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 -

E-mail: pssc@cbip.org

Introduction

Qualifications Pack: Pipe Fitter

SECTOR: POWER

SUB-SECTOR: Generation

OCCUPATION: Fitting and Assembly

REFERENCE ID: PSS/ Q 0201

Aligned to: NCO-2004/7136.30

Pipe Fitter: Perform basic fabrication, fitting and assembly activities on pipes to produce pipework systems as per given specifications.

Brief Job Description: It involves marking out the pipes as per specifications, and then use hand tools, portable power tools, manually operated machine tools and shaping, fabricating, fitting and assembly techniques appropriate to the operations being performed. The candidate will be expected to check the quality of the workpiece, using measuring equipment.

Personal Attributes: Basic communication, numerical and computational abilities. Openness to learning, ability to plan and organize own work and identify and solve problems in the course of working. Understanding the need to take initiative and manage self and work to improve efficiency and effectiveness

Job Details

Qualifications Pack Code	**PSS/ Q 0201**		
Job Role	**Pipe Fitter**		
Credits (NSQF)	**TBD**	**Version number**	**1.0**
Sector	**Power**	**Drafted on**	**26/03/15**
Sub-sector	**Generation**	**Last reviewed on**	**26/03/15**
Occupation	**FITTING AND ASSEMBLY**	**Next review date**	**26/03/17**

Job Role	**Pipe Fitter**
Role Description	Perform basic fabrication, fitting and assembly operations on various types of pipes to produce pipework systems as per given specifications.
NSQF level	4
Minimum Educational Qualifications	8th Standard
Maximum Educational Qualifications	N.A.
Training (Suggested but not mandatory)	ITI/other Training on pipe fabrication/ installation / commissioning. Pipe brazing/soldering/Welding and Oxy-Fuel Gas Cutting
Experience	For ITI - 1 year on the job experience as Power Plant Mechanical Junior Fitter preferably as any fabricator For Non-ITI upto 8th Std - 2 years on the job experience as Power Plant Mechanical Junior Fitter preferably as any fabricator
Applicable National Occupational Standards (NOS)	**Compulsory:** 1. PSS/ N 0201 (Perform fitting and assembly operations on pipes to produce pipework systems) 2. PSS/ N 2001 (Use basic health and safety practices at the workplace) 3. CSC/ N 1336 (Work effectively with others) **Optional:** N.A.
Performance Criteria	As described in the relevant OS units

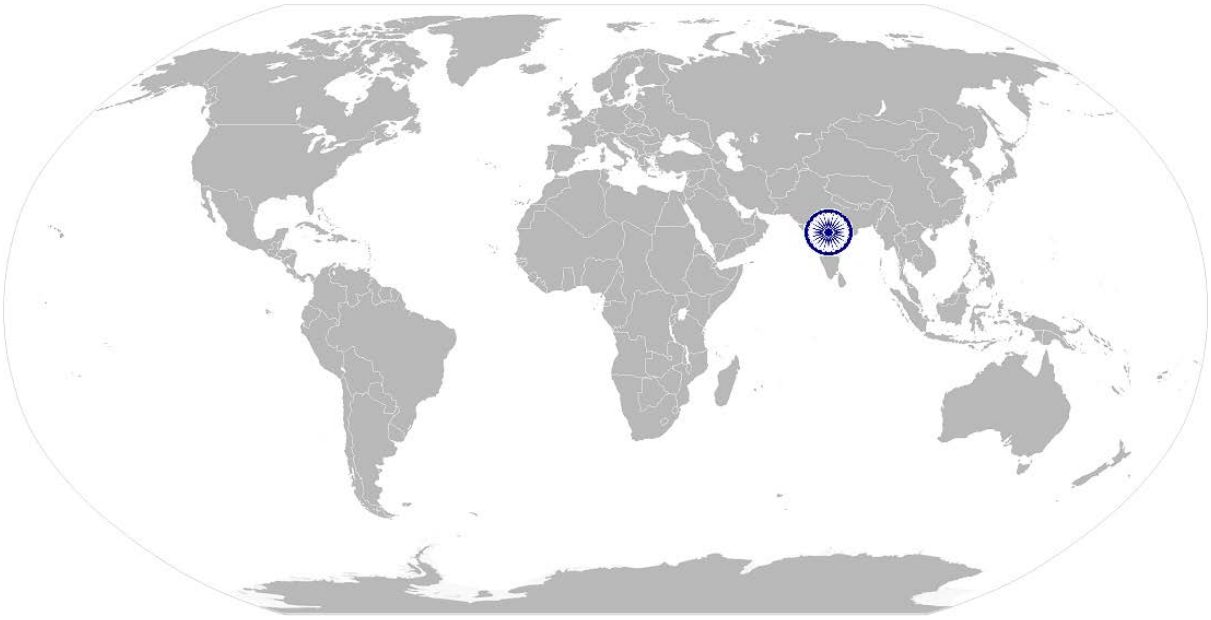
Definitions

Keywords /Terms	Description
Core Skills/Generic Skills	Core Skills or Generic Skills are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the NOS, these include communication related skills that are applicable to most job roles.
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 NOS.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organization.
Knowledge and Understanding	Knowledge and Understanding are statements which together specify the technical, generic, professional and organizational specific knowledge that an individual needs in order to perform to the required standard.
National Occupational Standards (NOS)	NOS are Occupational Standards which apply uniquely in the Indian context
Occupation	Occupation is a set of job roles, which perform similar/related set of functions in an industry.
Organisational Context	Organisational Context includes the way the organization is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Performance Criteria	Performance Criteria are statements that together specify the standard of performance required when carrying out a task.
Qualifications Pack(QP)	Qualifications Pack comprises the set of NOS, together with the educational, training and other criteria required to perform a job role. A Qualifications Pack is assigned a unique qualification pack code.
Qualifications Pack Code	Qualifications Pack Code is a unique reference code that identifies a qualifications pack.
Scope	Scope is the set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on the quality of performance required.
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.
Sub-functions	Sub-functions are sub-activities essential to fulfil the achieving the objectives of the function.
Technical Knowledge	Technical Knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Unit Code	Unit Code is a unique identifier for a NOS unit, which can be denoted with an 'N'
Unit Title	Unit Title gives a clear overall statement about what the incumbent should be able to do.
Vertical	Vertical may exist within a sub-sector representing different domain areas or the client industries served by the industry.

