plants
Skills (S)	
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. prepare documentation as per relevant industry standards SA2. present information in a logical and organized way
	Reading Skills
	The user/individual on the job needs to know and understand: SA3. advanced level of english language SA4. how to intrepret manuals, health and safety instructions, memos, other company documents SA5. how to read and report from different sources- books, screens in machines and signage SA6. how to interpret data from various sources
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA7. express statements or information clearly so that others can hear and understand SA8. participate in and understand the main points of simple discussions SA9. respond appropriately to any queries
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. ensure organization rule-based decision making process is being followed 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. plan and organize service work to meet deadlines SB4. plan to utilise time and equipment's effectively SB5. work constructively and collaboratively with others
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB6. follow organisation code of conduct SB7. 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: SB8. generate solutions to specific problems for a wide range of activities SB9. choose best methods to complete assigned tasks
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB10. apply wide range of factual and theoretical knowledge to select the right course of action to perform tasks related to solar photovoltaic power plant
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB11. use common sense and make judgments on day to day basis SB12. use reasoning skills to identify and resolve basic problems

	SB13. use intuition to detect any potential problems which could arise during operations SB14. use acquired knowledge of the process for identifying and handling issues



NOS Version Control

NOS Code	SGJ/N0129		
Credits (NSQF)	TBD	Version number	1.0
Industry	Green Jobs	Drafted on	01/09/2016
Industry Sub-sector	Renewable Energy	Last reviewed on	17/05/2017
Occupation	Desginer	Next review date	30/09/2019



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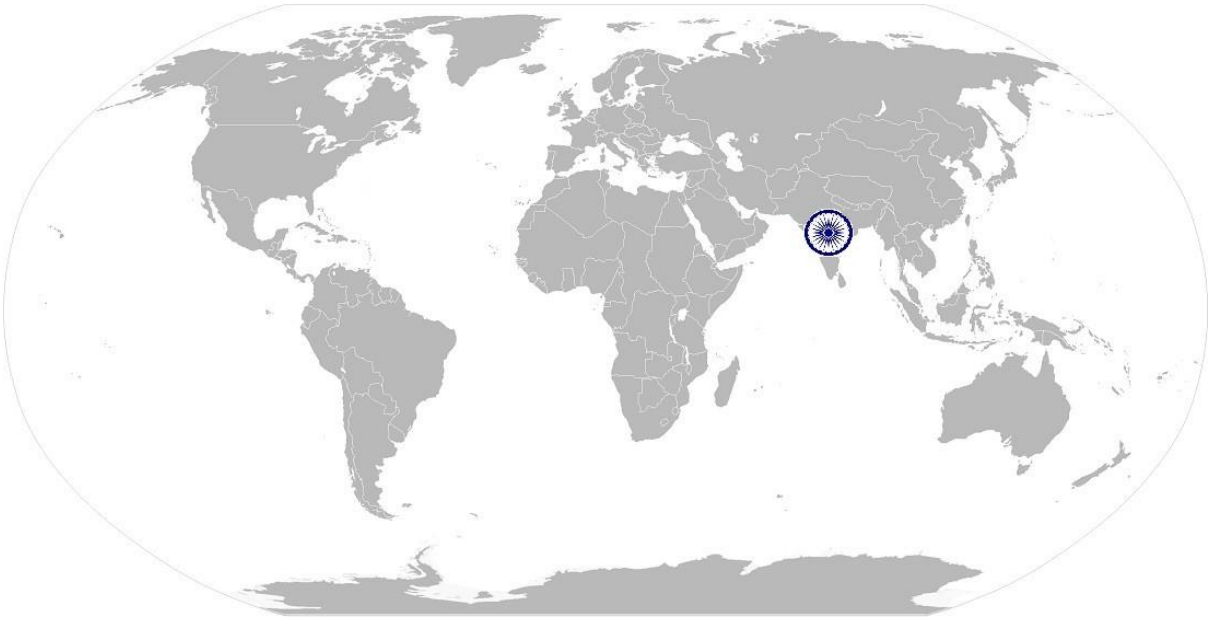

