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

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Introduction

Qualifications Pack- Technician:Distribution Transformer Repair

SECTOR: Power

SUB-SECTOR: Distribution

OCCUPATION: Technician

REFERENCE ID: PSS/ Q 3003

ALIGNED TO: NCO-2004/NIL

Technician: Distribution Transformer Repair is responsible for checking, testing, operation, repair, overhaul and maintenance of distribution transformer of rating 11/0.433 kV. Distribution Transformer Technician must have sound knowledge of internal circuitory and functions of each component of a distribution transformer

Brief Job Description: The individual at work inspects the defect/condition of distribution transformer and takes up its repair to make it functional in the work shop

Personal Attributes: The job requires the individual to have physical strength, appropriate technical skills, ability to read, write and communicate, ability to stand for long working hours, needs to be mentally strong and demonstrate patience.

Job Details

Qualifications Pack Code	**PSS/Q3003**		
Job Role	**Technician: Distribution Transformer Repair**		
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: Distribution Transformer Repair**
Role Description	Technician: Distribution Transformer Repair is capable of dealing with all types of faults and damages in a distribution transformer. He is capable of carrying out required repair and maintenance acitivity (ies) in the damaged distribution transformer and ensure overall health of the distribution transformer
NSQF level	4
Minimum Educational Qualifications	ITI in electrician trade
Training (Suggested but not mandatory)	Electrical maintenance training - 2 months
Minimum Job Entry Age	20 Years
Experience	2 years as an Electrician
Applicable National Occupational Standards (NOS)	**Compulsory:** 1. PSS/N3005 Testing and inspection of various faults in distribution transformer 2. PSS/N3006 Repair, overhaul and delivery of tested distribution transformer 3. PSS/N2001 Use basic health and safety practices as the workplace 4. 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

	specificallydesignated 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

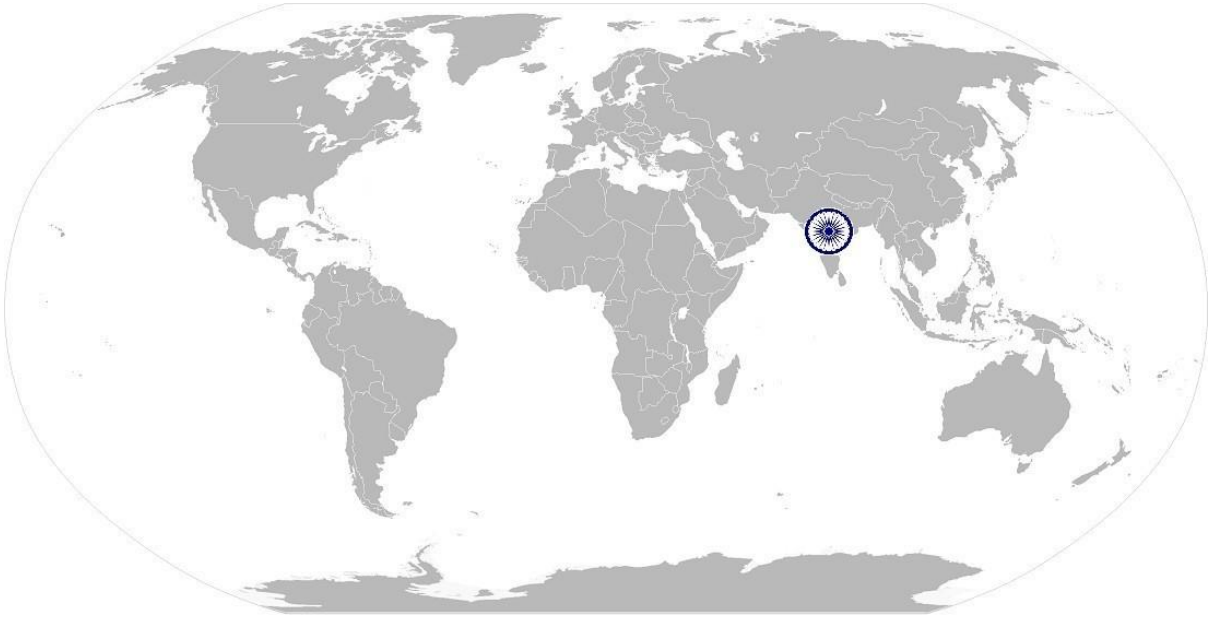
Keywords /Terms	Description
A	Ampere
AAC	All Aluminium Conductor
ABC	Aerial Bunched Conductor
AC	Alternating Current
ACSR	Aluminium Conductor Steel Reinforced (Steel Cored Aluminium Conductor)
AT&C	Aggregate Technical & Commercial Losses
BDV	Breakdown Voltage
BIS	Bureau of Indian Standards
CBIP	Central 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
DT	Distribution Transformer
E/F	Earth Fault
ELCB	Earth Leakage Circuit Breaker
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
LT	Low Tension
LV	Low Voltage
MCB	Miniature Circuit Breaker
N	Neutral
OCB	Oil Circuit Breaker
OLTC	On Load Tap Changer
O/C	Over Current
O/H	Over Head
O&M	Operation & Maintenance
P	Phase / Power
PF	Power Factor
PT	Potential Transformer
PV	Photo-Voltaic
PVC	Poly Vinyl Chloride
REC	Rural Electrification Corporation
SEB	State Electricity Board
SERC	State Electricity Regulatory Commission
T&D	Transmission and Distribution
T/F	Transformer
V	Voltage
VT	Voltage Transformer

NOS
National Occupational Standards

PSS/N3005 **Testing and inspection of faults in Distribution transformer**

National Occupational Standard



Overview

The Technician - distribution transformer repair conducts necessary testing and inspection of faulty transformers to determine the root cause of failure of distribution transformer. He also keeps the records of all the observations found during testing of defective transformer.