Acronyms

Keywords /Terms	Description
CO2	Carbon di-oxide
CPR	Cardiac Pulmonary Resuscitation
PPE	Personal Protective Equipment
OEE	Overal Equipment Effectiveness

National Occupational Standard



Overview

This unit covers the basic pipe fabrication, fitting and assembly operations on various types of pipes to produce pipework systems as per given specifications.

National Occupational Standard

PSS/ N 0201: Perform fabrication, fitting and assembly operations on pipes to produce pipework systems

Unit Code	PSS/ N 0201
Unit Title (Task)	Perform fabrication, fitting and assembly operations on pipes to produce pipework systems
Description	This unit covers the pipe fabrication, fitting and assembly operations on various types of pipes to produce pipework systems as per given specifications. The candidate will be expected to carry out the pipe fabrication, fitting and assembly activities with understanding of the types of equipment used, the manufacturing techniques, and the operating and safety procedures that are required. The candidate will use appropriate tools and equipment to mark out the material for the features to be produced, and then use hand tools, portable power tools, manually operated machine tools and shaping, fitting and assembly techniques appropriate to the operations being performed. These activities will include hand sawing, filing, drilling, tapping, reaming, surface grinding and assembly. The candidate will work largely independently with no or limited supervision, whilst taking responsibility for their own actions and for the quality and accuracy of the work that they carry out.
Scope	This unit/task covers the following: • Working safely • Preparing for pipe fabrication, fitting or assembling operations • Marking out the components • Performing general pipe fitting operations • Performing pipework systems assembling operations • Measuring and checking pipework

Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Working safely	The user/individual on the job should be able to: PC1. comply with health and safety, environmental and other relevant regulations and guidelines at work PC2. adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing fabrication and fitting operations PC3. ensure work area is clean and safe from hazards **Hazards**: use of power tools, trailing leads or hoses, damaged or badly maintained tools and equipment; using files with damaged or poor fitting handles; using machine tools; misuses of tools; not following laid-down maintenance procedures; hazardous working condition e.g. pressurized line, high temperature area, inflammable fluid or gas lines, working at confined space or at height etc. PC4. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition PC5. ensure that all machines and machine tools are secured at all times PC6. work safely in trenches, confined spaces and excavated areas PC7. observe safety measures while working on high pressure line/system (steam, compressed air, hydraulic etc. PC8. follow warning and safety signs (danger, out of service, etc.) while working with

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	energized system (electrical systems, Steam & Compressed Air system etc.) including road safety signs
Preparing for pipe fabrication, fitting or assembling operations	The user/individual on the job should be able to: PC9. determine job requirement from job specification documents obtained from valid sources **Job requirements**: raw materials or components required (type, quality, quantity); dimensions; limits and tolerances; operations required (list, sequence and procedures where applicable); shape or profiles to be fabricated; cutting, bending for fabricated forms; instruments and tools to be used; interdependencies; timelines **Job specification documents**: detailed component drawings; approved sketches/illustrations; national, international and organisational standards; reference tables and charts; fabrication/casting drawings **Valid source**: job instruction sheet/job card; work drawings and instructions; planning documentation; quality control documents; operation sheets; process specifications; instructions from supervisor PC10. establish the procedures to complete the pipe fitting or assembling operations PC11. obtain the appropriate equipment, parts and accessories for the pipe fitting or assembling operation PC12. check that all measuring equipment is within calibration date **Measuring equipment**: external/internal micrometers, vernier caliper, Tri-square, combination squares, rules, squares, protractors, depth micrometers, depth verniers, feeler gauges, bore/hole gauges, radius/profile gauges, thread gauges, hardness tester,
Marking out the components	The user/individual on the job should be able to: PC13. prepare/determine suitable datum from which to mark out PC14. apply a marking medium to enhance clarity of the marking out PC15. use an appropriate method of marking out **Marking out methods**: e.g. direct marking using tapes and markers, set-outs of pipework using templates, producing set wires, set-outs of pipework onto floor PC16. use a range of marking out equipment (e.g. rules, squares, scribers, vernier instruments) **Marking tools**: rules/tapes, dividers/trammels, scribers, punches, scribing blocks, squares, protractor, permanent markers PC17. mark out a range of features **Features**: datum lines; cutting guidelines; square and rectangular profiles; circular and radial profiles; angles; holes linearly positioned, boxed and on pitch circles
Performing pipe fitting operations	The user/individual on the job should be able to: PC18. plan the pipe fitting activities before starting PC19. cut the pipes to the appropriate lengths making allowances for bending using appropriate cutting operations and techniques **Pipe cutting operations:** cutting pipes to length with appropriate allowance for fittings, removing all external and internal burrs, cleaning pipe ends for soldering or cementing (where appropriate) or Prior to aligning pipe for welding, the ends of the pipe shall be bevelled, cutting threads on pipe ends to the appropriate length (where appropriate), checking that prepared pipes are the correct length

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	Pipe cutting techniques: cutting out the rough profile using saws (e.g. hacksaw, chop saw, power saw), or oxy-fuel gas cutting torch or using pipe/tube cutter cutting a pipe thread (e.g. tapping or dieing), de-burring reamers, rubbing with abrasive cloth, wire pipe cleaning, filing (flat, square, curved), drilling holes PC20. produce pipework bends using the appropriate tools and equipment for the types and sizes of pipe **Pipe bending tools and equipment:** hand operated pipe bender, bending springs, pipe expander, swaging kit, hydraulic pipe bending equipment, heating methods, fillers **Pipework bends and forms:** angular bends, offsets, bridge sets, radii, internal, swaged ends, expansion loops, external swaged ends
Performing assembling operations	The user/individual on the job should be able to: PC21. assemble and secure the pipework as per job specifications using appropriate pipe assembly methods and techniques **Pipe assembly methods:** securing pipework supports to structures, connecting pipe-to-equipment, fitting pipework supports, using gaskets, seals/sealing tapes or jointing compounds, connecting pipe-to-pipe, alignment/levelling equipment **Techniques**: compression fittings, soldered fittings, cemented fittings, snap-on/push fittings, brazed fittings, welded joints, screwed connections PC22. produce pipework assemblies which combine a range of different fittings **Pipe fittings:** straight couplings, elbows, tee pieces, flanges, reduction pieces, drain/bleeding devices, unions PC23. dismantle pipework assemblies without damage to components and/or subassemblies **Methods to dismantle**: procedure for isolation and locking off a device/system; sequence of operations used to dismantle a device/system; proof marking, correct storage procedures for removed parts; release of pressure/force; extraction PC24. deal promptly and effectively with problems within their control, and seek help and guidance from the relevant people if they have problems that they cannot resolve PC25. keep the work area in a safe and tidy condition during and on completion of the manufacturing activities PC26. return all tools and equipment to the correct location on completion of the fitting activities
Measuring and checking component	The user/individual on the job should be able to: PC27. perform the necessary checks for correct pipework assembly and dimensional accuracy **Checks:** hydraulic pressure testing, gas/air leakage test, water leakage testing **Dimensions**: linear dimensions (e.g. lengths, depths), diameters (e.g. external, internal), flatness, squareness, angles, profiles, hole size and position, thread size and fit PC28. use the appropriate measuring equipment for checking activities PC29. produce components within all of the applying standards **Components quality standards**: pipes are bent to the appropriate shape/form and position, all pipe bends are free from buckling or deformation, appropriate fittings are used, and are secure and leak free, soldered and cemented fittings are free from

