QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR POWER SECTOR

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

Contact Us:
Power Sector Skill Council
2nd Floor, CBIP Building,
Malcha Marg,
Chanakyapuri, New Delhi - 110021

E-mail: pssc@cbip.in

Introduction

Qualifications Pack- Technician-Substation Erection & Commissioning (66/11,33/11 KV)- Power Distribution

SECTOR: Power

SUB-SECTOR: Distribution

OCCUPATION: Technician

REFERENCE ID: PSS/Q3007

ALIGNED TO: NCO-2004/NIL

Technician-Substation Erection & Commissioning (66/11,33/11 KV)- Power Distribution is responsible for carrying out all types of technical activities of a project for construction of new substation(66/11kV and 33/11 kV) for erection and commissioning . Installs various equipments in the control room and outdoor switchyard under the supervision of Jr. Engineer(Executive).

Brief Job Description: This is skilled electrical work of erection and commissioning of 66/11kV and 33/11 kV high voltage equipments in outdoor switch yard installation of power transformer,Busbar etc. Station Technician install and connect all indoor and outdoor equipments as per schematic lay out plan of grid station. Person carries out control cable wiring and circuitory from yard to indoor control panel.

Personal Attributes: Technician- Substation Erection & Commissioning (66/11,33/11 KV) should be proficient to read schematic drawing all types of equipments used in substation. The candidate should have the ability to read, write and follow the instructions of officer incharge and ability to stand for long working hours

Job Details

Qualifications Pack Code	**PSS/Q3007**		
Job Role	**Technician Substation Erection & Commissioning (66/11,33/11 KV)- Power Distribution**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Sector	**Power**	**Drafted on**	**18/01/2016**
Sub-sector	**Distribution**	**Last reviewed on**	**19/07/2016**
Occupation	**Technician**	**Next review date**	**19/07/2018**
NSQC Clearance Date	**Not Applicable**		

Job Role	**Technician Sub-Station Erection & Commissioning (66/11,33/11 KV) Power Distribution**
Role Description	The role of technician is to install, commission and energise allequipments installed at 66/11kV & 33/11 kV in the outdoor switch yard and indoor control room of the grid station as per schematic lay out plan.
NSQF level	4
Minimum Educational Qualifications	ITI in Electrician trade
Training (Suggested but not mandatory)	Not Applicable
Minimum Job Entry Age	20 Years
Experience	4 years as Assistant sub station technician / Apprentice
Applicable National Occupational Standards (NOS)	**Compulsory:** 1. PSS/N3012 Lay out plan of Primary and Secondary system of grid substation erection 2. PSS/N3013 Erection, commissioning of substation equipment 3. PSS/N3014 Testing, opration and energisation of substation equipment 4. PSS/N2001 Use basic health and safety practices as the workplace 5. PSS/N1336 Work effectively with others **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.
Vertical	Vertical may exist within a sub-sector representing different domain areas or the client industries served by the industry.
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.
Sub-functions	Sub-functions are sub-activities essential achieving the objectives of the function.
Job role	Job role defines unique set of functions that together form a unique employment opportunity in an organization.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve consistently while carrying out a function at the workplace. Occupational Standards as set of competencies is applicable both in Indian and overreaching global contexts.
Performance Criteria	Performance Criteria defined for a task are statements that together specify the standard of performance while carrying out the task.
National Occupational Standards (NOS)	NOS are Occupational Standards which apply uniquely in Indian context.
Qualifications Pack Code	Qualifications Pack Code is a unique reference code that identifies a qualifications pack.
Qualifications Pack(QP)	Qualifications Pack comprises set of OS, together with the educational, training and other criteria that are required to perform a job role satisfactorily at workplace. A Qualifications Pack is assigned a unique qualification pack code for clear identification.
Knowledge and Understanding	Knowledge and Understanding are statements which together as a set specify the technical, generic, professional and organization specific knowledge that an individual needs to possess in order to perform and meet the required standards consistently.
Organizational Context	Organizational Context includes the way the organization is structured and how it operates. It includes elements of operational knowledge contents defined in relation to functioning of an organization that a skilled professional need to possessspecific to itsprecise areas of responsibility.
Technical Knowledge	Technical Knowledge is the specific domain knowledge needed to accomplish the task in combination with other competencies. It is usually coined with specifically designated roles and responsibilities.

Core Skills/Generic Skills	Core Skills or Generic Skills as set are group of skills. Itis key to working in today's world. These skills are typically needed in any work environment. In the context of the OS, these include mainly communication related skills that are applicable to most job roles.

Acronyms

Keywords /Terms	Description
A	Ampere
AAC	All Aluminium Conductor
ABC	Aerial Bunched Conductor
AC	Alternating Current
ACB	Air Circuit Breaker
ACSR	Aluminium Conductor Steel Reinforced (Steel Cored Aluminium Conductor)
AT&C	Aggregate Technical & Commercial Losses
BDV	Breakdown Voltage
BIS	Bureau of Indian Standards
CBIP	Central Board of Irrigation and Power
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
CGRF	Consumer Grievance Redressal Forum
CPRI	Central Power Research Institute
CT	Current Transformer
DC	Direct Current
DISCOM	Distribution Company
DP	Di-Pole (Double Pole)
DT	Distribution Transformer
E/F	Earth Fault
ELCB	Earth Leakage Circuit Breaker
FRLS	Fire Resistant Low Smoke Cable
GI	Galvanised Iron
HSV	Highest System Voltage
HT	High Tension
HTME	High Tension Metering Equipment
HV	High Voltage
HVDS	High Voltage Distribution System
Hz	Hertz (Unit of Frequency)
I	Current
IE Act	Indian Electricity Act 2003
IS	Indian Standard

KV	Kilo Volt
KVA	Kilo Volt Ampere
KVAh	Kilo Volt Ampere hour
KVAR	Kilo Volt Ampere Reactive
KW	Kilo Watt
KWh	Kilo Watt hour
LA	Lightening Arrestor
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LT	Low Tension
LV	Low Voltage
MCB	Miniature Circuit Breaker
MD	Maximum Demand
MVA	Mega Volt Ampere
MW	Mega Watt
MWh	Mega Watt hour
N	Neutral
OCB	Oil Circuit Breaker
O/C	Over Current
O/H	Over Head
O&M	Operation & Maintenance
OPGW	Optical Ground Wire
P	Phase / Power
PCC	Prestressed Cement Concrete Pole
PF	Power Factor
PILCA	Paper Insulated Lead Covered Armored Cable
PSU	Public Sector Undertaking
PT	Potential Transformer
PV	Photo-Voltaic
PVC	Poly Vinyl Chloride cable
REC	Rural Electrification Corporation
RMU	Ring Main Unit
SCADA	Supervisory Control and Data Acquisition
SEB	State Electricity Board
SERC	State Electricity Regulatory Commission
SMS	Short Message Service
T&D	Transmission and Distribution

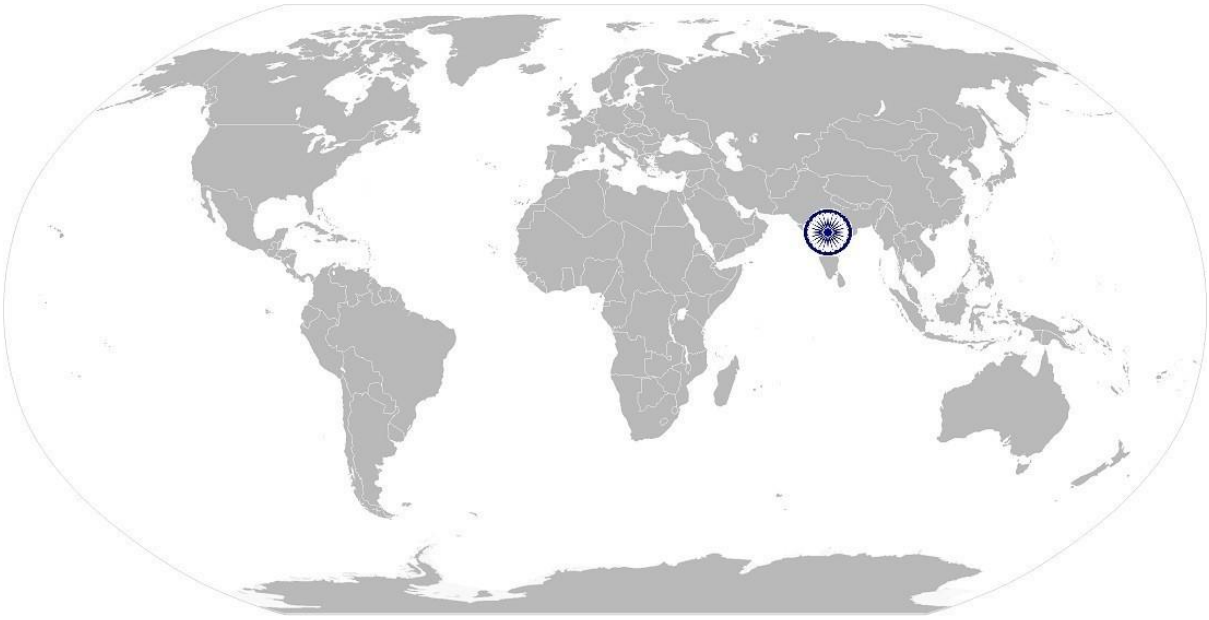
T/F	Transformer
TTB	Test Terminal Block
ULF	Ultra Low Frequency
UV	Ultra Violet
V	Voltage
VF	Voltage Factor
VLF	Very Low Frequency
VT	Voltage Transformer
XLPE	Cross Linked Poly Ethylene Cable

NOS
National Occupational Standards

PSS/N3012 Layout plan of primary and secondary system of grid substation erection

---

National Occupational Standard



Overview

This unit is about general system lay out design of primary and secondary system suitable for electrical envoirnment present in high volt substation 66/33/11 kV following the latest engineering practice and ensuring long term compatibility requirement and continuity of equipments supply on a concept of bay oriented, distributed intelligence (SCADA) and safety of operating staff.