Overview

This unit is about maintaining health & safety at solar PV project site

SGJ/N0106 **Maintain personal health & safety at project site**

Unit Code	SGJ/N0106
Unit Title (Task)	**Maintain personal health & safety at project site**
Description	This unit is about maintaining health & safety at solar PV project site
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	To be competent, the user/individual on the job must be able to: PC6. identify the PPE 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	To be competent, the user/individual on the job must be able to: PC9. identify environmental hazards associated with the project 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	To be competent, the user/individual on the job must be able to: 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	To be competent, the user/individual on the job must be able to: PC14. check access from ground to work area to ensure it is safe and in accordance with requirements PC15. re-assess 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 plant safely in accordance with sequence and remove from worksite to clear work area

SGJ/N0106 **Maintain personal health & safety at project site**

Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the 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 & organization culture KA7. company's different department and concerned authority
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. relevant personal protective equipment's required for installation KB2. relevant standards and regulations for installation of solar photovoltaic power plant in india KB3. occupational health and safety (OHS) standards for installation of solar photovoltaic power plant KB4. risk identification and mitigation procedure for safe installation of solar photovoltaic power plant KB5. knowhow of tools & tackles required to carry out the work
Skills (S)	
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. 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 peers, supervisor and sub-ordinates
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: SB3. plan and organize service work to meet deadlines SB4. organize raw materials and packaging materials required for site survey SB5. plan to utilise time and equipment's effectively SB6. work constructively and collaboratively with others

SGJ/N0106 **Maintain personal health & safety at project site**

	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB7. follow code of conduct SB8. 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: SB9. recognize problems and search for solutions SB10. choose best methods to complete assigned tasks SB11. approach relevant authority when required
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB12. apply domain knowledge, observations and data to select course of action to perform tasks related to solar photovoltaic power plant
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB13. critically evaluate information obtained from customers, supervisor and co-workers to perform day to day activities SB14. ask questions for better understanding

NOS Version Control

NOS Code	SGJ/N0106		
Credits (NSQF)	TBD	Version number	1.0
Industry	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

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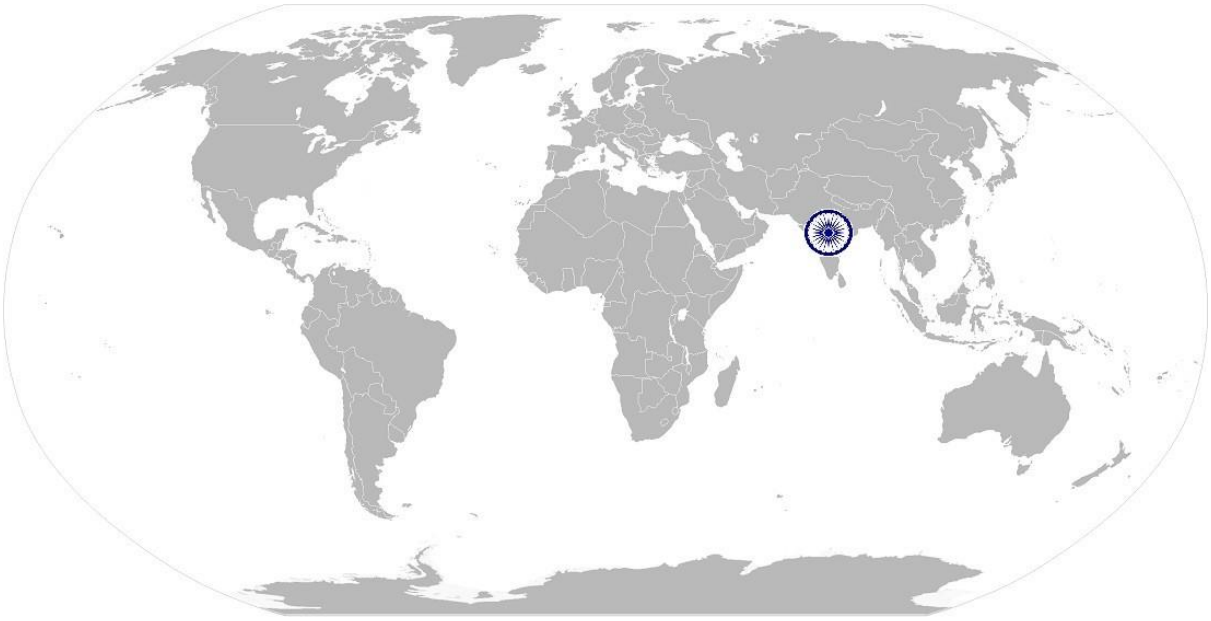
National Occupational Standard