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	excessive residues, the completed assembly meets the specific system requirements PC30. generate stage inspection reports
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 company relevant to own employment and performance conditions KA2. relevant health and safety requirements applicable in the work place KA3. importance of working in clean and safe environment KA4. own job role and responsibilities and sources for information pertaining to employment terms, entitlements, job role and responsibilities KA5. reporting structure, inter-dependent functions, lines and procedures in the work area KA6. relevant people and their responsibilities within the work area KA7. escalation matrix and procedures for reporting work and employment related issues KA8. documentation and related procedures applicable in the context of employment and work KA9. importance and purpose of documentation in context of employment and work
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. the hazards associated with the pipe fitting activities **Hazards**: e.g. handling long pipe lengths, using damaged or badly maintained tools and equipment, using pipe bending equipment, using heating and soldering equipment, using adhesives), and how they can be minimized, etc. KB2. how to extract and use information from engineering drawings and related specifications in relation to work undertaken with the help of supervisor/ engineer when needed KB3. how to interpret isometric drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing (Geometric Dimensioning and Tolerancing -- GD&T) KB4. preparation of materials in readiness for the marking out activities, in order to enhance clarity, accuracy and safety KB5. how to prepare the pipes in readiness for the marking out activities **Preparation of pipes**: e.g. visually checking for defects, cleaning the materials, removing burrs and sharp edges, etc. KB6. selection and establishment of a suitable datum KB7. importance of ensuring that marking out is undertaken from the selected datum KB8. possible effects of working from an incorrect datum KB9. mark-out conventions when marking out the workpiece KB10. how to determine the overall length of the pipework required, taking into account allowances for pipe fittings and (where appropriate) screwed connections KB11. tools and equipment used in the cutting and preparing the pipes KB12. the characteristics of the various materials that are to be used with regard to the bending operations KB13. need and use of heat/hot air to aid pipe bending process KB14. methods used to hand bend and form the pipe KB15. how to produce the various bends required KB16. the reasons for incorporating expansion loops in a system, and where they should be positioned

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	KB17. range of pipe fittings that can be used, and how to identify them KB18. how to produce pipe threads on the pipe ends, and the tools and KB19. equipment that can be used (such as stocks and dies, pipe threading machines) KB20. methods used to seal screwed joints (such as tapes and sealing compounds) KB21. use of flanges to connect pipes; use of gaskets; and torque loading of flange bolts KB22. methods used to prepare pipe ends and fittings for soldering or brazing, and why it is necessary to ensure that these preparations are carried out KB23. various types of soldered connectors available (such as solder ring types and capillary fittings) KB24. methods used to solder the joints, and how to recognise when the fitting is correctly soldered KB25. precautions to be taken when using gas torches to form the joint, and the effect of overheating the joint KB26. methods used to prepare pipe ends and fittings when using adhesives, and why it is necessary to ensure that these preparations are carried out KB27. methods used to cement the joints, and how to recognise when the fitting is correctly secured KB28. various adhesives and sealing compounds that are used on nonmetallic pipework KB29. precautions to be taken when using the adhesives, cements and sealing compounds (such as adequate ventilation, fume extraction, away from naked flames, avoiding skin contact) KB30. use of compression fittings; how the pipes are sealed; and the effects of over tightening the fittings KB31. use of push-fit connectors, and their advantages and disadvantages KB32. how to identify the correct orientation of fittings with regard to flow, and the consequences of incorrect orientation KB33. supporting methods that are used when assembling pipework, and the type of fittings that are used KB34. Mechanical fastenings and joining techniques: non-permanent - nuts, bolts, studs, permanent - welded, soldered, brazed, riveted KB35. how to mount and secure the cutting tools in the tool holding devices KB36. the methods of positioning, aligning and securing the workpiece KB37. assembly methods, techniques and procedures to be used KB38. methods of testing pipework systems for leaks (using air, water or hydraulic testing methods) KB39. application of cutting fluids and compounds with regard to a range of different materials, and why some materials do not require cutting fluids to be used **Range of Materials**: Ferrous metals: e.g. carbon steels, stainless steels, cast iron, tool steel, hard metals; Non-ferrous metals: e.g. bronze, aluminium, copper and copper alloys KB40. how to check the workpiece and the measuring equipment that is used **Measuring equipment**: external micrometers, Vernier caliper, rules, tri-squares, combination squares, protractors, feeler gauges, bore/hole gauges, radius/profile gauges, thread gauges, KB41. need to check that the measuring equipment is within current calibration dates, and that the instruments are correctly zeroed KB42. measuring internal and external dimensions KB43. measuring geometric features

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	KB44. the importance of leaving the work area and equipment in a safe and clean condition on completion of fitting activities KB45. basic rigging practice KB46. different types of pipe welding methods KB47. fuel brazing/soldering and cutting method
Skills (S) [Optional]	
A. Core Skills/ Generic Skills	**Communication**
	The user/ individual on the job needs to know and understand how to: SA1. read and interpret information correctly from various job specification documents, manuals, health and safety instructions, memos, etc. applicable to the job in English and/or local language SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. convey and share technical information clearly using appropriate language SA4. check and clarify task-related information SA5. liaise with appropriate authorities using correct protocol SA6. communicate with people in respectful form and manner in line with organizational protocol
	Numerical and computational skills
	The user/individual on the job needs to know and understand how to: SA7. undertake numerical operations, and calculations using calculators **Numerical computations**: addition(with decimal digits and with carrying), subtraction(with decimal digits and with borrowing), multiplication(with decimal digits), division(with decimal digit), fractions and decimals, percentages and proportions, simple ratios and averages SA8. identify and draw various basic, compound and solid shapes as per dimensions given **Basic shapes**: square, rectangle, triangle, circle **Compound shapes**: involving squares, rectangles, triangles, circles, semi-circles, quadrants of a circle **Solid shapes**: cube, rectangular prism, cylinder SA9. demonstrate measurement and calculation of Angle, Perimeter, Area of a common geometrical shape and can co-relate with job area requirements SA10. use appropriate measuring techniques and units of measurement SA11. use British and metric system of measurement and make conversions between them SA12. describe the difference between Celsius & Fahrenheit Scale and relationship between them SA13. use appropriate units and number systems to express degree of accuracy **Units and number systems representing degree of accuracy**: decimals places, significant figures, fractions as a decimal quantity SA14. interpret and express tolerance in terms of limits on dimensions
	Learning