PSS/N3005 **Testing and inspection of faults in distribution transformer**

National Occupational Standard

Unit Code	**PSS/N3005**
Unit Title (Task)	**Testing and inspection of faults in Distribution transformer**
Description	This unit covers the ability and knowledge required by Technician: Distribution Transformer Repair to test all types of distribution transformer and other associated components. It also includes checking and inspection of smell, visual, sensory, noise, humming and vibrations in the DT. This also includes carrying out necessary testing in a safe, efficient and effecive manner.
Scope	**This unit/task covers the following:** • testing and inspection, identification of faults and root cause of DT failure

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

Element	Performance Criteria
Testing and inspection, identification of faults and root cause of DT failure	The user/individual on the job needs to: PC1. maintain a record card which contains the basic information of a DT like serial number, diagram, rating plate and other related aspects PC2. maintain defect/repair record card which shows diagnostic records to assess the DT performance history PC3. prepare check list of parameters to be kept in to consideration while doing testing and inspection of distribution transformer PC4. checking general appearance and leakage of oil to identify visual faults PC5. identify the nature of fault and damage of part/ component PC6. disconnect the winding connections from terminal bushing and earth connection between core and tank before lifting PC7. inspect physical condition visually for rust on body and on radiators PC8. verify correct connections of HT/LT side PC9. inspect bolt/lugs and solder of electrical connections PC10. inspect all required grounding and shorting connections, perform insulation-resistance test PC11. check the oil level in oil cap under silica gel breather PC12. check Bushing collar, gaskets and gaskit joints for any leakage of oil PC13. check breathing holes in silica gel breather PC14. Inspect color of silica gel in breather PC15. check condition of OLTC PC16. check leakage from gasket, gasket joints and flanges PC17. inspect porcelain insulator bushing for any damage, flash and hair crack PC18. identify faults arising due to: primary Winding burnt (one phase, two phase or complete), braze /solder of LT winding joints melted, over heat, open circuit in internal wiring etc. PC19. detect/ trouble shooting of excess humming noise due to loose fitting of silicon mixed steel alloys laminated core joints

PSS/N3005 **Testing and inspection of faults in distribution transformer**

Knowledge and Understanding (K)	
A. Organizational Context	The user/individual on the job needs to know and understand: KA1. process standards and procedures followed in the organization KA2. know the persons and the responsibilities within the work area KA3. work area and number of distribution transformer under the area KA4. proper care of inventory management, quality management KA5. keep proper documentation, records and related procedures applicable KA6. know the employee related rules and regulations
B. Technical Knowledge	The individual on the job needs to know and understand: KB1. principles of electricity KB2. rules and procedures of safety KB3. how and where to keep record, accessories, gadgets, equipments, PPE's, tools & tackles systematic to maintain good house keeping KB4. Job responsibilities/duties and standard inspection procedures KB5. related power system aspects like ratings and various types of DT KB6. working of a DT, its component, accessories and their functioning. Difference between dry type and oil immersed transformer and their usage at site KB7. various material / parts / accessories required for maintenance like insulating oil, type of core, winding material, bushings, cable and conductor, cabling box, cooling radiators, conservators, oil gauges, valves, explosion vents or pressure release devices, sealing gaskets, temperature indicators, poles,Insulators andfuses etc. KB8. use of tools and kits required for testing, repair and maintenance : OLTC Continuity & Resistance Measurement Test,: Dissolve Gas Analyzer kit, temperature monitor device, Partial Discharge Test Set, Flash Point Test Set of Oil, discharge rod,chain pulley, tripod, crane, hoist, force pulley with sling,tommy bar, crimping machine, drilling machine, meggar,tong tester etc KB9. procedure and technical requirements for testing, repair and maintenance of the distribution transformer KB10. reasons of major faults occurred in transformer and their cause KB11. transformer winding, placing various types of insulations, fitting of core joints and complete assembly KB12. testing of the performance and condition of distribution transformer KB13. safety at work at all times, complying with health, safety and other relevant regulations and guidelines KB14. importance of reporting problem to junior engineer (Supervisor) KB15. reporting ofany hazards identified and any actions taken KB16. identification of any potential hazards and take appropriate action to minimize the risk KB17. testing and inspection within agreed time scales using approved testing equipment, materials, components, methods and procedures
Skills (S)	
A. Core Skills/	**Writing Skills**