NOS
National Occupational Standards

N·S·D·C National Skill Development Corporation

PSS/N3012 **Layout plan of primary and secondary system of grid substation erection**

National Occupational Standard

Unit Code	**PSS/N3012**
Unit Title (Task)	**Lay out plan of Primary and Secondary system of grid substation erection.**
Description	Technician-Substation Erection & Commissioning (66/11,33/11 KV)- Power Distribution carries out all types of technical activities of a project for construction of new substation(66/11kV or 33/11 kV) and augumentation of existing station for expansion scheme. Loading unloading of heavy delicate equipments at safe site. He is involved in preparation of civil masonary works, plinth for mounting of power transformer, gantry structure, station transformer, trenches, in the indoor control room and outdoor switchyard, grouting bolts, earth pit etc under the supervision of Asstt. Engineer (AM) /Jr. Engineer (Executive).
Scope	**This unit/task covers the following:** • lay out plan of station site, loading unloading of outdoor and indoor equipments • civil work: laying of earth pit, plinth grouting bolts,boundry wall, fencing, indoor control room and switch yard erection. • job specific safety
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Lay out plan of station site, loading unloading of outdoor and indoor equipments	Theuser/individual onthe job needs to: PC1. read and understand substation lay out as per layout drawing PC2. ensure detailing of information of of infrastructure lay out of grid station, number of bays, number of incoming and outgoing feeders, load management through single or double bus, number of power transformer, station transformer, control panel, battery panels, area network, yard lighting etc. PC3. ensure loading and unloading of packed equipment at site, opening of accessories from package without any damage to various equipments PC4. identify manufacturing defect like defective design, poor material quality, poor workmanship and poor packing of equipment/transformer for transportation/shifting PC5. prepare job cards of each equipment and erection as per approved schedule PC6. maintain inventories of all equipment with their spare parts state name plate, their type, ratings PC7. ensure safety chart, First Aid box, switchgear handles, Fire extinguishers, PPE's and discharge rod are placed at proper location

PSS/N3012 Layout plan of primary and secondary system of grid substation erection

Civil work: laying of Earth pit, plinth grouting bolts, boundry wall, fencing, indoor control room and switch yard erection	PC8. arrange mounting heavy equipment on their foundation accurately over the grouting bolts without any damage with the help of crane, chain pulley block and trolly PC9. carry out pipe and plate earthing, digging process to make earth connection and earth mat PC10. ensure that earth resistance of each earth pit marked with date and next due date PC11. ensure double earth connection is available to each equipment PC12. ensure control panels are grouted in alignment PC13. ensure back door of control panel be marked with name of feeder, numbered, approachable, clean, dust free and vermin protected PC14. ensure cable entry hole beneath the control panel should be properly plugged to avoid raptile entry and damage to wiring, instruments, accessories PC15. check painting of all equipment. layout gravel in the substation yard PC16. check status of civil masonary work of yard fencing and switchyard illumination and luminaries to secure the substation in a safe, efficient manner as per correct procedure
KnowledgeandUnderstanding (K)	
A. Organizational Context	Theuser/individualonthe jobneeds to know and understand: KA1. relevant standards, working procedures and policies of organization KA2. main purpose and object of organization KA3. department structure KA4. reporting structure KA5. conditions and terms of own employment KA6. own job role and responsibilities KA7. knowledge of work area KA8. working safely KA9. cleanness of working area, maintain 5S KA10. interpersonal relations

PSS/N3012 Layout plan of primary and secondary system of grid substation erection

B. Technical Knowledge	The individual on the job needs know and understand: KB1. principles of electricity KB2. power system: How power flows, Generation, Transmission and distributionnumber of bays, number of incoming and outgoing feeders , load management through single or double bus, substation network, ring system, back feed etc. KB3. line components towers, poles, single circuit, double circuit, over head, underground conductors and cables KB4. gantry structure, structure lay out, types of porcelain insulators, overhead conductors, clamps used in station. KB5. out door and indoor equipments like power transformer, Circuit breaker, isolator, LA's, station transformers, CT's, PT's, and CVT's KB6. DC distribution board (DCDB), AC distribution board (ACDB) and control cable and circuitory KB7. RTU and communication panel for SCADA KB8. lightening arrestors (LA) functioning KB9. Importance of proficiency in measurement of lay out dimentions, grouting bolt, holes of fitting, cables for laying etc KB10. types of earthing used in grid station, its significance, why earth connection with each equipments, measurement of earth resistance and earthing switch. KB11. complete tools, tackles and safety gadgets required in grid station erection and commissioning KB12. safety precautions as per safety manual KB13. how to keep records of all equipment like name plate, pre- commission test report and manuals KB14. the importance of reporting problem to junior engineer, Officer incharge KB15. hazards associated with carrying out substation construction and installation process and how they can be minimized
Skills (S)	
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. communicate effectively in writing as per requirement of site work SA2. write the information communicated by the engineer or in-charge of work SA3. write properly about the technical problems and other conditions of site SA4. note down of observations, critical points and location of site related work
	Reading Skills
	The user/individual on the job needs skills pertaining to: SA5. reading,understanding of written sentences and paragraphs in work related documents SA6. writing and using metric system for all measurements SA7. interpreting the process required for performing of work SA8. reading, interpretingand understanding therules and method stated in the documents SA9. read equipment manuals and understand the equipment operation and process requirement

PSS/N3012 Layout plan of primary and secondary system of grid substation erection

	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA10. discuss task lists, schedules and activities with the Engineer SA11. effectively communicate with the team/group members SA12. listen the information given by the junior engineer SA13. communicate clearly with the team and other staff
B. Professional Skills	**Decision Making**
	The user/individual on the jobneeds to: SB1. make work related Judgments appropriately SB2. identifycomplex problems and reviewrelated information to develop and evaluate SB3. follow organization rule baseddecision making process SB4. take decisions with systematic course of actions and/or response
	Plan and Organize
	The user/individual on the job needs to know and understand how to : SB5. plan and organize tasks to meet deadlines SB6. plan in advance maintenance schedule daily, weekly and monthly. SB7. organize properly manpower, tools and kits for testing and maintenance. SB8. plan and organize the shutdown of equipment SB9. plan, if any , special tool and testing kit required for maintenance SB10. plan work of maintenance completed within specified time SB11. plan return to shutdown permit in time
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB12. build customer relationships and use customer centric approach
	Problem Solving
	The user/individual on the job needs to: SB13. identify problems and reviewing related information to develop and evaluate options and implement solutions SB14. prioritize and plan for solving problem SB15. take help from the juniorengineertosolve the problems SB16. monitorsolving problems andtake corrective action with individuals andorganizations SB17. analyseproblems and changes in conditions, operations, and the environment to solve problems
	Analytical thinking
	The user/individual on the job needs to know and understand how to: SB18. analyze the problem seen in the equipment SB19. collect the information and technical data and define process for doing testing and maintenance
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB20. critically evaluate operation parameters in relation to Grid station features

	intended SB21. develop a holistic and comprehensive profile of erection of HV equipments based on segregated discrete process stages of blank forming processes

NOS Version Control

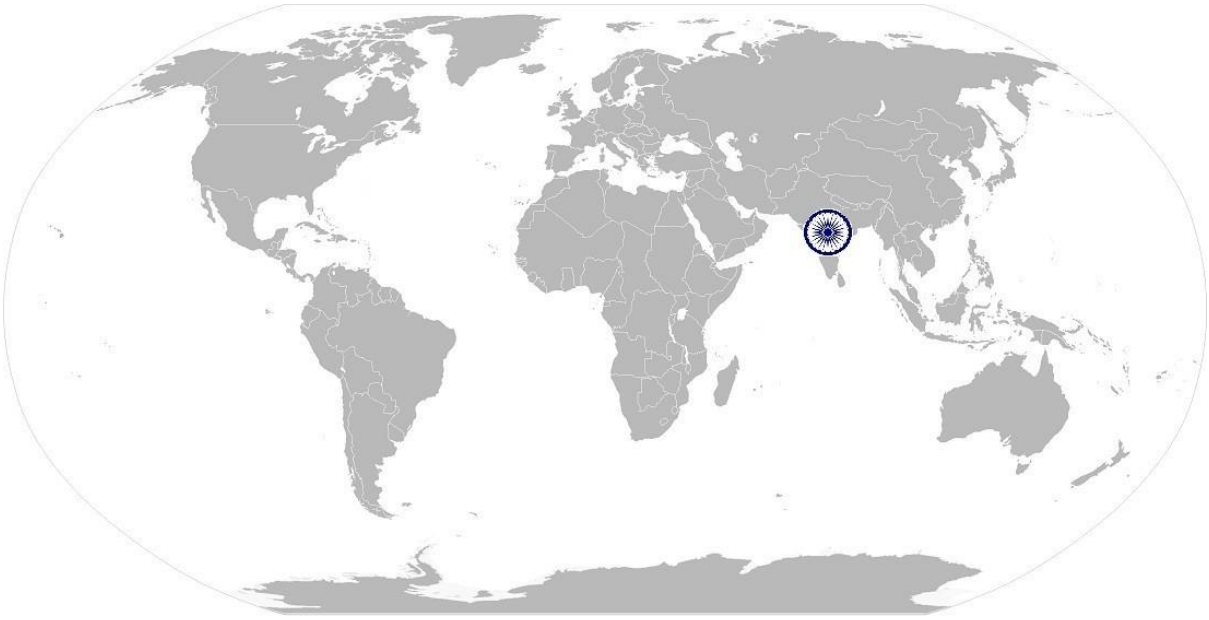
NOS Code	PSS/N3012		
Credits (NSQF)	TBD	Version number	1.0
Industry	Power	Drafted on	18/01/2016
Industry Sub-sector	Distribution	Last reviewed on	19/07/2016
Occupation	Technician	Next review date	19/07/2018

Back to Top

NOS
National Occupational Standards

PSS/N3013 **Erection & commissioning of substation equipments**

National Occupational Standard



Overview

This unit covers the competencies required to erect high volt substation 66/33/11 kV following the latest engineering practice and ensuring long term compatibility requirement and continuity of equipments supply on a concept of bay oriented, distributed intellengence (SCADA). It also covers the respective health and safety competencies require to perform such operation.