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	The user/individual on the job needs to know and understand how to: SA15. participate in on-the-job and other learning, training and development interventions and assessments SA16. clarify task related information with appropriate personnel or technical adviser SA17. seek to improve and modify own work practices SA18. maintain current knowledge of application standards, legislation, codes of practice and product/process developments
B. Professional Skills	**Problem Solving**
	The user/individual on the job needs to know and understand how to: SB1. identify problems with work planning, procedures, output and behavior and their implications SB2. prioritize and plan for problem solving SB3. communicate problems appropriately to others SB4. identify sources of information and support for problem solving SB5. seek assistance and support from other sources to solve problems SB6. identify effective resolution techniques SB7. select and apply resolution techniques SB8. seek evidence for problem resolution
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB9. plan, prioritize and sequence work operations as per job requirements SB10. organize and analyze information relevant to work SB11. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	Initiative and Enterprise
	The user/individual on the job needs to know and understand how to: SB12. undertake and express new ideas and initiatives to others SB13. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB14. one's competencies in new and different situations and contexts to achieve more
	Self-Management
	The user/individual on the job needs to know and understand how to: SB15. exercise restraint while expressing dissent and during conflict situations SB16. avoid and manage distractions to be disciplined at work SB17. manage own time for achieving better results
	Teamwork
	The user/individual on the job needs to know and understand how to: SB18. work in a team in order to achieve better results SB19. identify and clarify work roles within a team SB20. communicate and cooperate with others in the team for better results SB21. seek assistance from fellow team members

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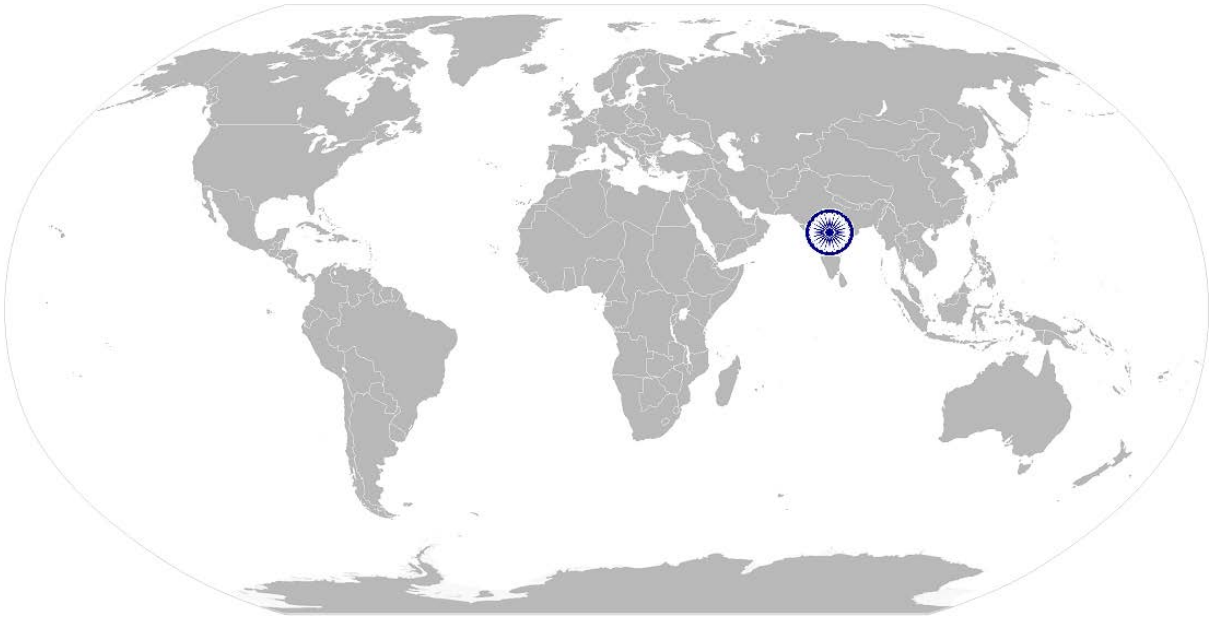
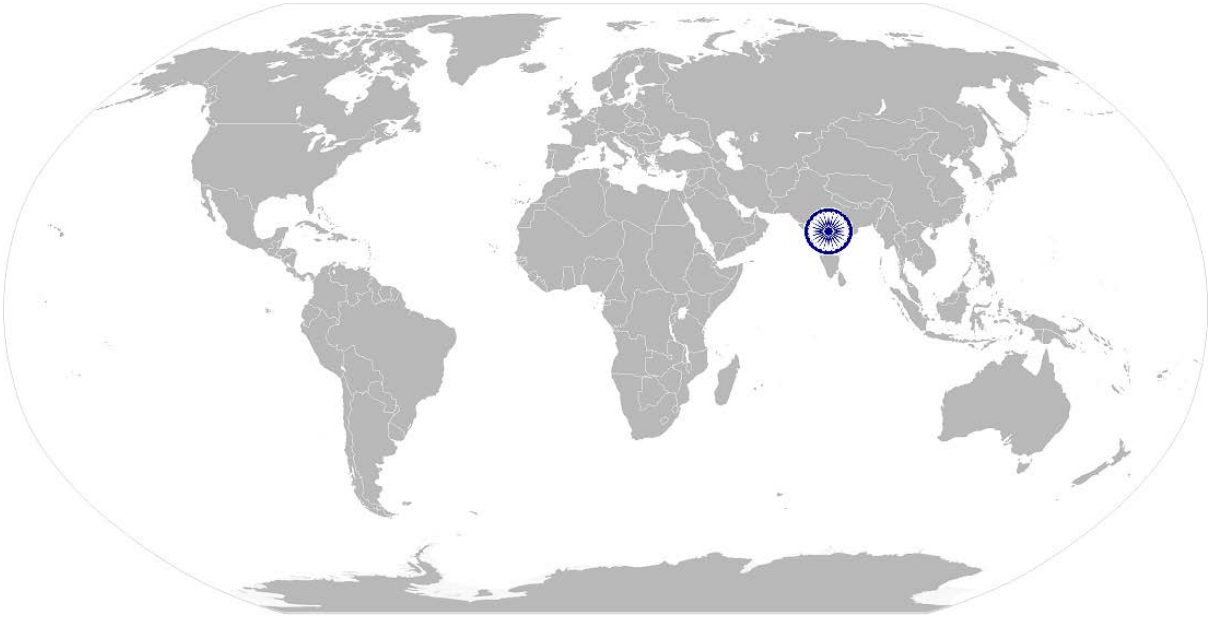
NOS Version Control