PSS/N3005 **Testing and inspection of faults in distribution transformer**

Generic Skills	The user/ individual on the job needs to know and understand how to: SA1. communicate effectively in writing SA2. be able to write the information communicated by the in-charge of work SA3. write properly about the technical problems and other conditions of site SA4. note down of testing repair observations, critical points SA5. be able to write about the condition of equipment SA6. prepare and fill up all technical forms and data as per guidelines and format
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA7. read and understand written sentences and paragraphs SA8. read metric system for all measurements SA9. Interpret the process required for performing of work SA10. read, interpret and understand therules and methods SA11. read 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: SA12. effectively communicate verbally SA13. be able to communicate effectively with voice modulation, tone of voice and eye contact SA14. use good body language for good oral communication SA15. discuss task lists, schedules and activities with the junior engineer SA16. effectively communicate with the team/group members SA17. listen the information given by the junior engineer SA18. able to communicate clearly with the team and other staff
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. make work related Judgments appropriately SB2. identifying complex problems and review related information to develop and evaluate SB3. follow organization rule based decision making process SB4. take decision with systematic course of actions and/or response
	Plan and Organize
	The user/individual on the job needs to know and understand: SB5. planning and organization of tasks to meet deadlines
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB6. NA
	Problem Solving
	The user/individual on the job needs to know and understand: SB7. identify problems and review related information to develop, evaluate options and implement solutions SB8. prioritize and plan for solving problem

	SB9. take help from the junior engineer to solve the problems SB10. implement corrective action with individuals and organizations for problem solving SB11. analyze 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: SB12. analyze the problem seen in the equipment SB13. 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: SB14. critically evaluate operation parameters in relation to distribution transformer features intended SB15. develop holistic and comprehensive profile of distribution transformer repair

NOS Version Control

NOS Code	PSS/N3005		
Credits (NSQF)	TBD	Version number	1.0
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Industry Sub-sector	Distribution	Last reviewed on	19/07/2016
Occupation	Technician	Next review date	19/07/2018

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National Occupational Standards

PSS/N3006 Repair, Overhaul and Delivery of tested distribution transformer

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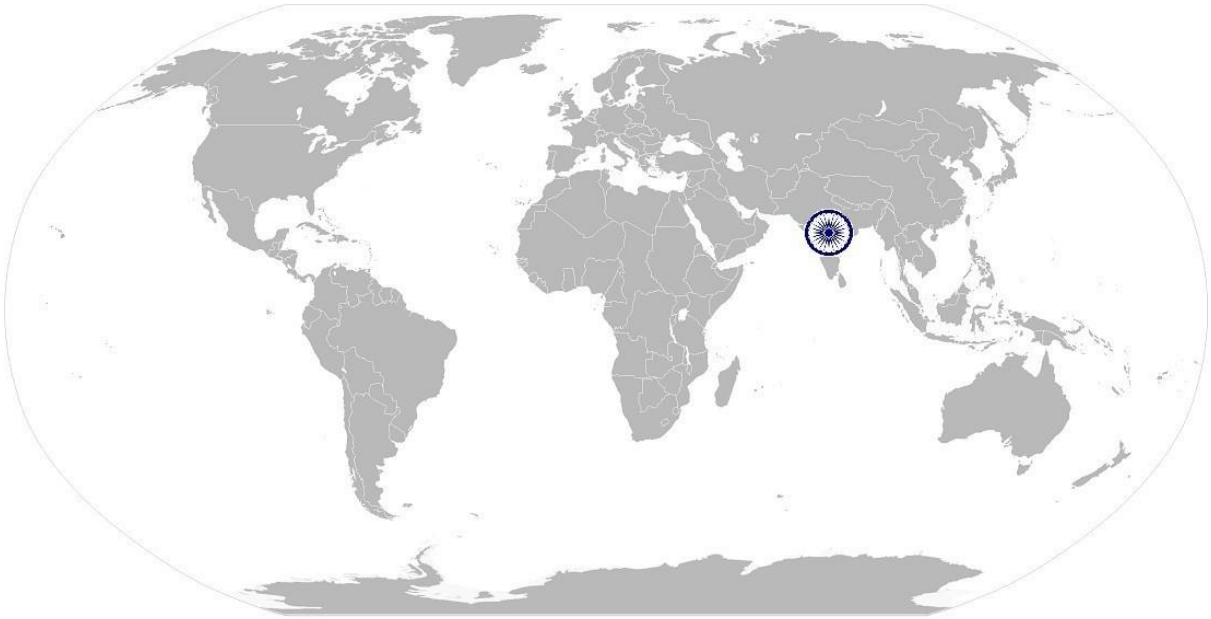
National Occupational Standard



Overview

The technician distribution transformer repair looks after repair, overhaul and set right various sizes and capacities of defective distribution transformer. He also keeps the records of all the repairs, replacement and inventory

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PSS/N3006 Repair, Overhaul and Delivery of tested distribution transformer