PSS/N3013 **Erection & Commissioning of Substation Equipments**

National Occupational Standard

Unit Code	**PSS/N3013**
Unit Title (Task)	**Erection & commissioning of substation equipments**
Description	Technician-Substation Erection & Commissioning (66/11,33/11 KV)- Power Distribution carries out all types of technical activities of a project for construction of new substation(66/11kV or 33/11 kV) and augumentation of existing station for expansion scheme. Install various equipments in the control room and outdoor switchyard under the supervision of Asstt. Engineer (AE) /Jr. Engineer (Executive).
Scope	**This unit/task covers the following:** • erection and commissioning of outdoor and indoor equipments in 66kV or 33kV Grid Station. • control and protection system in 66kV or 33kV Grid Station

Performance Criteria(PC) w.r.t. the Scope

Element	Performance Criteria
Erection and commissioning of outdoor and indoor equipments in 66kV or 33kV Grid Station	Theuser/individualonthe jobneeds to: PC1. prepare and maintain records of installation, commissioning, tests, results and energisation with handing over dates of each equipment to O&M PC2. maintain storing of all testing instruments, tools & tackles in proper healthy state, safe and easily available PC3. ensure safety chart, First Aid box, switchgear handles, Fire extinguishers, PPE's and discharge rod are placed at proper location PC4. lay power transformer on rails,check alignment, general appearance of bushings, connections at HV& LV bushings and oil level PC5. check fitting of auxiliary cooling system like cooling fans, pumps, oil coolers PC6. check of OLTC and its mechanism PC7. check the various gauges: oil level gauge, Pressure vacuum gauge, oil temperature gauge, winding temperature gauge etc. PC8. inspect air release in main tanks, bucholtz relays PC9. check neutral earth connections at both ends PC10. check alarm circuits and trip circuit of transformer PC11. check fire protection system PC12. install the circuit braker as per manual/ recommendation of manufacture PC13. check breaker assembly frame, condition of foundation and foundation bolt PC14. check compress air pressure, pneumatic drive, SF_6 gas pressure, hydraulic fluid and oil leakage PC15. ensure smooth movement of all contactors PC16. check alignment of main contacts, earth blade and spring assembly PC17. check earth connections of earth blade PC18. check insulators PC19. check interlocks PC20. install CT's, PT's and CVT as per manual/ recommendation of manufacture PC21. install Capacitor Bank as per manual/ recommendation of manufacture PC22. install Lightning arrestor (LA)

PSS/N3013 **Erection & Commissioning of Substation Equipments**

	PC23. make connection of overhead conductor, busbar string insulators with T clamps and PG clamps PC24. install auxiliary transformer, RTU andcommunication panel for SCADA system PC25. check bus bar
Control and protection system in 66kV or 33kV Grid Station	PC26. ensure all switch gear and control panels are properly aligned and grouted PC27. ensure back door of control panel be marked with name of feeder, numbered, approachable, clean, dust free and vermin protected PC28. check status of relays O/C & E/F their settings, flag etc. PC29. get installed DC distribution board (DCDB), AC distribution board (ACDB) and control cables PC30. check status of HRC fuse (PT and circuit) are of correct rating PC31. check terminal connection block control, cables are connected in proper sequence with color code and ferrule PC32. ensure control wires are layed in proper bunch in the concealed trays PC33. ensure ICT, auxiliary relays and other accessories are healthy and properly mounted PC34. check status of indicators, meters (Volt, Ampere, Watt, PF, Hz, Energy etc.) PC35. installation of battery bank and precautions to take during installation of battery bank, charging panel
Knowledge and Understanding (K)	
A. Organizational Context	Theuser/individualonthe jobneeds to know and understand: KA1. relevant standards, working procedures and policies of organization KA2. main purpose and object of organization KA3. department structure KA4. reporting structure conditions and terms of own employment KA5. own job role and responsibilities KA6. knowledge of work area KA7. working safely KA8. importance of cleanliness of working area, maintain 5S

PSS/N3013 **Erection & Commissioning of Substation Equipments**

B. Technical Knowledge	The individual on the job needs to know and underdstand: KB1. principles of electricity. KB2. power system: How power flows, Generation, Transmission and distribution number of bays, number of incoming and outgoing feeders , load management through single or double bus, substation network, ring system, back feed etc. KB3. line components towers, poles, single circuit, double circuit, over head, underground conductors and cables KB4. gantry structure, structure lay out, types of porcelain insulators, Overhead conductor and AA conductors, clamps used in station KB5. operating principle of Power Transformer, its main component, auxiliary components and accessories. Diference between Power and Distribution T/R KB6. operating principle of switch gears (CB), how it operates under fault current, benefits of operating medium of OCB, MOCB, ACB, SF_6, Vaccum circuit breakers KB7. fault current due to short circuit, over current and earth fault. Their impact and protection system KB8. instrument transformers like CT's, PT's, and CVT's KB9. control panel and its in built measuring instruments, accessories like heater, lamp, door switch, HRC fuse, relays, auxiliary, ICT's etc. KB10. batterypanel,battery bank, tricle charging, battery status, electrolyte level, specific gravity of electrolyte, safety measures in repair and mainentance, ventilation etc. KB11. DC distribution board (DCDB), AC distribution board (ACDB) and control cable and circuitory KB12. types of earthing used in grid station, its significance, why earth connection with each equipments, measurement of earth resistance and earthing switch. KB13. types of LA's like Rod Gap, Horn Gap, Expulsion and metal oxide arrestor. KB14. shunt capacitor bank, its function to improve pf, switching operation, repair, replacement and maintenance KB15. how to operate functions of transformer oil filter machine, inlet & outlet connection, how it purify and clean from chemical impurities, slug, carbon and moisture KB16. complete tools, tackles and safety gadgets required in grid station erection and commissioning KB17. use of Safety, T & P and testing equipment: hydraulic crimping kit, tool box kit and Safety gadgets like discharge rod, earth chain, neon tester, Signage, danger notice, cardon tape etc. KB18. approved maintenance procedures and regulation KB19. how to take safety precautions as per safety manual
Skills (S)	
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. communicate effectively in writing as per requirement of site work SA2. write the information communicated by the engineer or in-charge of work

PSS/N3013 **Erection & Commissioning of Substation Equipments**

	SA3. write properly about the technical problems and other conditions of site SA4. note down of observations, critical points and location of site related work
	Reading Skills
	The user/individual on the job needs skills pertaining to: SA5. reading, understanding of written sentences and paragraphs in work related documents SA6. writing and using metric system for all measurements SA7. interpreting the process required for performing of work SA8. reading, interpreting and understanding the rules and methods stated in the documents SA9. reading equipment manuals and understand the equipment operation and process requirement
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA10. discuss task lists, schedules and activities with the Engineer SA11. effectively communicate with the team/group members SA12. listen the information given by the junior engineer SA13. communicate clearly with the team and other staff
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to: SB1. make work related Judgments appropriately SB2. identify complex problems and reviewing related information to develop and evaluate SB3. how to follow organization rule based decision making process SB4. how to take decisions with systematic course of actions and/or response
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB5. plan and organize of tasks to meet deadlines SB6. plan and organize the shutdown of equipment SB7. plan work of erection completed within specified time SB8. plan return to shutdown permit in time
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB9. build customer relationships and use customer centric approach
	Problem Solving
	The user/individual on the job needs to: SB10. identify problems and review related information to develop and evaluate options and implement solutions SB11. prioritize and plan for solving problem SB12. take help from the junior engineer to solve the problems SB13. monitorsolving problems and take corrective action with individuals and organizations SB14. analyse problems and changes in conditions, operations, and the environment

	to solve problems
	Analytical thinking
	The user/individual on the job needs to know and understand how to: SB15. analyze the problem seen in the equipment SB16. collect the information and technical data and define process for doing testing and maintenance
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB17. critically evaluate operation parameters in relation to Grid station features intended SB18. develop a holistic and comprehensive profile of erection of HV equipmentsbased on segregated discrete process stages of blank forming processes