NOS Code	PSS/ N 0201		
Credits (NSQF)	TBD	Version number	1.0
Industry	Power Sector	Drafted on	26/03/15
Industry Sub-sector	Generation	Last reviewed on	26/03/15
		Next review date	26/03/17



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 in a power plant, power station/substation or on the field while working on power equipment.

PSS/ N 2001: Use basic health and safety practices for power related work

National Occupational Standard

Unit Code	**PSS / N 2001**
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 in a power plant, power station/substation or on the field while working on power equipment. It covers responsibilities towards self, others, assets and the environment. It includes understanding of risks and hazards in the workplace, along with common techniques to minimize risk, deal with accidents, emergencies, etc. It covers knowledge of fire safety, common first aid applications, safe practices and emergency procedures.
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 should be able to: PC1. use protective clothing/equipment for specific tasks and work conditions **Protective clothing**: leather or asbestos gloves, flame proof aprons, flame proof overalls buttoned to neck, cuffless (without folds), trousers, reinforced footwear, helmets/hard hats, cap and shoulder covers, ear defenders/plugs, safety boots, knee pads, particle masks, glasses/goggles/visors **Equipment**: hand and face shields, machine guards, residual current devices, shields, dust sheets, respirator 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 **Hazards**: electrical hazards (dealing with high voltage equipment, power supply and points, loose and naked cables and wires, electrical machines and appliances, etc.); sharp edged and heavy tools; heated metals; oxyfuel and gas cylinders; welding radiation; hazardous surfaces(sharp, slippery, uneven, chipped, broken, etc.); hazardous substances(chemicals, gas, oxy-fuel, fumes, dust, hazardous waste materials, etc.); physical hazards(working at heights, working in windy

PSS/ N 2001: Use basic health and safety practices for power related work

	or moist areas, large and heavy objects and machines, sharp and piercing objects, moving objects and part of machinery, tolls and machines, intense light, load noise, abnormal temperature; obstructions in corridors, by doors, blind turns, over stacked shelves and packages, etc.); working in high temperatures **Possible causes of risk and accident**: physical actions; not following instructions; inattention; sickness and incapacity (such as drunkenness); health hazards (such as untreated injuries and contagious illness); not taking safety precautions PC5. follow electrical safe working procedures such as Tag out/Lock out, 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 **Parameters**: temperature, pressure, flow& current PC11. carry out safe working practices while dealing with hazards to ensure the safety of self and others **Safe working practices**: using protective clothing and equipment; putting up and reading safety signs; handle tools in the correct manner and store and maintain them properly; keep work area clear of clutter, spillage and unsafe object lying casually; while working with electricity take all electrical precautions like insulated clothing, adequate equipment insulation, use of control equipment, dry work area, switch off the power supply when not required, etc.; safe lifting and carrying practices; use equipment that is working properly and is well maintained; take due measures for safety while working at heights, etc. including safety harness, fall arrestors, guardrails, proper work positioning, do not jump or overload, etc.; take due measures for safety while working in confined spaces or trenches, etc. PC12. state methods of accident prevention in the work environment of the job role **Methods of accident prevention**: training in health and safety procedures; using health and safety procedures; use of equipment and working practices (such as safe carrying procedures); safety notices, advice; instruction from colleagues and supervisors PC13. state location of general health and safety equipment in the workplace **General health and safety equipment**: fire extinguishers; first aid equipment; safety instruments and clothing; safety installations(e.g.

PSS/ N 2001: Use basic health and safety practices for power related work

	fire exits, exhaust fans) PC14. inspect for faults, set up and safely use of scaffolds and elevated platforms and ladders **Faults**: corrosion of metal components, deterioration, splits and cracks timber components, imbalance, loose rungs, missing/ unfixed nuts or bolts, etc. **Set up**: firm/level base, clip/lash down, leaning at the correct angle, appropriate load as per capacity, etc. PC15. lift, carry and transport heavy objects & tools safely using correct procedures from storage to workplace and vice versa PC16. inspect power plant and its equipment routinely for any signs of oil, water and/or steam 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 **Good housekeeping practices**: clean/tidy work areas, removal/disposal of waste products, protect surfaces PC20. identify common hazard signs displayed in various areas **Various areas**: on chemical containers; equipment; packages; inside buildings; in open areas and public spaces, etc. PC21. retrieve and/or point out documents that refer to health and safety in the workplace **Documents**: fire notices, accident reports, safety instructions for equipment and procedures, company notices and documents, legal documents (e.g. government notices) PC22. inform relevant authorities about any abnormal situation/behavior of any equipment/system promptly
Fire safety	The user/individual on the job should be able to: PC23. use the various appropriate fire extinguishers on different types of fires correctly **Types of fires**: Class A: e.g. ordinary solid combustibles, such as wood, paper, cloth, plastic, charcoal, etc.; Class B: flammable liquids; Class C: e.g. combustible gases, such as gasoline, propane, diesel fuel, tar, cooking oil, and similar substances; Class D: combustible chemicals and metals such as magnesium, titanium, and sodium (These fires burn at extremely high temperatures and require special suppression agents) Class E: e.g. electrical equipment such as appliances, wiring, breaker panels, etc. (These categories of fires become Class A, B, C and D fires when the electrical equipment that initiated the fire is no longer receiving electricity;) PC24. demonstrate rescue techniques applied during fire hazard PC25. demonstrate good housekeeping in order to prevent fire hazards PC26. demonstrate the correct use of a fire extinguisher