National Occupational Standard

Unit Code	PSS/N3006
Unit Title (Task)	Repair, overhaul and Delivery of tested distribution transformer
Description	This unit covers the ability and knowledge required by Technican - distribution transformer repair to repair all types of distribution transformer and other associated components. The Technican - distribution transformer repair will be expected to perform and act independently for following ratings: i) the standard voltage rating of 11/0.433 KV ii) Capacity Range of DT is – 10 KVA, 16KVA, 25 KVA, 63KVA, 100KVA, 160KVA, 200KVA, 250KVA, 315KVA, 400 KVA, 500KVA, 630KVA 750KVA, 1000KVA.
Scope	**This unit/task covers the following:** • prepare and carrying out repair of defective distribution transformer • testing and checking of over hauled distribution transformer before delivery

Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Prepare and carrying out repair of defective distribution transformer	The user/individual on the job needs to know and understand: PC1. demonstrate repair and maintenance compliance stated in the standard procedure manual PC2. refer maintenance manual and circuit diagram PC3. ensure all required tools and kits are in good condition PC4. check that all testing kits are calibrated PC5. record all the abnormalities and defects during repair PC6. prepare work area as per standard repair procedure PC7. ensure that adequate spare parts should be kept on hand to replace the faulty parts PC8. take oil samples from tank bottom, tank top and radiator for checking of Break-Down Voltage (BDV) test PC9. remove core and windings from the tank for visual inspection PC10. ensure core and winding in proper cover, dry and safe place after removal from tank PC11. check status of core, primary winding, secondary winding, primary terminal connections, secondary terminal connections, insulation (fish paper, empire tape/cloth, wooden spacers, tags etc) PC12. identify nature of fault and carry out repair and replacement PC13. place complete core and winding block for heat treatment in vacuum chamber PC14. maintain voltage within prescribed limits by the use of an Off-Circuit Tap Selector (OCTS) PC15. test for variation appearing in the primary side supply voltage and the

PSS/N3006 Repair, Overhaul and Delivery of tested distribution transformer

	secondary side supply voltage PC16. check insulation resistance by Megger PC17. check all loose bolts / screws / clamps, tighten the core joints, solder HT and LT terminal connections PC18. check and ensure that no sludge has been deposited on winding to block the oil ducts and opening passage PC19. check indoor and outdoor bushings for oil leakage and cracks or any other defects, replace the defective bushing PC20. check cooling radiators for any oil leakages along all the welded joints, gasket joints and plugs. Rectify the same from the radiators PC21. check and ensure clasping of the conservator PC22. check and clean all the oil gauges and replace the defective oil gauges PC23. check the dehydrating breather and replace if saturated and color has changed PC24. check that no foreign items have been left in the tank PC25. repair oil leakage and sweating. Top-up oil as per instruction stated in the manual PC26. check pressure release device and explosion vent PC27. check sealing gaskets for cracks, tight nut and bolts and replace damage gaskets PC28. check oil level in conservator tank gauge and thermometer PC29. check OLTC switch for arcing welding and wearing and replace repair defective parts PC30. check and clean the radiator with compressed air or water PC31. check arcing horns for dent, welds or any defect and replace the same if found defective PC32. check for any rust and damage of paint for external tank PC33. check oil temperature indicator (OTI) and winding temperature indicator (WTI) PC34. check air-release plugs of main tank, radiator, conservator, bushings, etc. are free of air pocket / bubbles PC35. energize distribution transformer at NO-LOAD only and checked for any abnormalities for the next 4 to 8 hours PC36. take advice from the manufacturer or suppliers if any major abnormalities or defects found during repair and maintenance
Testing and checking of over hauled Distribution transformer before delivery	The user / individual on the job should be able to: PC37. ensure complete transformer with its components are fitted and packed in its original shape PC38. confirm all the test are done before delivery. All the test relevant to the performance of DT and ensure basic parameters like Physical: leakage, low oil, silica in breather, HV & LV bushing. Electrical: IR value (HT to E, LT to E, HT to LT, oil BDV)

	PC39. ensure vent pipe is sealed with aluminum foil (diaphragm), temperature gauge is fitted and all HV terminals are fitted with horn and double screws and washers PC40. check list before delivery: oil level, No leakage of oil, tap position, silica gel in breather, radiator valve, thermometer packet, earth connection PC41. ensure that the inspected and tested component meets the specified operating conditions before issue of OK certificate PC42. anticipate problems well in advance in order to rectify timely
KnowledgeandUnderstanding (K)	
A. Organizational Context	The user/individual on the job needs to know and understand: KA1. process standards and procedures followed in the organization KA2. know the persons and the responsibilities within the work area KA3. work area and number of distribution transformer under the area KA4. proper care of inventory management, quality management KA5. keep proper documentation, records and related procedures applicable KA6. know the employee related rules and regulations
B. Technical Knowledge	The individual on the job needs to know and understand: KB1. principles of electricity KB2. rules and procedures of safety KB3. how and where to keep record, accessories, gadgets, equipments, PPE's, tools & tackles systematic to maintain good house keeping KB4. related power system aspects like ratings and various types of DT transformer, its component, accessories and their functioning. Difference between Dry type and Oil immersed transformer and their usage at site. KB5. various material / parts / accessories required for maintenance like insulating oil, type of core, winding material, bushings, cable and conductor, cabling box, cooling radiators, conservators, oil gauges, valves, explosion vents or pressure release devices, sealing gaskets, temperature indicators, poles,Insulators and fuses etc. KB6. usage of tools and kits required for testing, repair and maintenance : OLTC Continuity & Resistance Measurement Test,: Dissolve Gas Analyzer kit, temperature monitor device, Partial Discharge Test Set, Flash Point Test Set of Oil, discharge rod,chain pulley, tripod, crane, hoist, force pulley with sling,tommy bar, crimping machine, drilling machine, meggar,tong tester, KB7. procedure and technical requirements for testing, repair and maintenance of the distribution transformer KB8. transformer winding, placing various types of insulations, fitting of core joints and complete assembly KB9. heat treatment methods, temperature control in oven and operation of vacuum chamber KB10. operations of transformer oil filter machine KB11. keeping records of calibration schedule of equipment kits used for inspection, repair and maintenance KB12. test the performance and condition of distribution transformer, KB13. work safely at all times, complying with health, safety and other relevant