Overview

This unit covers basic practices that improves the effectiveness of working with others in an organizational set-up

SGJ/N0120 **Work effectively with others**

National Occupational Standard

Unit Code	SGJ/N0120
Unit Title (Task)	**Work effectively with others**
Description	This unit covers basic etiquette and competencies that a candidate is required to possess and demonstrate in their behavior and interactions with others at the workplace
Scope	This unit/task covers the following: • working with others
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Working with others	The user/individual on the job should be able to: PC1. accurately pass on information to the authorized persons who require it and within agreed timescale and confirm its receipt PC2. assist others in performing tasks in a positive manner where required and possible PC3. consult and assist others to maximize effectiveness and efficiency in carrying out tasks PC4. display appropriate communication etiquette while working PC5. display active listening skills while interacting with others at work PC6. demonstrate responsible and disciplined behaviors at the project site. PC7. escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict PC8. identify the need for common grounds with clients, team members, etc. and negotiate in an effective manner to achieve the same PC9. consider and respect the opinions, creativity, values, beliefs and perspectives of others PC10. ensure collaboration and group participation to achieve common goals PC11. promote a friendly, co-operative environment that is conducive to employee's sense of belonging PC12. facilitate an understanding and appreciation of the differences among team members
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. legislation, standards, policies, and procedures followed in the organization relevant to own employment and performance conditions KA2. reporting structure, inter-dependent functions, lines and procedures in the work area KA3. relevant people and their responsibilities within the work area KA4. escalation matrix and procedures for reporting work and employment related issues

SGJ/N0120 **Work effectively with others**

B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. various categories of people that one is required to communicate and co-ordinate with in the organization KB2. importance of effective communication in the workplace KB3. importance of teamwork in organizational and individual success KB4. various components of effective communication KB5. key elements of active listening KB6. value and importance of active listening and assertive communication KB7. barriers to effective communication KB8. importance of tone and pitch in effective communication KB9. importance of avoiding casual expletives and unpleasant terms while communicating professional circles KB10. how poor communication practices can disturb people, environment and cause problems for the employee, the employer and the customer KB11. key elements and importance of non-verbal communication KB12. importance of ethics for professional success KB13. importance of discipline for professional success KB14. what constitutes disciplined behavior for a working professional KB15. common reasons for interpersonal conflict KB16. importance of developing effective working relationships for professional success KB17. expressing and addressing grievances appropriately and effectively KB18. importance and ways of managing interpersonal conflict effectively KB19. importance of teamwork and collaboration
Skills	
A. Core Skills/ Generic Skills	**Writing Skills** The user/ individual on the job needs to know and understand how to: SA1. note the information communicated SA2. record the readings of various parameters in the prescribed format SA3. note down observations related to the activity SA4. write information documents to internal departments/ internal teams **Reading Skills** The user/individual on the job needs to know and understand how to: SA5. read vernacular/English language SA6. read and understand equipment manuals, health and safety instructions, memos, other company documents SA7. read from different sources- books, screens in machines and signage SA8. read internal information documents sent by internal teams **Oral Communication (Listening and Speaking skills)** The user/individual on the job needs to know and understand how to: SA9. express statements or information clearly so that others can hear and understand SA10. participate in and understand the main points of simple discussions SA11. respond appropriately to any queries SA12. communicate effectively with supervisor, peers and subordinates