PSS/ N 2001: Use basic health and safety practices for power related work

Emergencies, rescue and first-aid procedures	The user/individual on the job should be able to: PC27. demonstrate how to free a person from electrocution PC28. administer appropriate first aid to victims where required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc. PC29. demonstrate basic techniques of bandaging PC30. respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments PC31. perform and organize loss minimization or rescue activity during an accident in real or simulated environments PC32. 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 PC33. demonstrate the artificial respiration and the CPR Process PC34. participate in emergency procedures **Emergency procedures**: raising alarm, safe/efficient, evacuation, correct means of escape, correct assembly point, roll call, correct return to work PC35. complete a written accident/incident report or dictate a report to another person, and send report to person responsible **Incident Report includes details of**: name, date/time of incident, date/time of report, location, environment conditions, persons involved, sequence of events, injuries sustained, damage sustained, actions taken, witnesses, supervisor/manager notified PC36. demonstrate correct method to move injured people and others during an emergency
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. 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.
B. Technical Knowledge	The user/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 **Possible causes of risk and accident**: physical actions; not following instructions; inattention; sickness and incapacity (such as drunkenness); health hazards (such as untreated injuries and contagious illness); not taking safety precautions KB5. methods of accident prevention **Methods of accident prevention**: training in health and safety

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	procedures; using health and safety procedures; use of equipment and working practices (such as safe carrying procedures); safety notices, advice; instruction from colleagues and supervisors 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 **Exposure:** ingested, contact with skin, inhaled **Preventative action**: ventilation, masks, protective clothing/ equipment); **Remedial action:** immediate first aid, report to supervisor **Toxic materials:** solvents, flux, lead 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 **Causes of fires**: heating of metal; spontaneous ignition; sparking; electrical heating; loose fires (smoking, welding, etc.); chemical fires; etc. KB19. techniques of using the different fire extinguishers KB20. different methods of extinguishing fire KB21. different materials used for extinguishing fire **Materials**: sand, water, foam, CO2, dry powder 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 KB25. content of written accident report KB26. potential injuries and ill health associated with incorrect manual handing KB27. safe lifting, carrying and transporting practices KB28. personal safety, health and dignity issues relating to the movement of a person by others KB29. potential impact to a person who is moved incorrectly
Skills (S) [Optional]	

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A. Core Skills/ Generic Skills	**Reading and Writing Skills**
	The user/individual on the job needs to know and understand how to: SA1. read and comprehend basic content to read labels, charts, signages SA2. read and comprehend basic English to read manuals of operations SA3. read and write an accident/incident report in local language or English
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA4. question coworkers appropriately in order to clarify instructions and other issues SA5. give clear instructions to coworkers, subordinates others
	Decision Making
	The user/individual on the job needs to know and understand how to: SA6. make appropriate decisions pertaining to the concerned area of work with respect to intended work objective, span of authority, responsibility, laid down procedure and guidelines
B. Professional Skills	**Plan and Organize**
	The user/individual on the job needs to know and understand how to: SB1. plan and organize their own work schedule, work area, tools, equipment and materials to maintain decorum and for improved productivity
	Working with others
	The user/individual on the job needs to know and understand how to: SB2. remain congenial while discussing and debating issues with co-workers SB3. follow appropriate protocols for communication based on situation, hierarchy, organizational culture and practice SB4. ask for, provide and receive required assistance where possible to ensure achievement of work related objectives SB5. thank coworkers for any assistance received SB6. offer appropriate respect based on mutuality and respect for fellow worksmanship and authority
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB7. think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s) SB8. identify immediate or temporary solutions to resolve delays SB9. identify sources of support that can be availed of for problem solving for various kind of problems SB10. seek appropriate assistance from other sources to resolve problems SB11. report problems that you cannot resolve to appropriate authority
	Analytical Thinking

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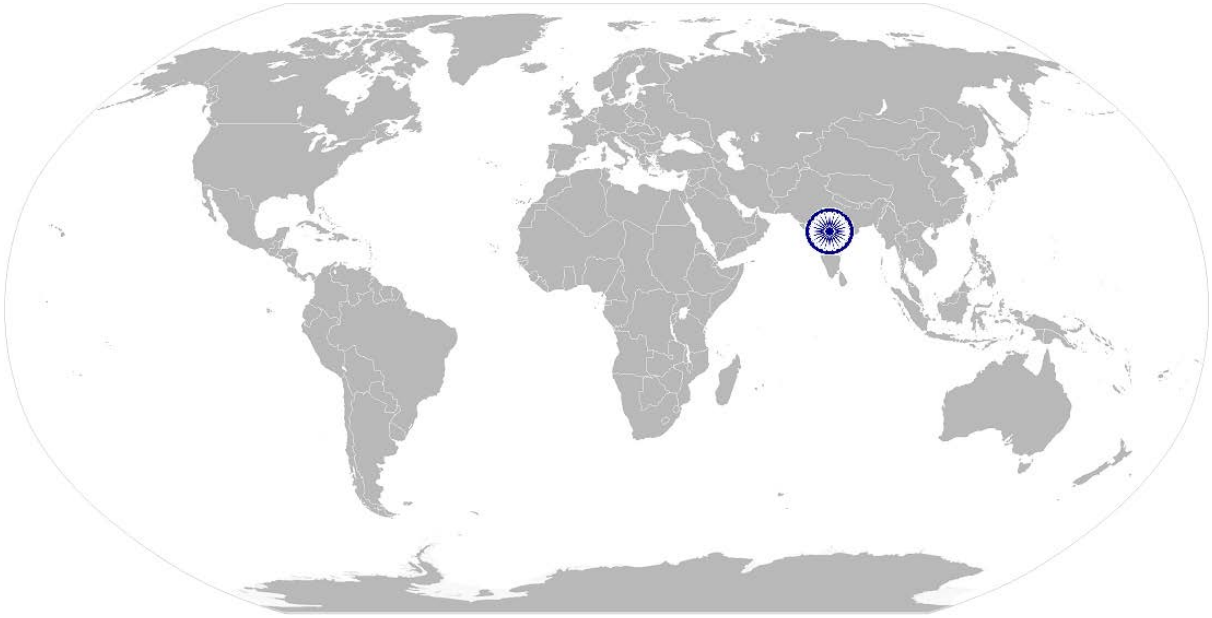
	The user/individual on the job needs to know and understand how to: SB12. identify cause and effect relations in their area of work SB13. use cause and effect relations to anticipate potential problems and their solution

