Indian Iron & Steel Sector Skill Council

QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR IRON & STEEL INDUSTRY

Contents

What are Occupational Standards (OS)?

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

Introduction

Qualifications Pack - Iron & Steel - Fitter Instrumentation

SECTOR: Iron & Steel

SUB-SECTOR: Electrical Maintenance

REFERENCE ID: ISC/Q0903

ALIGNED TO: NCO-2004 / NIL

Title of Job: This job is all about installing, dismantling, removing, replacing a range of components down to subassembly level right from pick-up unit / point of measurement and linking either directly to the instrument or to the instrument panel. This also involves making suitable slot on panel and fixing instrument and its associated parts under supervision of Technician Instrumentation.

Personal Attributes: The candidate should possess basic communication, numerical and measurement 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. He should be physically fit, not have colour blindness and willingness to work in a factory environment.

Job Details

Qualifications Pack Code	ISC/Q0903		
Job Role	Iron & Steel - Fitter Instrumentation		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron & Steel	Drafted on	23/07/2014
Sub-sector	Electrical Maintenance	Last reviewed on	30/12/2014
Occupation	Fitter	Next review date	30/12/2014

Job Role	Iron & Steel - Fitter Instrumentation
Role Description	This job is all about installing, dismantling, removing, replacing a range of components down to subassembly level right from pick-up unit / point of measurement and linking either directly to the instrument or to the instrument panel. This also involves making suitable slot on panel and fixing instrument and its associated parts under supervision of Technician Instrumentation.
NSQF level	3
Minimum Educational Qualifications	10th standard (Science) Pass
Maximum Educational Qualifications	ITI Pass
Training (Suggested but not mandatory)	• Hand/power Tools & metallurgy to understand strength of fixing and fixed devices • Component Drawings / Documents and Instrumentation • Mechanical detectors, Inductive detectors, Optical detectors, Transducers, Transmitters, Control Valves, Actuators, Thermocouples and similar measuring devices • Layout and Installation of Tubing and Piping Systems and joint boxes for troubleshooting • Latest techniques of punching holes in panels without causing denting and disturbing other adjacent instruments
Experience	In lieu of minimum qualification the incumbent should have minimum 24 months of relevant working experience in the similar field / function

Occupational Standards (OS)	Compulsory: ISC/N0937: Carry out maintenance activities under the guidance and supervision of Technician Instrumentation ISC/N0938: Periodically check measuring equipment for operation and ensure proper calibration ISC/N0008: Use basic health and safety practices at the workplace ISC/N0009: Work effectively with others Optional: 1. N/A
Performance Criteria	As described in the relevant NOS 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
NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
OEM	Original Equipment Manufacturer
OS	Occupational Standard(s)
QP	Qualifications Pack
5 S	Technique of maintaining orderliness –Japanese terminology
CP	Control Plan
WI	Work Instructions

National Occupational Standards

Overview

This unit covers assistance to "Technician Instrumentation" towards installation and maintenance of Measuring and Process control Equipment, in accordance with approved procedures.

National Occupational Standard

Unit Code	ISC/N0937
Unit Title (Task)	Carry out maintenance activities under the guidance and supervision of technician instrumentation
Description	This unit covers assistance to "Technician Instrumentation" towards installation and maintenance of measuring and process control equipment, in accordance with approved procedures. The candidate will be required to assist "Technician Instrumentation" towards installation and maintenance of a range of instrumentation and control equipment (eg. temperature pressure, flow, level / gap measuring instruments); fiscal monitoring equipment; smoke, heat, gas, water, chemical and metal detection and alarm systems; industrial weighing systems; linear and rotational speed measurement and control; vibration monitoring equipment; optical and photo-electric instruments; analyzers recorders and indicators; telemetry systems; emergency shutdown systems and other specific instrumentation. This will involve installing; dismantling, removing and replacing a range of transducers and peripheral components towards measuring down to unit and component level, as appropriate.
Scope	This unit/task covers the following: • Performing repeated adjustment activities till satisfactory results are achieved and continue to execute the same at the time of need during operation of equipment under guidance/ supervision of the "Technician Instrumentation" • Fixing transducers and pick-up devices properly so that the setting does not get disturbed during use • Interim feedback to superior in case of delay • Compliances to the satisfaction of "Technician Instrumentation"

Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Performing repeated adjustment activities till satisfactory results are achieved and continue to execute the same at the time of need during operation of equipment under guidance/ supervision of the "Technician Instrumentation"	To be competent, the user/individual on the job must be able to: PC1. Confirm from "Technician Instrumentation" that the measuring device is functioning within tolerance limits PC2. In case of errors in reading, re-fix / re-position the pick-up until reading comes to the satisfying range. PC3. Understand the characteristics of linking device so that no transmission errors take place due to intermediate losses / interference. PC4. Identify and execute suitable re-routing of transmission system in case of need to achieve satisfactory results. PC5. Activities for satisfactory performance: • Maintenance procedures/instructions/operator manuals/working instructions • Preventive maintenance (routine inspections, and adjustments) • Corrective maintenance (activities identified from preventative

	maintenance activities) • Predictive maintenance (analysis of the equipment's condition) • Reactive maintenance (unexpected equipment/component failure) • Maintenance prevention (equipment / component design and development) • Health and safety • Regulatory compliance PC6. Re-connect and return the system to service on completion of activities PC7. Conduct maintenance activities within the limits of their personal authority PC8. Carry out the maintenance activities in the specified sequence and in an agreed timescale. Instrumentation control equipment on which maintenance activities carried out are: • Pressure (e.g. absolute, gauge, vacuum) • Flow (e.g. orifice plate, venturi tube, electromagnetic, ultrasonic, differential pressure cell, positive displacement) • Level (e.g. Gauges, floats, displacer, differential pressure cells, load cells, ultrasonic, capacitive, conductivity) • Temperature (e.g. bi-metallic, thermocouples, resistance, infra-red, thermal imaging) • Weight (e.g. mechanical systems, load cells/strain gauges, transducers) • Fiscal metering (e.g. gas, electricity, water, fuel) • Detection and alarm (e.g. smoke, heat, gas, chemical, water, metal) • Speed measurement (e.g. mechanical, electrical, stroboscopic) • Speed control (e.g. mechanical governors, electrical governors, DC speed controller, AC motor control systems, stepper motors, invertors) • Vibration monitoring (e.g. vibration switches, proximity probes, seismic velocity transducer, linear variable differential transformers, portable data collectors) • Analyzers (e.g. gas detection, spectroscopy, oxygen analyzer, water analysis, moisture measurement, density) • Recorders and indicators • Telemetry systems (e.g. master station, outstation, standalone systems) • Valves and valve mechanisms (e.g. control valves, valve actuators and positioners) • Other specific instrumentation equipments PC9. Report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule PC10. Complete relevant maintenance documentation accurately. Complete the relevant maintenance documentation using: • Job cards • Permit to work/formal risk assessment and/or sign-on/off procedures • Maintenance log or report • Company-specific recording system PC11. Dispose of waste materials in accordance with safe working practices and approved procedures