NOS Version Control

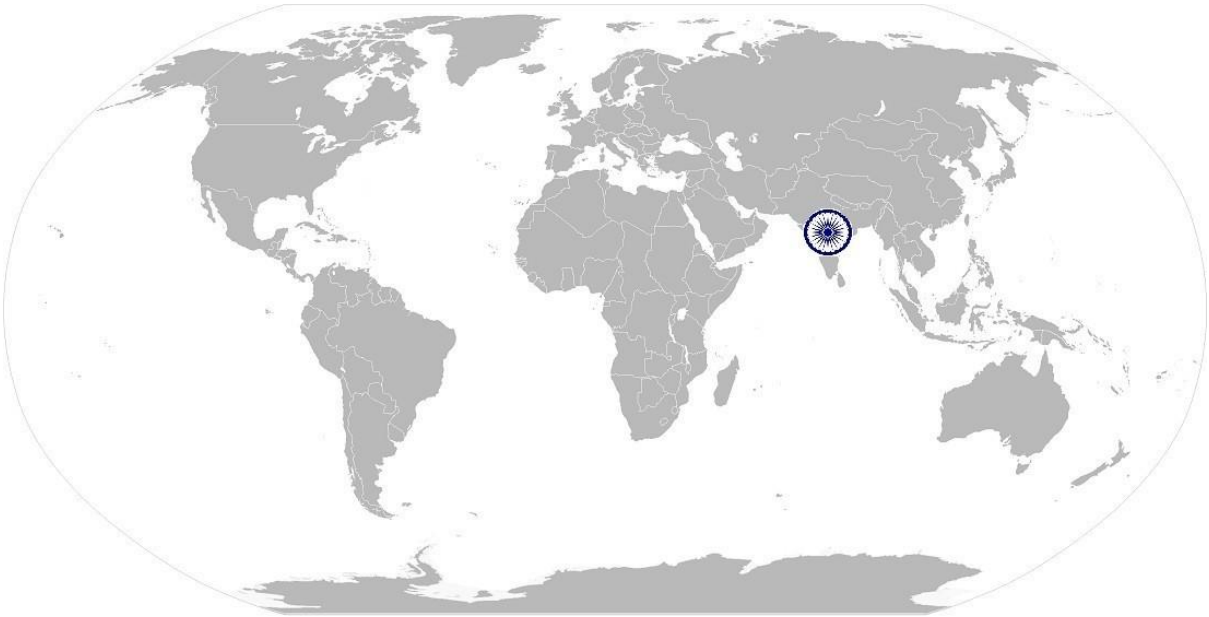
NOS Code	PSS/N3013		
Credits (NSQF)	TBD	Version number	1.0
Industry	Power	Drafted on	18/01/2016
Industry Sub-sector	Distribution	Last reviewed on	19/07/2016
Occupation	Technician	Next review date	19/07/2018

Back to Top

NOS
National Occupational Standards

PSS/N3014 **Testing, Operation and Energisation of Substation Equipment**

National Occupational Standard



Overview

This unit is about the testing, commissioning, operation and energisationof newly installed 66/11 kV or 33/11kV substation and handing over to Distribution authorities for onward load dispatch.

NOS
National Occupational Standards

N·S·D·C National Skill Development Corporation

PSS/N3014 **Testing, Operation and Energisation of Substation Equipment**

National Occupational Standard

Unit Code	**PSS/N3014**
Unit Title (Task)	**Testing, operation and energisation of substation equipment**
Description	Technician-Substation Erection & Commissioning (66/11,33/11 KV)- Power Distribution carries out all types of technical activities of a project for construction of new substation(66/11kV or 33/11 kV) and augumentationof existing stationin expansion scheme. Operate and energisevarious switch gearequipments installed in the control room and outdoor switchyard after thorough testing and clearance under the supervision of Asstt. Engineer (AM) /Jr. Engineer (Executive) for onward handing over to O&M department for operation of substation.
Scope	**This unit/task covers the following:** • testing, operation and energisation of outdoor and indoor equipments installed in 66kV or 33kV Grid Station before handing over to O&M. • checks of power transformer • checks of circuit breakers • checks of isolators, CT's PT's and CVT's • checks of earthing, capacitor bank and lightning arrestors • checks of switchyard area and control panel • Checks of Battery and battery charge

Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Testing and energisation of outdoor and indoor equipments installed in 66kV or 33kV Grid Station before handing over to O&M	Theuser/individualonthe jobneeds to: PC1. plan testing activities keeping into consideration the lay out of grid station, number of bays, number of incoming and outgoing feedrs , load management through single or double bus, number of power transformer, station transformer, control panel, battery panels, area network, yard lighting etc. PC2. prepare and maintain records of installation, commissioning, tests, results and energisation with handing over dates of each equipment to O&M. PC3. maintain storing of all testing instruments, tools & tackles in proper healthy state, safe and easily available PC4. maintain inventories of all equipment with their spare parts state name plate, their type, ratings PC5. apply proper selection criterion for rating of equipment, breaking, making and short time current
Checks of Power Transformer	PC6. check general appearance of bushings, connections atHV& LV bushings and oil level PC7. check of auxiliary cooling system like cooling fans, pumps, oil coolers PC8. inspect power transformers for any visible damage or leaks and insure gases are operative PC9. check of OLTC and its mechanism PC10. check that the windings are connected for the desired voltage PC11. check the various gauges: oil level gauge, Pressure vacuum gauge, oil temperature gauge, winding temperature gauge etc.

	PC12. inspect air release in main tanks,bucholtz relays PC13. check neutral earth connections at both ends PC14. check alarm circuits and trip circuit of transformer PC15. check fire protection system
Checks of Circuit Brakers	PC16. inspect the circuit braker as per manual/ recommendation of manufacture PC17. check tripping mechanism for short circuit, over current and earth fault PC18. check signage/flag status of trip due to fault, or operation for ON, OFF, Earth PC19. ensure operating handles are in healthy state and place at appropriate location PC20. check compress air pressure PC21. check SF_6 gas pressure PC22. inspect oil leakage PC23. check of hydraulic fluid PC24. check of pneumatic drive PC25. check loose connection in control wiring PC26. check breaker assembly frame, condition of foundation and foundation bolt PC27. record numbers of operation of counters PC28. inspect breaker status indicator PC29. inspect smooth movement of all contactors PC30. check vermin proofing PC31. inspect anti pumping relay
Checks of Isolators,CT's PT's and CVT's	PC32. check main contacts, earth blade and spring assembly PC33. apply petroleum jelly to all contacts and lubricate all moving parts/ assembly PC34. inspect earth switch copperflexibles PC35. check earth connections of earth blade PC36. check insulators PC37. check interlocks PC38. check oil level and leakage PC39. check HF bushing PC40. check terminal block for loose connection PC41. check earth connection of secondary circuit PC42. checking of jumps and clamps
Checks ofEarthing,Capacitor Bank and Lightning arrestors (LA)	PC43. ensure earth strips are intact and firmly connected in each gantry and equipment PC44. ensure earth resistance of each earth pit marked with date and next due date PC45. ensure double connection to each equipment PC46. check of oil leakage PC47. check current of each phase of capacitor row PC48. checking of earth connections , jumps and clamps PC49. check LA stacks PC50. observe any cracks PC51. determine IR value PC52. check earth connections

PSS/N3014 **Testing, Operation and Energisation of Substation Equipment**

Checks of Switchyard area and Control panels	PC53. check ACSR conductor PC54. check of bushbar string insulators PC55. check tightness of T clams and PG clamps PC56. check of auxiliary transformer PC57. check bus bar PC58. check fire extinguishes PC59. check switchyard illumination and luminares PC60. check earthing of all equipment PC61. check status of civil masonary work on plinth, grouting bolts and yard fencing PC62. check painting of all equipment PC63. check RTU and communication panel for SCADA system PC64. check status of relays O/C & E/F their settings, flag etc. PC65. check status of indicators, meters (Volt, Ampere, Watt, PF, Hz, Energy etc.) PC66. check Test terminal block for availability of secondary current and voltage PC67. check status of door switch, lamp and heater in side the chamber PC68. ensure that back door of control panel be marked with name of feeder, numbered, approachable, clean, dust free and vermin protected PC69. ensure cable entry hole beneath the control panel should be properly plugged to avoid raptile entry and damage to wiring, instruments, accessories PC70. check terminal connection block control, cables are connected in proper sequence with color code and ferrule PC71. control wires are layed in proper bunch in the concealed trays PC72. check status of HRC fuse (PT and ckt) are of correct rating. PC73. ensure ICT, auxiliary relays and other accessories are healthy and properly mounted
Checks of Battery and battery charger	PC74. keep float charge in "ON" condition always PC75. keep exhaust fan in working condition and maintain open ventilation PC76. take care of Sufficient air inlet provision in the battery room PC77. maintain electrolyte level of each cell with distilled water PC78. check cleanliness and loose connection of battery charger

Knowledge and Understanding (K)	
A. Organizational Context	Theuser/individual on the job needs to understand: KA1. relevant standards, working procedures and policies of organization KA2. main purpose and object of organization KA3. department structure KA4. reporting structure KA5. conditions and terms of own employment KA6. own job role and responsibilities KA7. knowledge of work area KA8. working safely KA9. cleanness of working area, maintain 5S KA10. interpersonal relations

PSS/N3014 **Testing, Operation and Energisation of Substation Equipment**

B. Technical Knowledge	The individual on the job needs to know and understand: KB1. principles of electricity KB2. power system: How power flows, Generation, Transmission and distributionnumber of bays, number of incoming and outgoing feeders , load management through single or double bus, substation network, ring system, back feed etc. KB3. line components towers, poles, single circuit, double circuit, over head, underground conductors and cables KB4. gantry structure, structure lay out, types of porcelain insulators, ACSR and AA conductors, clamps used in station KB5. operating principle of Power Transformer, its main component, auxiliary components and accessories. Diference between Power and Distribution T/R KB6. operating principle of switch gears (CB), how it operates under fault current, benefits of operating medium of OCB, MOCB, ACB, SF_6, Vaccum circuit breakers KB7. fault current due to short circuit, over current and earth fault. Their impact and protection system KB8. instrument transformers like CT's, PT's, and CVT's KB9. control panel and its in built measuring instruments, accessories like heater, lamp, door switch, HRC fuse, relays, auxiliary, ICT's etc. KB10. batterypanel,batterybank,tricle charging, battery status, electrolyte level, specific gravity of electrolyte, safety measures in repair and mainentance, ventilation etc.