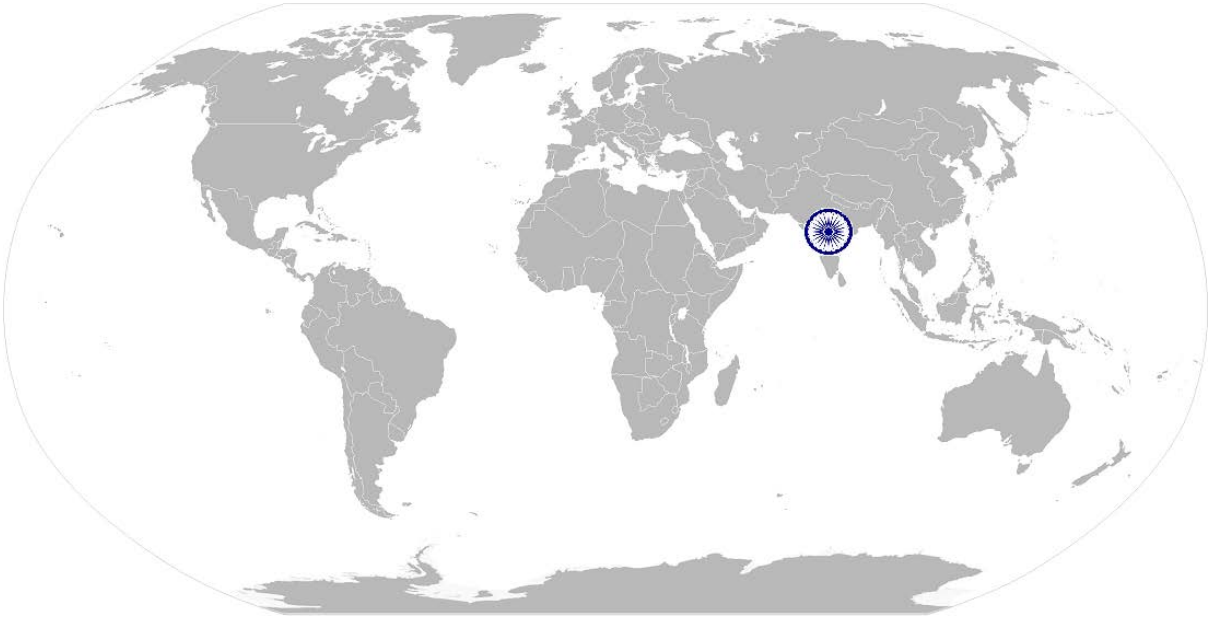


PSS/ N 2001: Use basic health and safety practices for power related work

NOS Version Control

NOS Code	PSS / N 2001		
Credits (NSQF)	TBD	Version number	1.0
Industry	Power	Drafted on	26/03/15
Industry Sub-sector	Generation, Transmission, Distribution, Renewable energy, Equipment manufacturing	Last reviewed on	26/03/15
		Next review date	26/03/17

National Occupational Standard



Overview

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

CSC/ N 1336: Work effectively with others

National Occupational Standard

Unit Code	CSC / N 1336
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 **Communication etiquette:** do not use abusive language; use appropriate titles and terms of respect; do not eat or chew while talking (vice versa)etc. 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 behaviors at the workplace **Disciplined behaviors:** e.g. punctuality; completing tasks as per given time and standards; not gossiping and idling time; eliminating waste, honesty, etc. 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 company 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

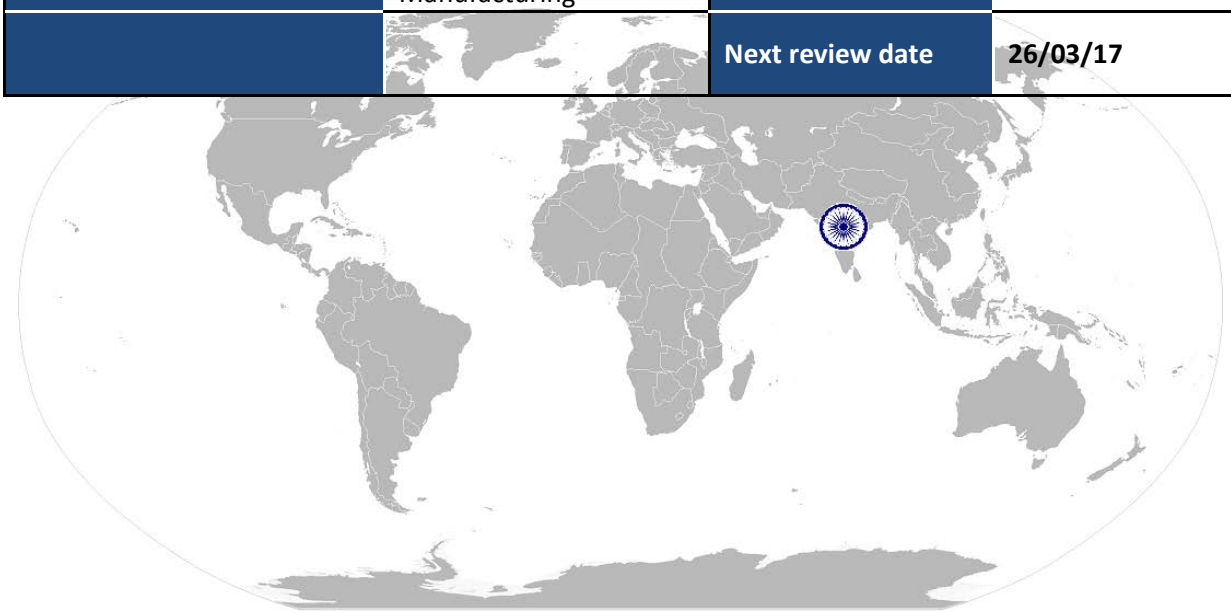
CSC/ N 1336: Work effectively with others

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. expressing and addressing grievances appropriately and effectively KB17. importance and ways of managing interpersonal conflict effectively
Skills (S) [Optional]	