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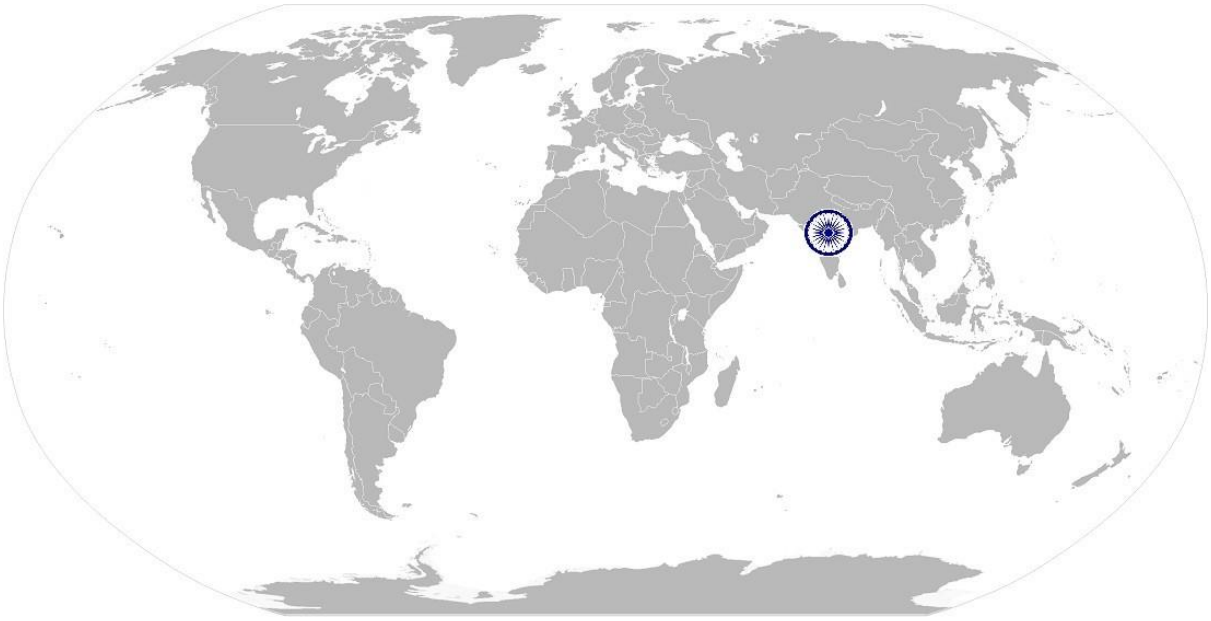
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. follow organization rule-based decision making process SB2. analyse critical points in day to day tasks and identify control measures to solve the issue SB3. handle issues in case the superior is not available (as per the authority matrix defined by the organisation)
	Plan and Organize
	The user/individual on the job needs to know and understand how to : SB4. planning and organization of work to meet deadlines SB5. work constructively and collaboratively with others SB6. support the superiors in scheduling tasks
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB7. follow organisation code of conduct SB8. 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: SB9. recognize problems and search for solutions SB10. choose best methods to complete assigned tasks SB11. approach relevant authority when required
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB12. apply domain knowledge, observations and data to select course of action to perform tasks
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB13. critically evaluate information obtained from customers, supervisor and co-workers to perform day to day activities SB14. ask questions for better understanding

NOS Version Control

NOS Code	SGJ/N0120		
Credits (NSQF)	TBD	Version number	1.0
Industry	Green Jobs	Drafted on	01/09/2016
Industry Sub-sector	Renewable Energy	Last reviewed on	15/02/2017
Occupation	Team management	Next review date	30/09/2019