PSS/N3014 **Testing, Operation and Energisation of Substation Equipment**

	KB11. DC distribution board (DCDB), AC distribution board (ACDB) and control cable and circuitory KB12. tripping mechanism short circuit, earth fault, over current, low frequency etc. Control panel relay for 66 or 33 kV outdoor switch yard KB13. RTU and communication panel for SCADA KB14. key faults occurred in major equipment like Power transformer, Distribution transformer, circuit brakers, control and relay panels etc. Their causes and protection system to avoid break down. KB15. lightening arrestors (LA) functioning.Ttypes of LA's like Rod Gap, Horn Gap, Expulsion and metal oxide arrestor. KB16. types of earthing used in grid station, its significance, why earth connection with each equipments, measurement of earth resistance and earthing switch. KB17. shunt capacitor bank, its function to improve pf, switching operation, repair, replacement and maintenance. KB18. operating functions of transformer oil filter machine, inlet & outlet connection, how it purify and clean from chemical impurities, slug, carbon and moisture KB19. complete tools, tackles and safety gadgets required in grid station erection and commissioning KB20. **use of Safety, T&P and testing equipment**: multimeter, partial discharging kit, circuit brakers testing kit, meggar, SDF6 gas leakage kit, digital tong tester, oil testing kit, battery testing kit, hydraulic crimping kit high voltage testing kit, protection testing kit, fault locater kit, tool box kit and Safety gadgets like discharge rod, earth chain, neon tester, Signage, danger notice, cardon tape etc. KB21. how to take safety precautions as per safety manual KB22. how to keep records of all equipment like name plate, pre- commission test report and manuals
Skills (S)	
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. communicate effectively in writing as per requirement of site work SA2. write the information communicated by the engineer or in-charge of work SA3. write properly about the technical problems and other conditions of site SA4. note down of observations, critical points and location of site related work
	Reading Skills
	The user/individual on the job needs skills pertaining to: SA5. reading, understanding of written sentences and paragraphs in work related documents SA6. writing and using metric system for all measurements SA7. interpreting the process required for performing of work SA8. reading, interpreting and understanding the rules and method stated in the documents SA9. reading equipment manuals and understand the equipment operation and process requirement
	Oral Communication (Listening and Speaking skills)

PSS/N3014 **Testing, Operation and Energisation of Substation Equipment**

	The user/individual on the job needs to know and understand how to: SA10. discuss task lists, schedules and activities with the Engineer SA11. effectively communicate with the team/group members SA12. listen the information given by the junior engineer SA13. communicate clearly with the team and other staff
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to: SB1. make work related Judgments appropriately SB2. identify complex problems and review related information to develop and evaluate SB3. follow organization rule based decision making process SB4. take decisions with systematic course of actions and/or response
	Plan and Organize
	The user/individual on the job needs to know and understand how to : SB5. plann and organize tasks to meet deadlines SB6. plan in advance maintenance schedule daily, weekly and monthly SB7. organize properly manpower and tools and kits for testing and maintenance SB8. plan and organize the shutdown of equipment SB9. plan, if any , special tool and testing kit required for maintenance SB10. plan work of maintenance completed within specified time SB11. plan return to shutdown permit in time
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB12. build customer relationships and use customer centric approach
	Problem Solving
	The user/individual on the job needs to: SB13. identify problems and review related information to develop and evaluate options and implement solutions SB14. prioritize and plan for solving problem SB15. take help from the junior engineer to solve the problems SB16. monitorsolving problems and take corrective action with individuals and organizations SB17. analyseproblems and changes in conditions, operations, and the environment to solve problems
	Analytical thinking
	The user/individual on the job needs to know and understand how to: SB18. analyze the problem seen in the equipment SB19. collect the information and technical data and define process for doing testing and maintenance
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB20. critically evaluate operation parameters in relation to Grid station features

	intended SB21. develop a holistic and comprehensive profile of erection of HV equipmentsbased on segregated discrete process stages of blank forming processes

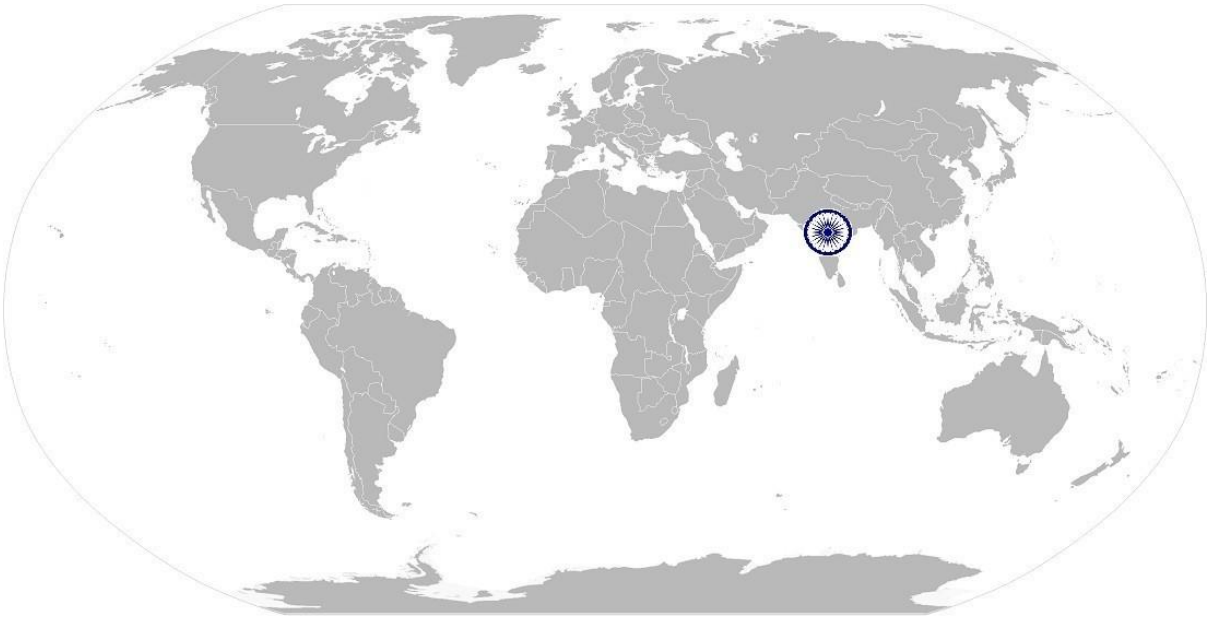
NOS Version Control

NOS Code	PSS/N3014		
Credits (NSQF)	TBD	Version number	1.0
Industry	Power	Drafted on	04/11/2015
Industry Sub-sector	Transmission	Last reviewed on	19/07/2016
Occupation	Technician	Next review date	19/07/2018

Back to Top

PSS/N2001 **Use basic health and safety practices for power related work**

National Occupational Standard



Overview

This unit covers health, safety and security for power related work. This includes procedures and practices that candidates need to follow to help maintain a healthy, safe and secure work environment.

NOS
National Occupational Standards

N·S·D·C National Skill Development Corporation

PSS/N2001 **Use basic health and safety practices for power related work**

National Occupational Standard

Unit Code	PSS/N2001
Unit Title (Task)	**Use basic health and safety practices for power related work**
Description	This unit covers health, safety and security for power related work. This includes procedures and practices that candidates need to follow to help maintain a healthy, safe and secure work environment. It covers responsibilities towards self, others, assets and the environment. .
Scope	**This unit/task covers the following:** • health and safety • fire safety • emergencies, rescue and first-aid procedures
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Health and safety	The user/individual on the job needs to: PC1. use protective clothing/equipment for specific tasks and work conditions. PC2. state the name and location of people responsible for health and safety in the workplace PC3. state the names and location of documents that refer to health and safety in the workplace PC4. identify job-site hazardous work and state possible causes of risk or accident in the workplace PC5. follow electrical safe working procedures such as Tag out/Lock out and display PTW (Permit To Work), PC6. follow warning signs (danger, out of service, etc.) while working with electrical systems PC7. use standard safe working practices when working at heights, confined areas and trenches PC8. test any electrical equipment and system using insulated testing devices before touching them PC9. ensure positive isolation of electrical equipment & system as per given standards PC10. recognize any abnormalities in electrical equipment or system installed alarm annunciation and/or noticing parameters from gauge/ indicator installed PC11. carry out safe working practices while dealing with hazards to ensure the safety of self and others PC12. state methods of accident prevention in the work environment of the job role PC13. state location of general health and safety equipment in the workplace PC14. inspect for faults, set up and safely use of scaffolds and elevated platforms and ladder PC15. lift,carry and transport heavy objects & tools safely using correct procedures from storage to workplace and vice versa PC16. inspect Grid station and its equipment routinely for any signs of oil and water leakage PC17. store flammable materials and machine lubricating oil safely and correctly PC18. check that the emission and pollution control devices are working properly in line with environmental policy standards PC19. apply good housekeeping practices at all times

PSS/N2001 **Use basic health and safety practices for power related work**

	PC20. identify common hazard signs displayed in various areas PC21. retrieve and/or point out documents that refer to health and safety in the workplace PC22. inform relevant authorities about any abnormal situation/behavior of any equipment/system promptly
Fire safety	The user/individual on the job needs to: PC23. use the various appropriate fire extinguishers on different types of fires correctly PC24. distinguish types of fire PC25. demonstrate rescue techniques applied during fire hazard PC26. demonstrate good housekeeping in order to prevent fire hazards PC27. demonstrate the correct use of a fire extinguisher
Emergencies, rescue and first-aid procedures	The user/individual on the job needs to: PC28. demonstrate how to free a person from electrocution PC29. administer appropriate first aid to victims where required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc. PC30. demonstrate basic techniques of bandaging PC31. respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments PC32. perform and organize loss minimization or rescue activity during an accident in real or simulated environments PC33. administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases PC34. demonstrate the artificial respiration and the CPR Process PC35. participate in emergency procedures Emergency procedures: raising alarm, safe/efficient, evacuation, correct means of escape, correct assembly point, roll call, correct return to work PC36. complete a written accident/incident report or dictate a report to another person, and send report to person responsible PC37. demonstrate correct method to move injured people and others during an emergency
KnowledgeandUnderstanding (K)	
A. Organizational Context	The user/individual on the job needs to know and understand: KA1. names (and job titles if applicable), and where to find, all the people responsible for health and safety in a workplace. KA2. names and location of documents that refer to health and safety in the workplace.