CSC/ N 1336: Work effectively with others

NOS Version Control

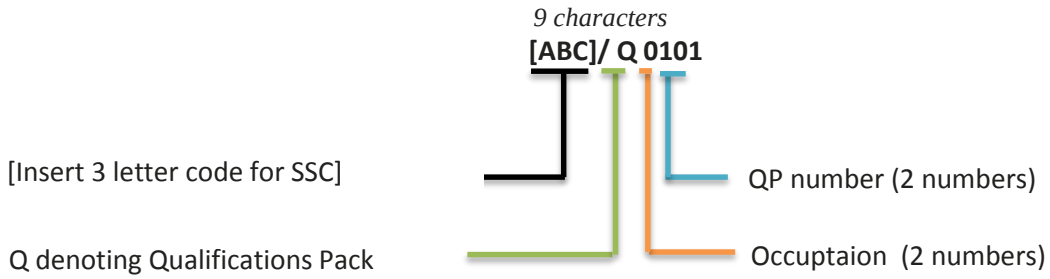
NOS Code	CSC / N 1336		
Credits(NSQF)	TBD	Version number	1.0
Industry	Power	Drafted on	26/03/15
Industry Sub-sector	Generation, Transmission, Distribution, Renewable Energy, Power Equipment Manufacturing	Last reviewed on	26/03/15
		Next review date	26/03/17



Annexure

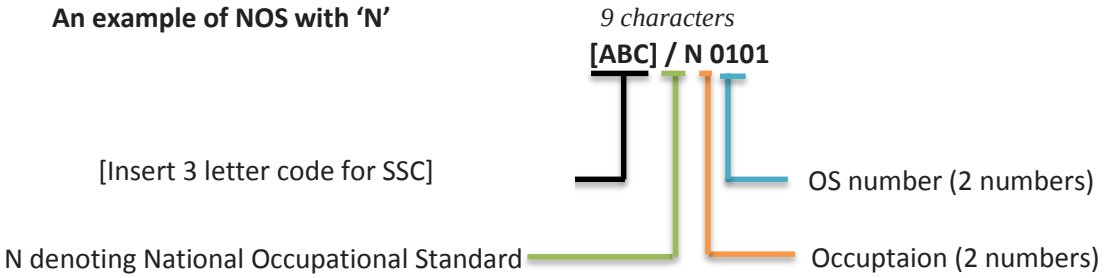
Nomenclature for QP and NOS

Qualifications Pack



Occupational Standard

An example of NOS with 'N'



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

Sub-sector	Range of Occupation numbers
Generation	01-10
Transmission	01-10
Distribution	01-10
Renewable Energy	01-10
Power Equipment Manufacturing	01-10

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

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Pipe Fitter

Qualification Pack PSS/ Q 0201

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 evaluations for skill practical for every student at each examination/training center based on this criteria
5. To pass the Qualification Pack, every trainee should score a minimum of 70% in every NOS
6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack

				Mark Allocation	
		Total Mark (300)	**Out of**	**Theory**	**Skills Practical**
PSS/ N 0201: Perform fitting and assembly operations on pipes to produce pipework systems	PC1. comply with health and safety, environmental and other relevant regulations and guidelines at work		4	1	3
	PC2. adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing pipe fitting and assembly operations		5	1	4
	PC3. ensure work area is clean and safe from hazards		4	1	3
	PC4. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		2	0	2
	PC5. ensure that all machines and machine tools are secured at all times		2	0	2
	PC6. work safely in trenches, confined spaces and excavated areas		3	0	3

	PC7. observe safety measures while working on high pressure line/system (steam, compressed air, hydraulic etc.		4	1	3
	PC8. follow warning and safety signs (danger, out of service, etc.) while working with energized system (electrical systems, Steam & Compressed Air system etc.) including road safety signs		3	1	2
	PC9. determine job requirement from job specification documents obtained from valid sources		5	2	3
	PC10. establish the procedures to complete the pipe fitting or assembling operations		3	1	2
	PC11. obtain the appropriate equipment, parts and accessories for the pipe fitting or assembling operation		3	1	2
	PC12. check that all measuring equipment is within calibration date		2	0	2
	PC13. prepare/determine suitable datum from which to mark out		3	1	2
	PC14. apply a marking medium to enhance clarity of the marking out		2	0	2
	PC15. use an appropriate method of marking out		3	1	2
	PC16. use a range of marking out equipment (eg. rules, squares, scribers, vernier instruments)		4	2	2
	PC17. mark out a range of features		5	2	3
	PC18. plan the pipe fitting activities before starting		3	1	2
	PC19. cut the pipes to the appropriate lengths making allowances for bending using appropriate cutting operations and techniques		5	1	4
	PC20. produce pipework bends using the appropriate tools and equipment for the types and sizes of pipe		5	1	4

	PC21. assemble and secure the pipework as per job specifications using appropriate pipe assembly methods and techniques		4	1	3
	PC22. produce pipework assemblies which combine a range of different fittings		5	1	4
	PC23. dismantle pipework assemblies without damage to components and/or subassemblies		3	0	3
	PC24. deal promptly and effectively with problems within their control, and seek help and guidance from the relevant people if they have problems that they cannot resolve		2	0	2
	PC25. keep the work area in a safe and tidy condition during and on completion of the manufacturing activities		2	0	2
	PC26. return all tools and equipment to the correct location on completion of the fitting activities		1	0	1
	PC27. perform the necessary checks for correct pipework assembly and dimensional accuracy		3	1	2
	PC28. use the appropriate measuring equipment for checking activities		3	1	2
	PC29. produce components within all of the applying standards		4	2	2
	PC30. generate stage inspection reports		3	1	2
		Total	**100**	**25**	**75**
PSS/ N 2001 (Use basic health and safety practices at the workplace)	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, 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 trenches		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 platforms and ladders		2	0	2
	PC15. lift, carry and transport heavy objects & tools safely using correct procedures from storage to workplace and vice versa		3	1	2
	PC16. inspect power plant and its equipment routinely for any signs of oil, water and/or steam leakage		3	0	3
	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		5	2	3
	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		4	1	3
	PC25. demonstrate good housekeeping in order to prevent fire hazards		3	1	2
	PC26. demonstrate the correct use of a fire extinguisher		3	1	2
	PC27. demonstrate how to free a person from electrocution		3	1	2
	PC28. administer appropriate first aid to victims where required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc.		3	0	3
	PC29. demonstrate basic techniques of bandaging		3	1	2
	PC30. respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		3	1	2
	PC31. perform and organize loss minimization or rescue activity during an accident in real or simulated environments		3	1	2
	PC32. 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
	PC33. demonstrate the artificial respiration and the CPR Process		3	1	2

	PC34. participate in emergency procedures		3	1	2
	PC35. complete a written accident/incident report or dictate a report to another person, and send report to person responsible		3	1	2
	PC36. demonstrate correct method to move injured people and others during an emergency		3	1	2
		Total	**100**	**24**	**76**
CSC/ N 1336 (Work effectively with others)	PC1. accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required		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	**100**	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
		Total	**100**	**30**	**70**