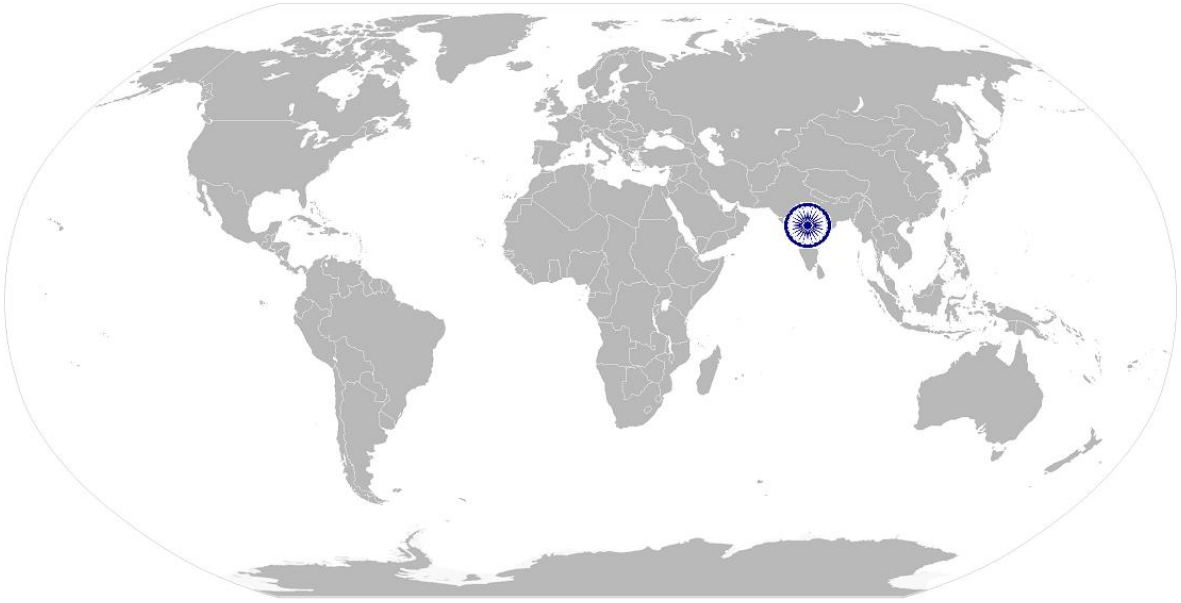
Fixing transducers and pick-up devices properly so that the setting does not get disturbed during use	To be competent, the user/individual on the job must be able to: PC12. Re-position the pick-up / sensor to better location as advised by "Technician Instrumentation" PC13. Re-fix the pick-up / sensor with better fixing device / fastener as advised by "Technician Instrumentation"
Interim feedback to superior in case of delay	To be competent, the user/individual on the job must be able to: PC14. Monitor the problem and keep the superior informed about progress or any delays in resolving the problem. Sources of evidence of fault diagnostic are from: • The person or operator who reported the fault • Equipment self-diagnosis • Recording devices • Plant/equipment records • Circuit outputs/computer display (e.g. pressure, flow, temperature) • Equipment outputs • Sensory input (sight, sound, smell, touch) PC15. Refer the problem to "Technician Instrumentation" or competent internal / external specialist if it cannot be resolved PC16. Obtain help or advice from specialist if the problem is outside candidate's area of competence or experience
Compliances to the satisfaction of "Technician Instrumentation"	To be competent, the user/individual on the job must be able to: PC17. All the above activities are to achieve proper output on display from measuring monitoring instrument PC18. Since "Technician Instrumentation" is responsible for ultimate performance of measuring monitoring instrument, the ultimate objective of instrumentation fitter is to obtain satisfaction of "Technician Instrumentation"
Process Compliances	To be competent, the user/individual on the job must be able to: PC19. Comply with relevant SOPs
Element	**Knowledge and Understanding (K)**
A. Organisational Context (Knowledge of the Company/ Organisation 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. Isolation and lock-off procedures or permit-to-work procedure that applies KB2. Health and safety precautions to be applied during the maintenance procedure, and their effects on others KB3. Hazards associated with carrying out mechanical maintenance activities (e.g. handling oils, greases, stored pressure/force, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down maintenance procedures), and how to minimise these and reduce any risks KB4. Importance of wearing protective clothing and other appropriate KB5. Safety equipment during maintenance process KB6. How to obtain and interpret drawings, specifications, manufacturers' manuals and other documents needed in the maintenance process KB7. Functioning of different process plant and its measuring and control equipment KB8. How to evaluate sensory conditions (by sight, sound, smell, touch) KB9. How to analyze evidence and evaluate possible characteristics and causes of specific faults/problems KB10. How to relate previous reports/records of similar fault conditions KB11. Care for handling specific sensitive devices / sensors. KB12. precautions to be taken to prevent electrostatic discharge (ESD) damage to electronic circuits and components KB13. Very basic principles of operation of the instrumentation and control equipment being maintained, how the system functions, its operating sequence, the working purpose of individual units/components and how they interact KB14. Reasons for making sure that control systems are isolated or put into manual control, and appropriate trip locks, keys or program overrides are inserted, before removing any sensors or instruments from the system KB15. Correct way of fitting sensors to avoid faulty readings (caused by head correction, poor flow past sensor, blockages, incorrect wiring, poor insulation or incorrect materials) KB16. Correct and tidy installation and connection of external wiring and components, to avoid electronic interference or mechanical damage KB17. How to carry out visual checks of the instruments (e.g. checking for leaks, security of joints and physical damage) KB18. Procedure for obtaining replacement parts, materials and other consumables necessary for the maintenance process KB19. Techniques of working on integrated equipment KB20. Methods of attaching identification marks/labels to removed components or cables, to assist with reassembly KB21. Equipment operating and control procedures to be applied during the maintenance activity KB22. The techniques required to communicate information using visual control systems (e.g. card systems, colour coding, floor footprints, graphs and charts, team boards, tool/equipment shadow boards)