PSS/N2001 **Use basic health and safety practices for power related work**

B. Technical Knowledge	The individual on the job needs to know and understand: KB1. meaning of "hazards" and "risks" KB2. health and safety hazards commonly present in the work environment and related precautions KB3. possible causes of risk, hazard or accident in the workplace and why risk and/or accidents are possible KB4. possible causes of risk and accident KB5. methods of accident prevention KB6. safe working practices when working with tools and machines KB7. safe working practices while working at various hazardous sites KB8. where to find all the general health and safety equipment in the workplace KB9. various dangers associated with the use of electrical equipment KB10. positive isolation of electrical equipment and system KB11. safe handling and disposal of hazardous power plant wastes KB12. use of emission and pollution control devices and measures taken to control pollution KB13. various safety procedures and equipment used to work at heights, trenches and confined places KB14. safe working practices specific to working with electrical equipment & system e.g. lock out/ tag out, PTW, etc. KB15. preventative and remedial actions to be taken in the case of exposure to toxic materials KB16. importance of using protective clothing/equipment and other insulated work gear while handling electrical system and equipment KB17. precautionary activities taken to prevent fire accident KB18. various causes of fire KB19. techniques of using the different fire extinguishers KB20. different methods of extinguishing fire KB21. different materials used for extinguishing fire KB22. emergency rescue techniques applied during a fire hazard KB23. various types of safety signs and what they mean KB24. appropriate basic first aid treatment relevant to the condition e.g. shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries
Skills (S)	
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 by the officer incharge. SA2. note down observations (if any) related to the operation/maintenance.
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA3. read and interpret the process required for different types of manuals for maintenance. SA4. read and interpret the flowchart of all parts of an assembly. SA5. read manuals and documents to understand the product-details & how they can be used.
	Oral Communication (Listening and Speaking skills)

PSS/N2001 **Use basic health and safety practices for power related work**

	The user/individual on the job needs to know and understand how to: SA6. discuss task lists, schedules and activities with the colleague/supervisor. SA7. effectively communicate with the team members. SA8. attentively listen and comprehend the information given by the colleague/supervisor/contractor. SA9. communicate clearly with the colleague on the issues faced during query/fault.
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. follow colleague/contractor rule-based decision making process. SB2. take decisions with systematic course of actions and/or response.
	Plan and Organize
	The user/individual on the job needs to know and understand: SB3. planning and organization of tasks to meet deadlines.
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB4. build customer relationships and use customer centric approach.
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB5. seek and comprehend operation related inputs for clarification SB6. find ways of modifying difficult operating stages to make it operation friendly
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB7. work systematically and logically to resolve the issues and identify causation and anticipate unexpected results. SB8. quick approach and solution towards faults repairing.
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB9. critically evaluate operation parameters in relation to system normality SB10. develop a holistic and comprehensive profile of grid station on segregated discrete process stages of blank forming processes

NOS Version Control

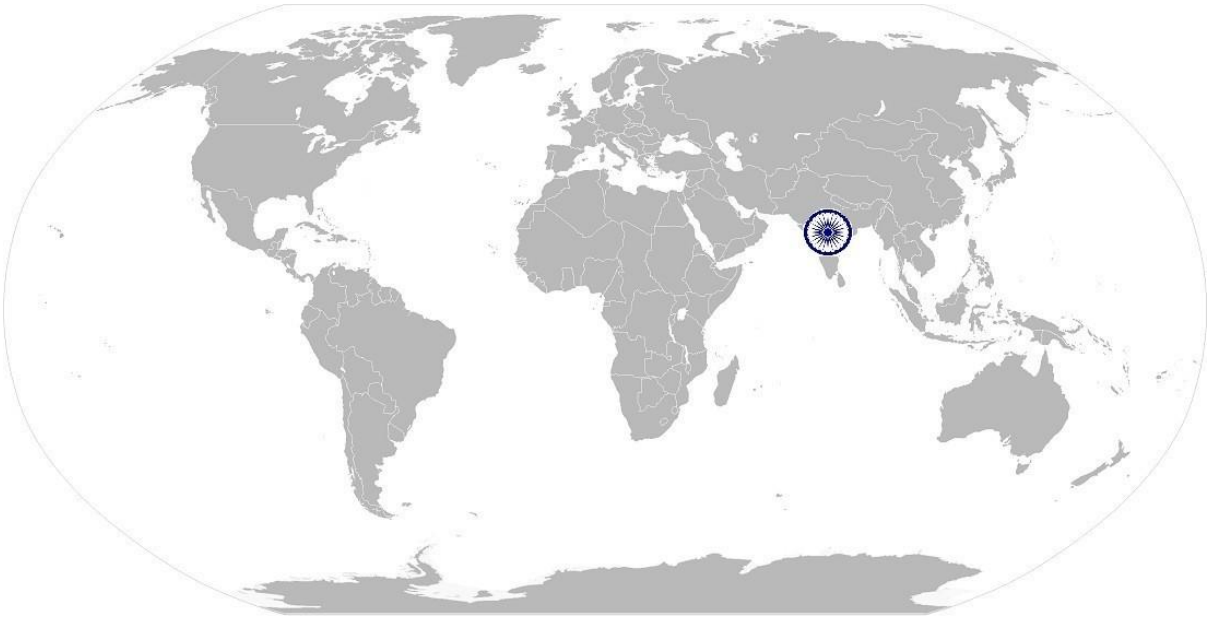
NOS Code	PSS/N2001		
Credits (NSQF)	TBD	Version number	1.0
Industry	Power	Drafted on	04/06/2016
Industry Sub-sector	Generation, Transmission & Distribution	Last reviewed on	19/07/2016
Occupation	Technician	Next review date	19/07/2018

Back to Top

NOS
National Occupational Standards

PSS/N1336 **Work effectively with others**

National Occupational Standard



Overview

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

NOS
National Occupational Standards

N·S·D·C National Skill Development Corporation

PSS/N1336 **Work effectively with others**

National Occupational Standard

Unit Code	**PSS/N1336**
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. These cover areas such as communication etiquette, discipline, listening, handling conflict and grievances.
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 receive information and instructions from the supervisor and fellow workers, getting clarification where required PC2. accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt PC3. give information to others clearly, at a pace and in a manner that helps them to understand PC4. display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible PC5. consult with and assist others to maximize effectiveness and efficiency in carrying out tasks PC6. display appropriate communication etiquette while working . PC7. display active listening skills while interacting with others at work PC8. use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism PC9. demonstrate responsible and disciplined behavior at the workplace PC10. escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict

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 organisation 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

PSS/N1336 **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. importance of ethics for professional success KB12. importance of discipline for professional success KB13. what constitutes disciplined behavior for a working professional KB14. common reasons for interpersonal conflict KB15. importance of developing effective working relationships for professional success KB16. how to express and address grievances appropriately and effectively KB17. importance and ways of managing interpersonal conflict effectively
Skills (S) (Optional)	
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 by the officer incharge. SA2. note down observations (if any) related to the operation/maintenance.
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA3. read and interpret the process required for different types of manuals SA4. read and interpret the flowchart of all parts of an assembly. SA5. read manuals and documents to understand the product-details & how they can be used.
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA6. discuss task lists, schedules and activities with the colleague/supervisor. SA7. effectively communicate with the team members. SA8. attentively listen and comprehend the information given by the colleague/supervisor/contractor. SA9. communicate clearly with the colleague on the issues faced during query/fault.
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB11. follow colleague/contractor rule-based decision making process.

	SB12. take decisions with systematic course of actions and/or response.
	Plan and Organize
	The user/individual on the job needs to know and understand: SB13. planning and organization of tasks to meet deadlines.
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB14. build customer relationships and use customer centric approach.
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB15. seek and comprehend operation related inputs for clarification find ways of modifying difficult operating stages to make it operation friendly
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB16. work systematically and logically to resolve the issues and identify causation and anticipate unexpected results.quick approach and solution towards faults repairing.
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB17. critically evaluate operation parameters in relation to system normality develop a holistic and comprehensive profile of grid station on segregated discrete process stages of blank forming processes

NOS Version Control

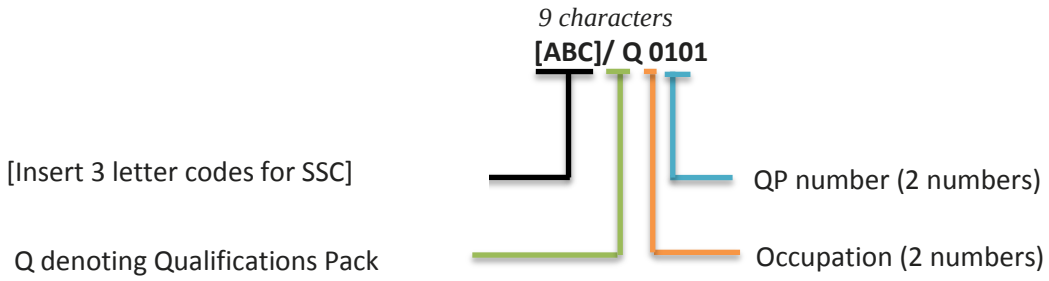
NOS Code	PSS/N1336		
Credits (NSQF)	TBD	Version number	1.0
Industry	Power	Drafted on	04/06/2016
Industry Sub-sector	Generation, Transmission & Distribution	Last reviewed on	19/07/2016
Occupation	Technician	Next review date	19/07/2018