	regulations and guidelines. KB14. importance of reporting problem to junior engineer (Supervisor). KB15. report any hazards identified and any actions taken KB16. identify any potential hazards and take appropriate action to minimize the risk
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 SA2. able to write the information communicated by the in-charge of work SA3. write properly about the technical problems and other conditions of site SA4. note down of testing repair observations, critical points SA5. able to write about the condition of equipment SA6. prepare and fill up all technical forms and data as per guidelines and format
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA7. reading, understanding of written sentences and paragraphs SA8. able to read Metric System for all measurements SA9. Interpret the process required for performing of work SA10. read, interpret and understand the rules and methods SA11. read 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: SA12. effective verbal communication SA13. able to communicate effectively with voice modulation, tone of voice and eye contact SA14. use good body language for good oral communication SA15. discuss task lists, schedules and activities with the junior engineer SA16. effectively communicate with the team/group members SA17. listen the information given by the junior engineer SA18. able to communicate clearly with the team and other staff
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. make work related Judgments appropriately SB2. identifying complex problems and review related information to develop and evaluate SB3. follow organization rule based decision making process SB4. take decision with systematic course of actions and/or response
	Plan and Organize
	The user/individual on the job needs to know and understand: SB5. planning and organization of tasks to meet deadlines
	Customer Centricity

PSS/N3006 Repair, Overhaul and Delivery of tested distribution transformer

	The user/individual on the job needs to know and understand how to: SB6. not applicable
	Problem Solving
	The user/individual on the job needs to know and understand: SB7. identify problems and review related information to develop and evaluate options and implement solutions SB8. prioritize and plan for solving problem SB9. take help from the junior engineer to solve the problems SB10. monitor problem solving to take corrective action with individuals and organizations SB11. analyze 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: SB12. analyze the problem seen in the equipment SB13. 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: SB14. critically evaluate operation parameters in relation to distribution transformer features intended SB15. develop holistic and comprehensive profile of distribution transformer repair based on segregated discrete process stages

NOS Version Control

NOS Code	PSS/N3006		
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

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NOS
National Occupational Standards

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

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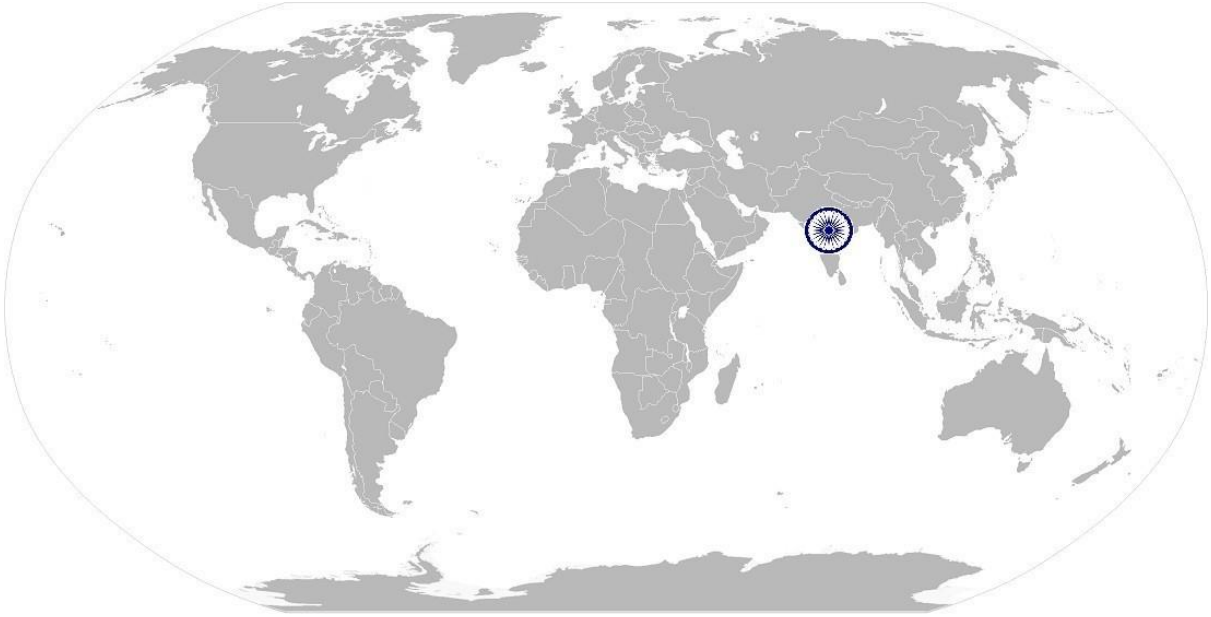
National Occupational Standard



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.