Skills (S) w.r.t. the scope	
Element	Skills
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/ formulae SA8. Identify and draw various basic, compound and solid shapes as per dimensions given SA9. Use appropriate measuring techniques and units of measurement SA10. Use appropriate units and number systems to express degree of accuracy SA11. Interpret and express tolerance in terms of limits on dimensions SA12. Calculation of the value of angles in a triangle
	Learning
	The user/individual on the job needs to know and understand how to: SA13. Maintain current knowledge of applicable standards, legislation, codes of practice and product/process developments SA14. Participate in on-the-job and other learning, training and development interventions and assessment SA15. Clarify task related information with appropriate personnel or technical adviser SA16. Seek to improve and modify own work practices
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 behaviour and their implications

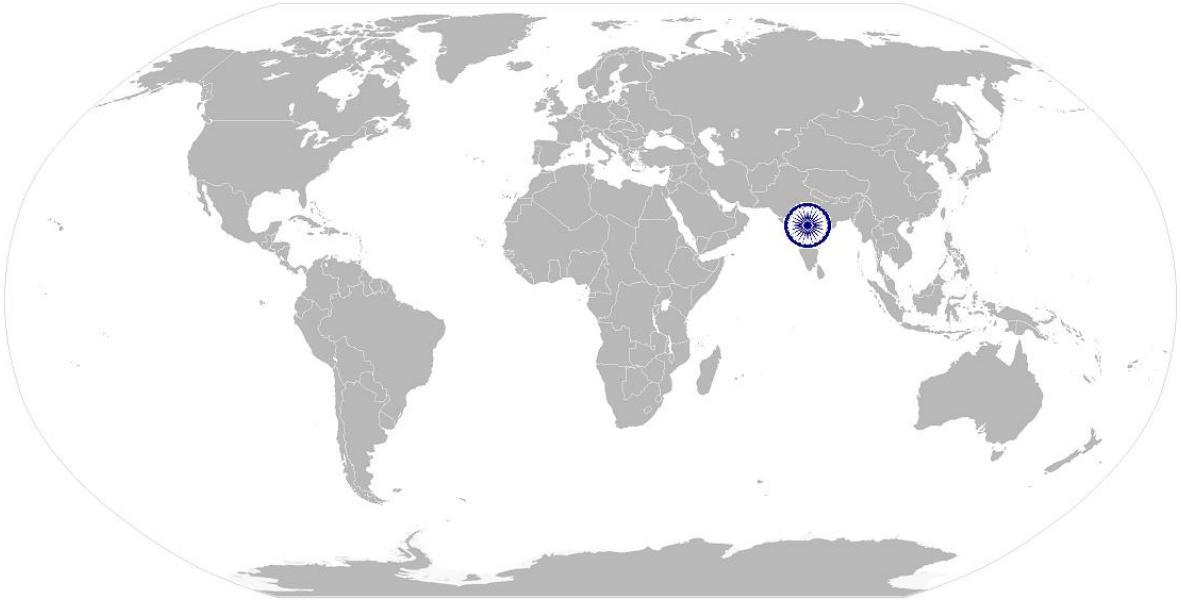
	SB2. Identify sources of information and support for problem solving SB3. seek assistance and support from Technician and other sources to solve problems SB4. Identify effective resolution techniques SB5. Select and apply resolution techniques SB6. Seek evidence for problem resolution
	Initiative
	The user/individual on the job needs to know and understand how to: SB7. Importance and impact of initiative and enterprise for achieving better results for self, others and organization SB8. How to undertake and express new ideas and initiatives to others SB9. Modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB10. Participate in improvement procedures including process, quality and internal customer relationships SB11. One's competencies can and should be applied 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: SB12. Importance of taking responsibility for own work outcomes SB13. Importance of adherence to work timings, dress code and other organizational policies SB14. Importance of following laid down rules, procedures, instructions and policies SB15. Importance of exercising restraint while expressing dissent and during conflict situations SB16. How to avoid and manage distractions to be disciplined at work SB17. Importance of time management 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 SB21. Seek assistance from fellow team members
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB22. Apply, analyze, and evaluate the information gathered from observation,

	experience, reasoning, or communication, as a guide to thought and action



NOS Version Control

NOS Code	ISC/N0937		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron and steel	Drafted on	23/07/2014
Industry Sub-sector	Electrical Maintenance	Last reviewed on	30/12/2014
Occupation	Fitter	Next review date	30/12/2015



National Occupational Standards

Overview

This unit covers testing and calibration of measuring and control equipment for correct operation in accordance with pre-determined procedures.