Back to Top

Annexure

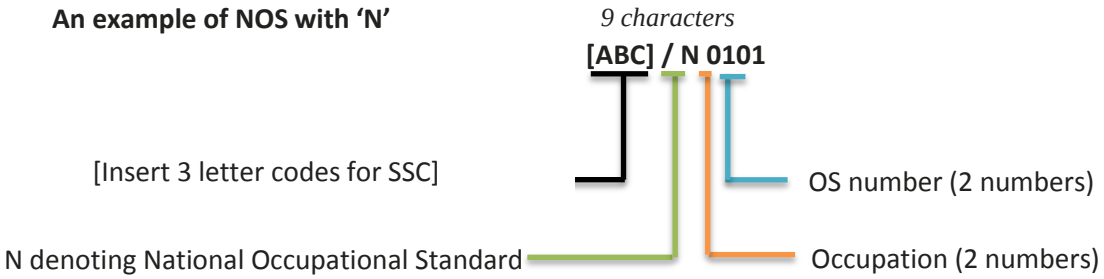
Nomenclature for QP and NOS

Qualifications Pack



Occupational Standard

An example of NOS with 'N'



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

Sub-sector	Range of Occupation numbers
[Insert Name of Sub-sector1, Font: Calibri (Body), size 11, Bold]	[Insert range]
[Insert Name of Sub-sector2, Font: Calibri (Body), size 11, Bold]	[Insert range]
[Insert Name of Sub-sector3, Font: Calibri (Body), size 11, Bold]	[Insert range]
[Insert Name of Sub-sector4, Font: Calibri (Body), size 11, Bold]	[Insert range]
…	…

Sequence	Description	Example
Three letters	Industry name	[ABC, Font: Calibri (Body), size 11]
Slash	/	/
Next letter	Whether **Q**P or **N**OS	N
Next two numbers	Occupation code	01
Next two numbers	OS number	01

NOS
National Occupational Standards

N·S·D·C National Skill Development Corporation

Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Technician Sub-Station Erection & Commissioning (66/11,33/11 KV) Power Distribution

Qualification Pack PSS/Q3007

Sector Skill Council Power

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 evaulations 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			
Assessable outcomes	**Assessment criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
1. PSS/ N 3012 Lay out plan of Primary and Secondary system of grid substation erection	PC1. read and understand substation lay out as per schematic drawing.	**100**	6	2	4
	PC2. apply knowledge of infrastructure lay out of grid station, number of bays, number of incoming and outgoing feedrs , load management through single or double bus, number of power transformer, station transformer, control panel, battery panels, area network, yard lighting etc.		8	3	5
	PC3. apply knowledge of loading and unloading of packed equipment at site, opening of accessories from package.		6	2	4

PC4.	identify manufacturing defect like defective design, poor material quality, poor workmanship and poor packing of equipment/transformer for transportation/shifting	4	1	3
PC5.	prepare job cards of each equipment and erection as per approved schedule.	5	2	3
PC6.	maintain inventories of all equipment with their spare parts state name plate, their type, ratings.	4	1	3
PC7.	ensure safety chart, First Aid box, switchgear handles, Fire extinguishers, PPE's and discharge rod are placed at proper location	6	0	6
PC8.	apply knowledge of mounting heavy equipment on their foundation accurately over the grouting bolts without any damage with the help of crane, chain pulley block and trolly	5	2	3
PC9.	apply knowledge of pipe and plate earthing, digging process to make earth connection and earth mat	5	1	4
PC10.	ensure that earth resistance of each earth pit marked with date and next due date	5	2	3
PC11.	ensure double earth connection is available to each equipment	4	1	3
PC12.	ensure control panels are grouted in alignment	6	0	6
PC13.	ensure back door of control panel be marked with name of feeder, numbered, approachable, clean, dust free and vermin protected	3	0	3
PC14.	ensure cable entry hole beneath the control panel should be properly	3	0	3

		plugged to avoid raptile entry and damage to wiring, instruments, accessories				
		PC15. check painting of all equipment. layout gravel in the substation yard.		3	0	3
		PC16. check status of civil masonary work of yard fencing and switchyard illumination and luminaries to secure the substation in a safe, efficient manner as per correct procedure		4	1	3
				100	**25**	**75**
2.	**PSS/N 3013 Erection & commissioning of substation equipment**	PC1. prepare and maintain records of installation, commissioning, tests, results and energisation with handing over dates of each equipment to O&M	**100**	**4**	**2**	**2**
		PC2. maintain storing of all testing instruments, tools & tackles in proper healthy state, safe and easily available		**2**	**0**	**2**
		PC3. ensure safety chart, First Aid box, switchgear handles, Fire extinguishers, PPE's and discharge rod are placed at proper location.		**2**	**0**	**2**
		PC4. lay power transformer on rails,check alignment, general appearance of bushings, connections at HV & LV bushings and oil level		**3**	**1**	**2**
		PC5. check fitting of auxiliary cooling system like cooling fans, pumps, oil coolers		**2**	**0**	**2**
		PC6. checking of OLTC and its mechanism		**3**	**1**	**2**
		PC7. check the various gauges: oil level gauge, Pressure vacuum gauge, oil temperature gauge, winding temperature gauge etc.		**3**	**1**	**2**

PC8.	inspect air release in main tanks, bucholtz relays	**3**	**1**	**2**
PC9.	check neutral earth connections at both ends	**2**	**0**	**2**
PC10.	check alarm circuits and trip circuit of transformer	**3**	**1**	**2**
PC11.	check fire protection system	**3**	**1**	**2**
PC12.	install the circuit braker as per manual/ recommendation of manufacture	**3**	**1**	**2**
PC13.	check breaker assembly frame, condition of foundation and foundation bolt	**3**	**1**	**2**
PC14.	check compress air pressure, pneumatic drive, SF_6 gas pressure, hydraulic fluid and oil leakage	**4**	**1**	**3**
PC15.	ensure smooth movement of all contactors	**2**	**0**	**2**
PC16.	check alignment of main contacts, earth blade and spring assembly	**2**	**0**	**2**
PC17.	check earth connections of earth blade	**2**	**0**	**2**
PC18.	check insulators	**3**	**0**	**3**
PC19.	check interlocks	**3**	**0**	**3**
PC20.	install CT's, PT's and CVT as per manual/ recommendation of manufacture	**3**	**1**	**2**
PC21.	install Capacitor Bank as per manual/ recommendation of manufacture	**4**	**1**	**3**
PC22.	install Lightning arrestor (LA)	**3**	**1**	**2**
PC23.	make connection of overhead conductor, busbar string insulators	**2**	**0**	**2**

	with T clamps and PG clamps			
PC24.	install auxiliary transformer, RTU andcommunication panel for SCADA system	**3**	**1**	**2**
PC25.	check bus bar	**2**	**0**	**2**
PC26.	ensure all switch gear and control panels are properly aliegn and grouted	**2**	**0**	**2**
PC27.	ensure back door of Control panel be marked with name of feeder, numbered, approachable, clean, dust free and vermin protected	**2**	**0**	**2**
PC28.	check status of relays O/C & E/F their settings, flag etc.	**2**	**1**	**1**
PC29.	apply knowledge of DC distribution board (DCDB), AC distribution board (ACDB) and control cable and circuitory	**3**	**1**	**2**
PC30.	check status of HRC fuse (PT and circuit) are of correct rating.	**4**	**2**	**2**
PC31.	check terminal connection block control, cables are connected in proper sequence with color code and ferrule	**4**	**2**	**2**
PC32.	ensurecontrol wires are layed in proper bunch in the concealed trays	**2**	**0**	**2**
PC33.	ensure ICT, auxiliary relays and other accessories are healthy and properly mounted	**4**	**2**	**2**
PC34.	check status of indicators, meters (Volt, Ampere, Watt, PF, Hz, Energy etc.)	**4**	**2**	**2**
PC35.	apply knowledge of Battery functions and precautions to take during installation of battery bank,	**4**	**2**	**2**

		charging panel.				
				100	**23**	**77**
3.	**PSS/N3014 Testing, operation and energisation of substation equipment**	PC1. lay out of grid station, number of bays, number of incoming and outgoing feedrs , load management through single or double bus, number of power transformer, station transformer, control panel, battery panels, area network, yard lighting etc.	**100**	**2**	**1**	**1**
		PC2. prepare and maintain records of installation, commissioning, tests, results and energisation with handing over dates of each equipment to O&M		**2**	**1**	**1**
		PC3. maintain storing of all testing instruments, tools & tackles in proper healthy state, safe and easily available		**1**	**0**	**1**
		PC4. maintain inventories of all equipment with their spare parts state name plate, their type, ratings.		**1**	**0**	**1**
		PC5. apply knowledge of selection criterion for rating of equipment, breaking, making and short time current		**2**	**1**	**1**
		PC6. check general appearance of bushings, connections at HV & LV bushings and oil level		**1**	**0**	**1**
		PC7. checking of auxiliary cooling system like cooling fans, pumps, oil coolers		**1**	**0**	**1**
		PC8. Inspect power transformers for any visible damage or leaks and insure gases are operative		**1**	**0**	**1**
		PC9. checking of OLTC and its mechanism		**2**	**1**	**1**
		PC10. check that the windings are		**1**	**0**	**1**