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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

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

	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 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.

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

	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: 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

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

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

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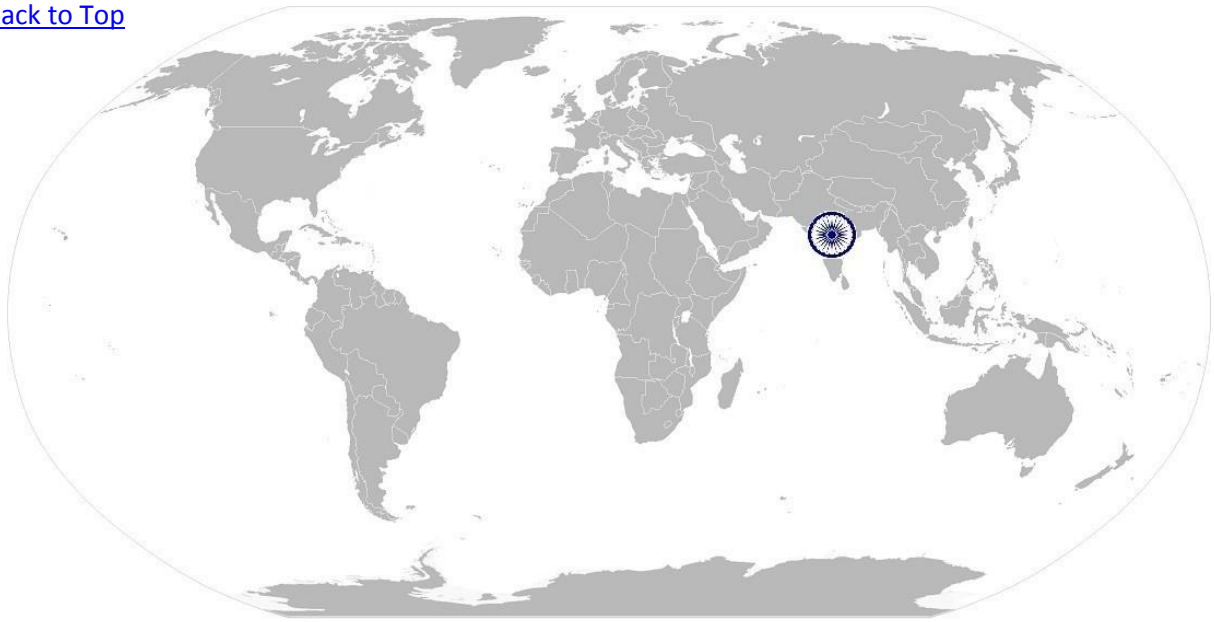
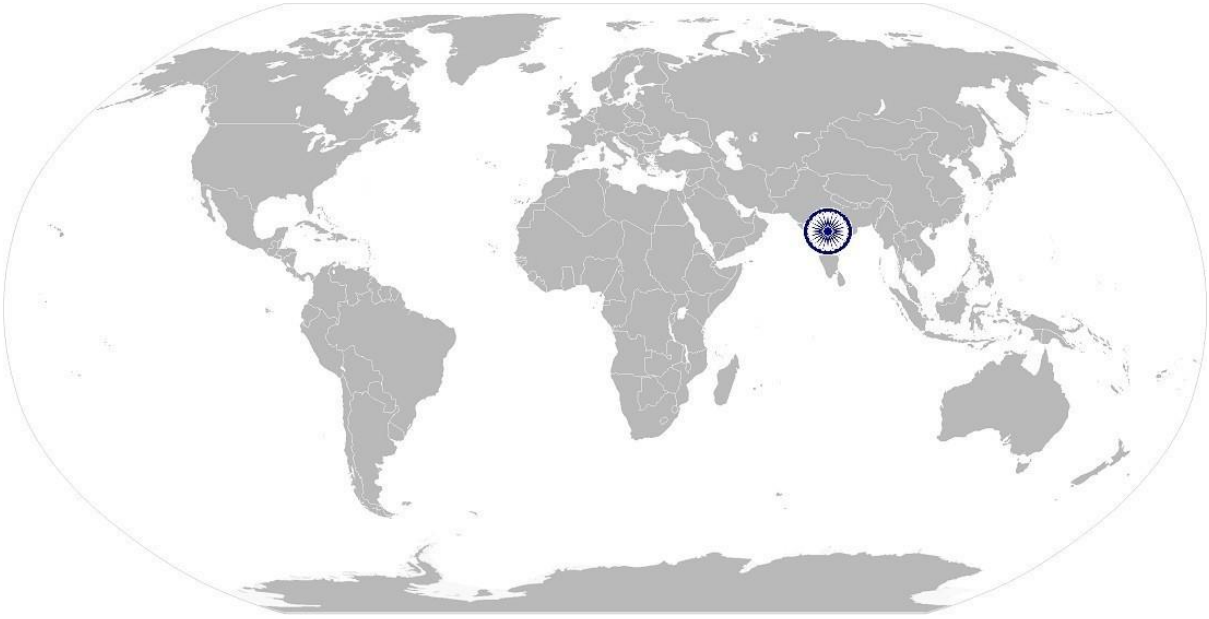