National Occupational Standard

Unit Code	ISC/N0938
Unit Title (Task)	Periodically check measuring equipment for operation and ensure proper calibration
Description	This unit covers setting, adjustment, validation or verification of precision mechanical, pneumatic, hydraulic, electrical, electronic measuring and control instruments using reference standards in accordance with predetermined standard procedures. This may involve the use of appropriate setting equipment and the selection or determination of an appropriate external standard in accordance with standard operating procedures. The candidate will be able to monitor, repair, and adjust mechanical, pneumatic, hydraulic, electrical or electronic systems within a specified value range. The candidate will be able to maintain, test and repair a variety of instrumentation and equipment and make sure that instruments, gauges and testing devices are calibrated correctly translated to national or international standards and give accurate readings using a variety of sophisticated machinery, including analytical and electronic measuring devices, recording and indicating instruments, and electrical, mechanical and electromechanical equipment. The candidate's responsibilities will require complying with organisational policy and procedures for carrying out the testing and calibration activities, and to report any problems with these activities that cannot be resolved, or that are outside permitted authority, to the relevant people. The candidate will be expected to work with minimal supervision, taking personal responsibility for own actions, and for the quality and accuracy of the work carried out.
Scope	This unit/task covers the following: • Checking equipment for correct operation • Testing measure and control equipment • Analysing and reporting test results • Calibrating measure and control equipment • Escalating unsolved problem as per protocol • Giving interim feedback to Technician Instrumentation, in case of delays • Process compliances

Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Checking equipment for correct operation	To be competent, the user/individual on the job must be able to: PC1. Appropriate checks are made of components, leads, fasteners, etc. for wear, loose connections or other faults.

Testing measure and control equipment	To be competent, the user/individual on the job must be able to: PC2. Produce and update relevant testing/calibration schedules and plans. Various tests and calibrations carried out are: • Visual inspection of the instrument for completeness and freedom from damage or foreign objects • Standard serviceability test/calibration • Equipment self-diagnostics • Leak/pressure test • Signal injection tests • Soak test • Special-to-type tests • Signal measurement and transmission • Operational/function checks • Five point calibration • Unit substitution PC3. Carry out the testing/calibration activities in the specified sequence and in an agreed timescale. Components tested are: • Sensors • Transmitters • Converters • Indicators • Analyzers • Controllers • Power supplies • Removable circuit boards • Sensor units associated with determining/controlling density, level, flow, temperature, composition etc. of a range of materials PC4. Work/test requirements are identified and defined to standard operating procedures PC5. Inspect and test the operation of instruments and systems to diagnose faults using testing devices PC6. Correct test application principles are selected after inspection of instrumentation systems, equipment/components PC7. Appropriate test equipment is selected in accordance with defined requirements PC8. Device isolation methods/requirements are observed and localised PC9. Appropriate test procedures and application principles are applied in assessing operation of instrumentation systems, equipment/components PC10. Report any instances where the testing/calibration activities cannot be fully met or where there are identified defects outside the planned schedule PC11. Complete relevant testing/calibration documentation accurately
Analyzing and reporting test results	To be competent, the user/individual on the job must be able to: PC12. Test results are analyzed/verified against operational specifications and localized faults are confirmed PC13. Potential and real faults are reported based on standard operating procedures