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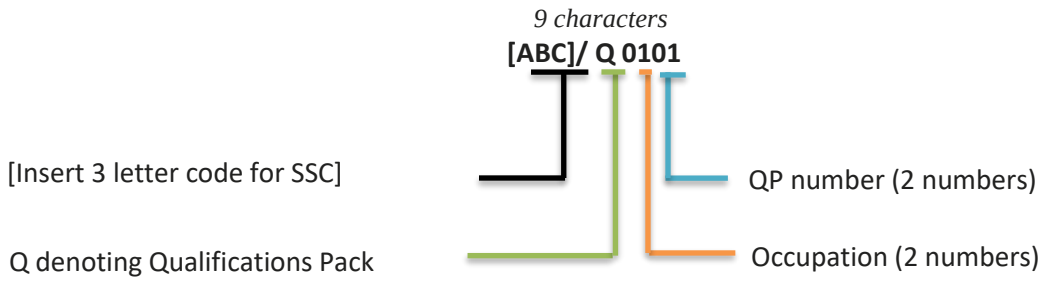
Annexure

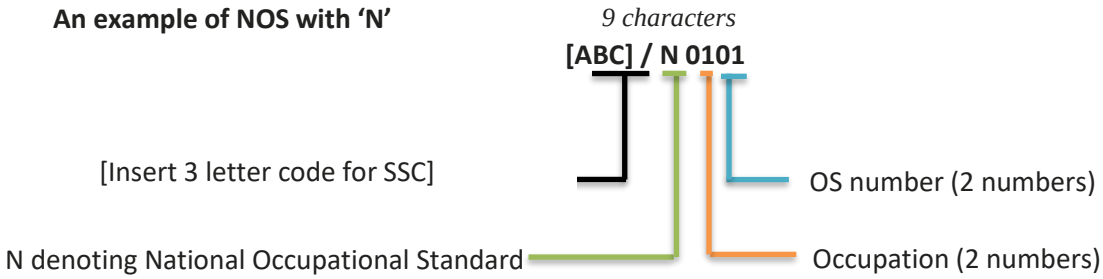
Nomenclature for QP and NOS

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
Renewable Energy (01-35)	**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
Green Transportation (36 - 40)	**Alternative Fuel Transportation**	36-40
	Bio-fuels and Farming	40-45
	Other Green Transportation	46-50
Green Construction (51- 60)	**Green Buildings**	51-55
	Energy Efficiency	56-60
Waste Management (61- 65)	**Waste Management**	61-65
Water Management (66-70)	**Water and Wastewater Management**	66-70
Co-Generation (71 - 75)	**Co-generation**	71-75
Other Green Jobs (76- 99)	**Carbon Sinks**	76-80
	Environmental Compliance and Sustainability Planning	81-85
	Other Green Jobs	85-99

Sequence	Description	Example
Three letters	Industry name	SGJ
Slash	/	/
Next letter	Whether QP or NOS	Q or 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 Designer

Qualification Pack SGJ/Q0110

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 **Total Marks: 350**			**Marks allocation**		
Assessment Outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out of**	**Theory**	**Skills Practical**
SGJ/N0128 Review the structural design of Solar PV Power Plant	PC1. study the soil test reports, water table depth report and the pull test data to ensure design meets the requirement	**100**	12	5	7
	PC2. review the overall plant layout		6	3	3
	PC3. review the layout for solar field compound wall /entry gate		4	2	2
	PC4. review the layout for in plant roads with material specifications		4	2	2
	PC5. review the design for water distribution network inside the plant		6	3	3
	PC6. review the design for water drainage system		4	2	2
	PC7. review the design for pathways between the solar arrays		4	2	2
	PC8. review the design for the foundation for mounting solar PV panel support structure		4	2	2
	PC9. review the design for the tilt brackets and mounting frames for solar panels with fastening arrangement		4	2	2
	PC10. document the details of RCC foundation, plan of the inverter room		2	1	1
	PC11. document the details of the bolt ,base plates etc. used in structure, foundation of inverter and control room		2	1	1
	PC12. document the transformer foundation details		2	1	1