NOS
National Occupational Standards

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
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	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

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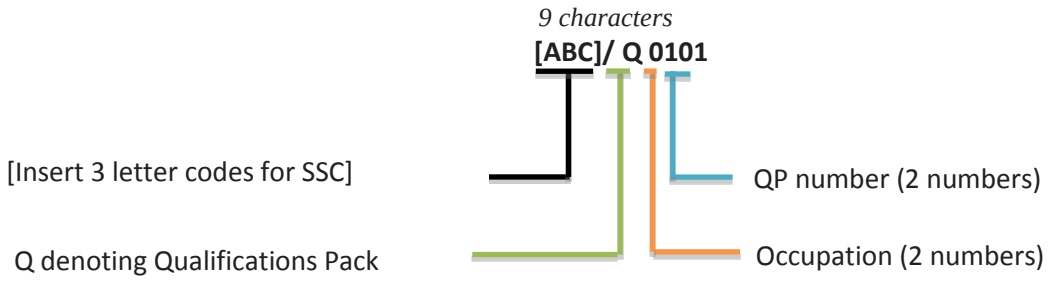
Annexure

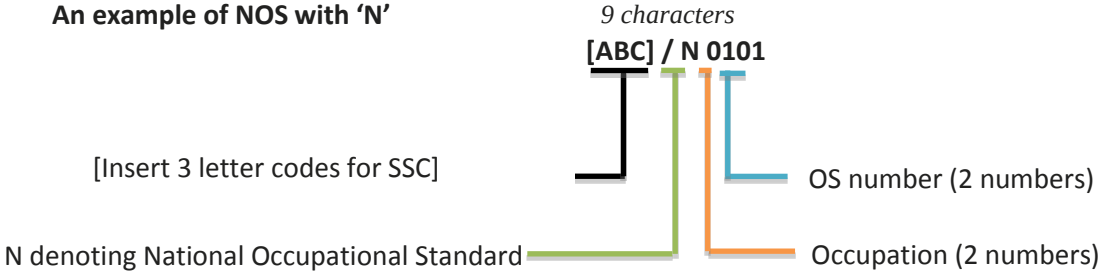
Nomenclature for QP and NOS

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 Distribution Transformer Repair

Qualification Pack PSS/Q3003

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. Testing and inspection of faults in Distribution transformer	PC1. Maintain a record card which contains the basic information of a DT like serial number, diagram, rating plate and other related aspects	**100**	4	1	3
	PC2. Maintain defect/repair record card which shows diagnostic records to assess the DT performance history		4	1	3
	PC3. prepare check list of parameters to be kept into consideration while doing testing and inspection of distribution transformer		4	2	2
	PC4. checking general appearance and leakage of oil to identify visual		2	0	2

		faults				
	PC5.	identify the nature of fault and damage of part/ component		5	2	3
	PC6.	disconnect the winding connections from terminal bushing and earth connection between core and tank before lifting.		3	0	3
	PC7.	inspect physical condition visually for rust on body and on radiators.		3	0	3
	PC8.	verify correct connections of HT/LT side		5	2	3
	PC9.	inspect bolt/lugs and solder of electrical connections		4	1	3
	PC10.	inspect all required grounding and shorting connections, perform insulation-resistance test		5	2	3
	PC11.	check the oil level in oil cap under silica gel breather		4	2	2
	PC12.	check Bushing collar, gaskets and gaskits joints for any leakage of oil.		4	0	4
	PC13.	check breathing holes in silica gel breather		4	0	4
	PC14.	inspect color of silica gel in breather		4	0	4
	PC15.	check condition of OLTC		5	2	3
	PC16.	check leakage from gasket, gasket joint and flanges (Repeat)		4	0	4
	PC17.	inspect porcelain insulator bushing for any damage, flash and hair crack		4	0	4
	PC18.	identify faults arising due to : primary Winding burnt (one phase, two phase or complete), braze /solder of LT winding joints melted, over heat, open circuit in internal		5	2	3