	connected for the desired voltage			
PC11.	check the various gauges: oil level gauge, Pressure vacuum gauge, oil temperature gauge, winding temperature gauge etc.	**2**	**1**	**1**
PC12.	inspect air release in main tanks, bucholtz relays	**1**	**0**	**1**
PC13.	check neutral earth connections at both ends	**1**	**0**	**1**
PC14.	check alarm circuits and trip circuit of transformer	**2**	**1**	**1**
PC15.	check fire protection system	**1**	**0**	**1**
PC16.	inspect the circuit braker as per manual/ recommendation of manufacture	**2**	**1**	**1**
PC17.	check tripping mechanism for short circuit, over current and earth fault	**2**	**1**	**1**
PC18.	check signage/flag status of trip due to fault, or operation for ON, OFF, Earth	**1**	**0**	**1**
PC19.	operating handles are in healthy state and place at appropriate location	**1**	**0**	**1**
PC20.	check compress air pressure	**1**	**0**	**1**
PC21.	check SF_6 gas pressure	**1**	**0**	**1**
PC22.	inspect oil leakage	**1**	**0**	**1**
PC23.	checking of hydraulic fluid	**1**	**0**	**1**
PC24.	checking of pneumatic drive	**1**	**0**	**1**
PC25.	check loose connection in control wiring	**1**	**0**	**1**
PC26.	check breaker assembly frame, condition of foundation and	**1**	**0**	**1**

	foundation bolt			
PC27.	record numbers of operation of counters	**1**	**0**	**1**
PC28.	inspection of breaker status indicator	**1**	**0**	**1**
PC29.	inspect smooth movement of all contactors	**1**	**0**	**1**
PC30.	check vermin proofing	**1**	**0**	**1**
PC31.	inspect anti pumping relay	**1**	**0**	**1**
PC32.	check main contacts, earth blade and spring assembly	**1**	**0**	**1**
PC33.	apply petroleum jelly to all contacts and lubricate all moving parts/ assembly	**1**	**0**	**1**
PC34.	inspect earth switch copper flexibles	**1**	**0**	**1**
PC35.	check earth connections of earth blade	**1**	**0**	**1**
PC36.	check insulators	**1**	**0**	**1**
PC37.	check interlocks	**1**	**0**	**1**
PC38.	check oil level and leakage	**1**	**0**	**1**
PC39.	check HF bushing	**1**	**0**	**1**
PC40.	check terminal block for loose connection	**1**	**0**	**1**
PC41.	check earth connection of secondary circuit	**1**	**0**	**1**
PC42.	checking of jumps and clamps	**1**	**0**	**1**
PC43.	ensure earth strips are intact and firmly connected in each gantry and equipment	**1**	**0**	**1**
PC44.	ensure earth resistance of each earth pit marked with date and next	**2**	**1**	**1**

due date			
PC45. ensure double connection to each equipment	**1**	**0**	**1**
PC46. checking of oil leakage	**1**	**0**	**1**
PC47. check current of each phase of capacitor row	**2**	**1**	**1**
PC48. checking of earth connections , jumps and clamps	**1**	**0**	**1**
PC49. check LA stacks	**1**	**0**	**1**
PC50. observe any cracks	**1**	**0**	**1**
PC51. determine IR value	**2**	**1**	**1**
PC52. check earth connections	**1**	**0**	**1**
PC53. check ACSR conductor	**1**	**0**	**1**
PC54. check of bushbar string insulators	**1**	**0**	**1**
PC55. check tightness of T clams and PG clamps	**1**	**0**	**1**
PC56. check of auxiliary transformer	**1**	**0**	**1**
PC57. check bus bar	**1**	**0**	**1**
PC58. check fire extinguishes	**1**	**0**	**1**
PC59. check switchyard illumination and luminares	**1**	**0**	**1**
PC60. check earthing of all equipment	**1**	**0**	**1**
PC61. check status of civil masonary work on plinth, grouting bolts and yard fencing	**1**	**0**	**1**
PC62. check painting of all equipment	**1**	**0**	**1**
PC63. check RTU and communication panel for SCADA system	**2**	**1**	**1**
PC64. check status of relays O/C & E/F	**2**	**1**	**1**

	their settings, flag etc.			
PC65.	check status of indicators, meters (Volt, Ampere, Watt, PF, Hz, Energy etc.)	**2**	**1**	**1**
PC66.	check Test terminal block for availability of secondary current and voltage	**2**	**1**	**1**
PC67.	check status of door switch, lamp and heater in side the chamber	**2**	**0**	**2**
PC68.	back door of Control panel be marked with name of feeder, numbered, approachable, clean, dust free and vermin protected	**2**	**0**	**2**
PC69.	cable entry hole beneath the control panel should be properly plugged to avoid raptile entry and damage to wiring, instruments, accessories	**2**	**0**	**2**
PC70.	check terminal connection block control, cables are connected in proper sequence with color code and ferrule	**2**	**0**	**2**
PC71.	control wires are layed in proper bunch in the concealed trays	**2**	**0**	**2**
PC72.	check status of HRC fuse (PT and ckt) are of correct rating.	**1**	**0**	**1**
PC73.	ICT, auxiliary relays and other accessories are healthy and properly mounted	**1**	**0**	**1**
PC74.	keep float charge in “ON” condition always	**1**	**0**	**1**
PC75.	keep exhaust fan in working condition and maintain open ventilation	**1**	**0**	**1**
PC76.	take care of Sufficient air inlet provision in the battery room	**1**	**0**	**1**

		PC77. maintain electrolyte level of each cell with distilled water		**2**	**1**	**1**
		PC78. check cleanliness and loose connection of battery charger		**2**	**1**	**1**
				100	**17**	**83**
4.	**PSS/N2001 Use basic health and safety practices for power related work**	PC1. use protective clothing/equipment for specific tasks and work conditions.	**100**	3	0	3
		PC2. state the name and location of people responsible for health and safety in the workplace		2	0	2
		PC3. state the names and location of documents that refer to health and safety in the workplace		2	0	2
		PC4. identify job-site hazardous work and state possible causes of risk or accident in the workplace		3	1	2
		PC5. follow electrical safe working procedures such as Tag out/Lock out and display PTW (Permit To Work),		3	1	2
		PC6. follow warning signs (danger, out of service, etc.) while working with electrical systems		3	1	2
		PC7. use standard safe working practices when working at heights, confined areas and trenche		3	1	2
		PC8. test any electrical equipment and system using insulated testing devices before touching them		3	1	2
		PC9. ensure positive isolation of electrical equipment & system as per given standards		3	1	2
		PC10. recognize any abnormalities in electrical equipment or system installed alarm annunciation and/or noticing parameters from gauge/		3	1	2

	indicator installed			
PC11.	carry out safe working practices while dealing with hazards to ensure the safety of self and others	3	1	2
PC12.	state methods of accident prevention in the work environment of the job role	2	0	2
PC13.	state location of general health and safety equipment in the workplace	2	0	2
PC14.	inspect for faults, set up and safely use of scaffolds and elevated platforms and ladder	2	0	2
PC15.	lift,carry and transport heavy objects & tools safely using correct procedures from storage to workplace and vice versa	2	1	1
PC16.	inspect Grid station and its equipment routinely for any signs of oil and water leakage	2	0	2
PC17.	store flammable materials and machine lubricating oil safely and correctly	2	0	2
PC18.	check that the emission and pollution control devices are working properly in line with environmental policy standards	3	1	2
PC19.	apply good housekeeping practices at all times	3	1	2
PC20.	identify common hazard signs displayed in various areas	2	0	2
PC21.	retrieve and/or point out documents that refer to health and safety in the workplace	2	0	2
PC22.	inform relevant authorities about any abnormal situation/behavior of	3	0	3

	any equipment/system promptly			
PC23.	use the various appropriate fire extinguishers on different types of fires correctly	2	1	1
PC24.	distinguish types of fire	3	1	2
PC25.	demonstrate rescue techniques applied during fire hazard	3	1	2
PC26.	demonstrate good housekeeping in order to prevent fire hazards	3	1	2
PC27.	demonstrate the correct use of a fire extinguisher	3	1	2
PC28.	demonstrate how to free a person from electrocution	3	1	2
PC29.	administer appropriate first aid to victims where required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc.	3	0	3
PC30.	demonstrate basic techniques of bandaging	3	1	2
PC31.	respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments	3	1	2
PC32.	perform and organize loss minimization or rescue activity during an accident in real or simulated environments	3	1	2
PC33.	administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases	3	1	2
PC34.	demonstrate the artificial respiration and the CPR Process	3	1	2

	PC35. participate in emergency procedures Emergency procedures: raising alarm, safe/efficient, evacuation, correct means of escape, correct assembly point, roll call, correct return to work		3	1	2
	PC36. complete a written accident/incident report or dictate a report to another person, and send report to person responsible		3	1	2
	PC37. demonstrate correct method to move injured people and others during an emergency		3	1	2
			100	**24**	**76**
5. PSS/N1336 Work effectively with others	PC1. accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required	**100**	10	3	7
	PC2. accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt		10	3	7
	PC3. give information to others clearly, at a pace and in a manner that helps them to understand		10	3	7
	PC4. display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible		10	3	7
	PC5. consult with and assist others to maximize effectiveness and efficiency in carrying out tasks		10	3	7
	PC6. display appropriate communication etiquette while working		10	3	7
	PC7. display active listening skills while interacting with others at work		10	3	7
	PC8. use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	3	7
	PC9. demonstrate responsible and disciplined behaviors at the workplace		10	3	7
	PC10. escalate grievances and problems to appropriate authority as per		10	3	7

	procedure to resolve them and avoid conflict				
			100	**30**	**70**