	PC13. document the foundation and design details of the control room		2	1	1
	PC14. review the design plan for earthing pits		3	1	2
	PC15. review the design plan for lightning arrestor foundation		3	1	2
	PC16. review the design plan for street light foundation		3	1	2
	PC17. review the structural design for plant switchyard as per the grid code and transmission authority regulations		6	2	4
	PC18. review the foundation plan for the transmission tower		4	1	3
	PC19. review the design for structure of the transmission tower		4	1	3
	PC20. Review the design for stub and cleats of transmission tower		4	1	3
	PC21. review the design for corridor of transmission line		4	1	3
	PC22. review the foundation design for module mounting structures such that the dead and dynamic loads on modules are transferred to the beam and columns of the building		5	2	3
	PC23. review the design for walk ways for maintenance of modules and system		4	1	3
	PC24. review the design for movable mounting structure for canal top plant to increase output		4	1	3
		TOTAL	**100**	**40**	**60**
SGJ/N0129 Review the electrical design of solar PV power plant and the energy simulation report	PC1. analyze the availability of shadow free space available	**100**	4	1	3
	PC2. analyze the global solar irradiation at the site		4	1	3
	PC3. workout the capacity of the solar power plant		4	2	2
	PC4. select solar module technology and size, based on analysis of cost, power output, quality, climatic conditions of the site, global and diffused irradiance ratio at the site etc.		6	2	4
	PC5. workout the total numbers of modules based on the total capacity of the plant and the capacity of selected modules		4	2	2
	PC6. review earthing design of solar module arrays		4	2	2
	PC7. select inverter, based on compatibility with module technology, compliance with grid code and other applicable regulations, reliability, system availability, serviceability, quality, cost, DC TO AC conversion efficiency		4	2	2
	PC8. in case of a roof top power plant, decide on specifications of the inverter to power the AC loads in the building		4	2	2
	PC9. decide on number of inverters to be used based on the capacity and specifications of the inverter selected		2	1	1
	PC10. finalize the inverter layout and inverter locations on the basis of total capacity		4	1	3
	PC11. review the earthing design of inverters		2	1	1

	PC12. workout number of modules in a string based on the input voltage and MPPT voltage range of the inverter		2	1	1
	PC13. workout number of strings connected to a combiner box based on minimum run of DC connecting cables to minimized DC losses		2	1	1
	PC14. finalize the inter space between the solar modules on the basis of minimum inter row shading, adequate space for cleaning and maintenance of solar modules and the tilted to south at an angle that optimizes the annual energy yield		4	2	2
	PC15. specify DC cabling material, size, type of PVC for cables connecting modules, junction boxes to the combiner boxes and combiner boxes to the inverter panels etc.		4	1	3
	PC16. review the specification of DC connectors (plugs and sockets) to be used		2	1	1
	PC17. review the design specifications for junction boxes/combiner including IP number		2	1	1
	PC18. review the specifications for disconnects/switches		4	2	2
	PC19. workout number of combiner boxes connected to one panel of the inverter based on the input current rating of the inverter		2	1	1
	PC20. review islanding facility for grid connected power plant, in case of non- availability of grid		4	2	2
	PC21. protect incorrect polarity, over-voltage and overload for the DC cables		4	1	3
	PC22. decide on specification of charge controller/ inverter to the control the overcharging/ discharging of batteries		4	2	2
	PC23. select the suitable simulation software		1	1	0
	PC24. feed the parameters in the software basis on the electrical design		4	1	3
	PC25. prepare the energy simulation report		6	1	5
	PC26. analyze the energy simulation report and provide to superiors		5	2	3
	PC27. decide the storage battery capacity (AH) based on the number of days autonomy required (KWH/WH) and the depth of discharge of the battery bank		4	2	2
	PC28. decide on the specifications for the charge controller/ inverter to control the overcharging/discharging of the batteries, prepare energy generation report using simulation software		4	1	3
		TOTAL	**100**	**40**	**60**
SGJ/ N0106 Maintain personal health	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

& safety at project site	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		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	0
	PC20. dismantle plant safely in accordance with sequence and remove from worksite to clear work area		2	1	1
		TOTAL	**50**	**29**	**21**
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	**100**	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 project site.		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**

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