	wiring etc.				
	PC19. detect/ trouble shooting of excess humming noise due to loose fitting of silicon mixed steel alloys laminated core joints		4	1	3
			100	**22**	**78**
2. PSS/ N 3006 Repair, overhaul and delivery of tested distribution transformer	PC1. demonstrate repair and maintenance compliance stated in the standard procedure manual	**100**	**3**	**1**	**2**
	PC2. refer maintenance manual and circuit diagram		**2**	**1**	**1**
	PC3. ensure all required tools and kits are in good condition		**2**	**0**	**2**
	PC4. check that all testing kits are calibrated		**2**	**1**	**1**
	PC5. record all the abnormalities and defects during repair		**2**	**1**	**1**
	PC6. prepare work area as per standard repair procedure		**2**	**1**	**1**
	PC7. ensure that adequate spare parts should be kept on hand to replace the faulty parts.		**2**	**0**	**2**
	PC8. take oil samples from tank bottom, tank top and radiator for checking of Break-Down Voltage (BDV) test		**3**	**1**	**2**
	PC9. remove core and windings from the tank for visual inspection		**1**	**0**	**1**
	PC10. ensure core and winding in proper cover, dry and safe place after removal from tank		**1**	**0**	**1**
	PC11. check status of core, primary winding, secondary winding, primary terminal connections, secondary terminal connections, insulation (fish paper, empire tape/cloth,		**1**	**0**	**1**

	wooden spacers, tags etc)				
PC12.	identify nature of fault and carry out repair and replacement.		**3**	**1**	**2**
PC13.	place complete core and winding block for heat treatment in vacuum chamber		**1**	**0**	**1**
PC14.	maintain voltage within prescribed limits by the use of an Off-Circuit Tap Selector (OCTS)		**2**	**1**	**1**
PC15.	test for variation appearing in the primary side supply voltage and the secondary side supply voltage		**2**	**1**	**1**
PC16.	check insulation resistance by Megger.		**2**	**1**	**1**
PC17.	check all loose bolts / screws / clamps, tighten the core joints, solder HT and LT terminal connections		**2**	**0**	**2**
PC18.	check and ensure that no sludge has been deposited on winding to block the oil ducts and opening passage		**1**	**0**	**1**
PC19.	check indoor and outdoor bushings for oil leakage and cracks or any other defects, replace the defective bushing		**2**	**0**	**2**
PC20.	check cooling radiators for any oil leakages along all the welded joints, gasket joints and plugs. Rectify the same from the radiators.		**2**	**0**	**2**
PC21.	check and ensure clasping of the conservator.		**1**	**0**	**1**
PC22.	check and clean all the oil gauges and replace the defective oil gauges.		**2**	**0**	**2**
PC23.	check the dehydrating breather and replace if saturated and color has		**3**	**1**	**2**

	changed.				
PC24.	check that no foreign items have been left in the tank.		**1**	**0**	**1**
PC25.	repair oil leakage and sweating. Top-up oil as per instruction stated in the manual.		**2**	**1**	**1**
PC26.	check pressure release device and explosion vent.		**2**	**0**	**2**
PC27.	check sealing gaskets for cracks, tight nut and bolts and replace damage gaskets.		**2**	**0**	**2**
PC28.	check oil level in conservator tank gauge and thermometer.		**2**	**0**	**2**
PC29.	check OLTC switch for arcing welding and wearing and replace repair defective parts		**2**	**0**	**2**
PC30.	check and clean the radiator with compressed air or water		**1**	**0**	**1**
PC31.	check arcing horns for dent, welds or any defect and replace the same if found defective		**1**	**0**	**1**
PC32.	check for any rust and damage of paint for external tank		**1**	**0**	**1**
PC33.	check oil temperature indicator (OTI) and winding temperature indicator (WTI)		**2**	**1**	**1**
PC34.	check air-release plugs of main tank, radiator, conservator, bushings, etc., are free of air pocket / bubbles.		**2**	**0**	**2**
PC35.	energize distribution transformer at NO-LOAD only and checked for any abnormalities for the next 4 to 8 hours		**4**	**2**	**2**
PC36.	take advice from the manufacturer or suppliers if any major		**5**	**2**	**3**

	abnormalities or defects found during repair and maintenance.				
	PC37. ensure complete transformer with its components are fitted and packed in its original shape.		**3**	**1**	**2**
	PC38. confirm all the test are done before delivery. All the test relevant to the performance of DT and ensure basic parameters like Physical: leakage, low oil, silica in breather, HV & LV bushing. Electrical: IR value (HT to E, LT to E, HT to LT, oil BDV)		**4**	**2**	**2**
	PC39. ensure vent pipe is sealed with aluminum foil (diaphragm), temperature gauge is fitted and all HV terminals are fitted with horn and double screws and washers.		**1**	**0**	**1**
	PC40. check list before delivery: oil level, No leakage of oil, tap position, silica gel in breather, radiator valve, thermometer packet, earth connection		**3**	**1**	**2**
	PC41. ensure that the inspected and tested component meets the specified operating conditions before issue of OK certificate.		**4**	**2**	**2**
	PC42. anticipate problems well in advance in order to rectify timely.		**3**	**1**	**2**
			100	**26**	**74**
3. 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/ indicator installed		3	1	2
	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		2	0	2

	platforms and ladder				
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 any equipment/system promptly		3	0	3
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		3	1	2

	during an emergency				
			100	**24**	**76**
4. 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 procedure to resolve them and avoid conflict		10	3	7
			100	**30**	**70**