	PC14. Faulty conditions are evaluated and corrective action is planned PC15. Action plan is recorded and documented according to standard operating procedures
Calibrating measuring and control equipment	To be competent, the user/individual on the job must be able to: PC16. Calibration of measuring and control equipment is assessed to manufacturers' specifications and/or standard operating procedures. Instrumentation control equipment on which tests carried out are: • Pressure (e.g. absolute, gauge, vacuum) • Flow (e.g. orifice plate, venturi tube, electromagnetic, ultrasonic, differential pressure cell, positive displacement) • Level (e.g. floats, displacer, differential pressure cells, load cells, ultrasonic, conductivity) • Temperature (e.g. bi-metallic, thermocouples, resistance, infra-red, thermal imaging) • Weight (e.g. mechanical systems, load cells/strain gauges, transducers) • Fiscal metering (e.g. gas, electricity, water, fuel) • Detection and alarm (e.g. smoke, heat, gas, chemical, water, metal) • Speed measurement (e.g. mechanical, electrical, stroboscopic) • Emergency shutdown • Speed control (e.g. mechanical governors, electrical governors, DC speed controller, AC motor control systems, stepper motors, invertors) • Vibration monitoring (e.g. vibration switches, proximity probes, seismic velocity transducer, linear variable differential transformers, portable data collectors) • Analyzers (e.g. gas detection, spectroscopy, oxygen analyzer, water analysis, moisture measurement, density) • Recorders and indicators • Telemetry systems (e.g. master station, outstation, standalone systems) • Valves and valve mechanisms (e.g. control valves, valve actuators and positioners) • Other specific instrumentation equipments PC17. Equipment is calibrated against appropriate physical standards using correct calibration devices, equipment, techniques using predetermined procedures. Testing and calibrating tools used are: • Oscilloscopes • Pressure gauge • Standard test gauges • Temperature controllers • Temperature baths • Micrometer • Current injection devices • Voltmeter • All types of comparators • Jigs and fixtures

	• Templates and patterns • Insulation testers • Calibrated weights • Pressure sources • Vernier calliper • Analogue and digital meters • Digital pressure indicators • Dead weight tester • Logic probes • Calibrated flow meters • Special purpose test equipment • System calibrators • Manometers • pH simulator/buffers • Wheatstone bridge • Potentiometers • Frequency/signal generators • Logic probes • Multimeters, (analog/digital) • Test gauges • Cathode ray oscilloscopes and other associated equipment PC18. Zero, span and range checks are undertaken on indicators/controllers using correct and appropriate configuration PC19. Wherever applicable, methods of adjustment using calibration devices are performed and documented to prescribed procedures and operational specifications PC20. Equipment is recommissioned in accordance with standard operating procedures
Escalating unresolved problems as per protocol	To be competent, the user/individual on the job must be able to: PC21. Refer the problem to a "Technician Instrumentation" if it cannot be resolved
Giving interim feedback to Technician Instrumentation, in case of delays	To be competent, the user/individual on the job must be able to: PC22. Monitor the problem and keep the supervisor informed about progress or any delays in resolving the problem
Process Compliances	To be competent, the user/individual on the job must be able to: PC23. Comply with relevant SOPs
Element	**Knowledge and Understanding (K)**
A. Organisational Context	The user/individual on the job needs to know and understand: KA1. Legislation, standards, policies, and procedures followed in the company relevant

(Knowledge of the Company/ Organisation and its processes)	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 KA6. work area KA7. Relevant people and their responsibilities within the work area KA8. Escalation matrix and procedures for reporting work and employment related issues KA9. Documentation and related procedures applicable in the context of employment and work KA10. 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. General knowledge of SOPs for checking and calibration of measuring equipments KB2. Good understanding of electricity and electrical circuitry. KB3. Using appropriate tools and equipment to check measuring equipment for faults KB4. Using appropriate techniques to check the calibration of the measuring equipment for conformance to specifications KB5. Calibrating the measuring equipment against the appropriate physical standard KB6. Re-commissioning the measuring equipment KB7. Checks that are to be made of the measuring equipment and the tools and equipment to be used when checking the measuring equipment KB8. Common fault(s) that may be found in the measuring equipment KB9. Effects of faults on the performance/accuracy of the measuring equipment KB10. Hazards and controls associated with calibrating measuring equipment KB11. Functionality of the equipment and tolerance levels for calibration KB12. Instrumentation principles (e.g. controlling density, level, flow, temperature, composition of a range of materials) KB13. Effects of resistance, capacitance, inductance and impedance upon electrical circuit including RLC series circuit KB14. Interpretation requirements of schematic, wiring and block diagrams and circuits KB15. Principles of hydraulic, pneumatic and electrical flow KB16. Calibration procedures of instrumentation systems and equipment/ components KB17. Purpose/operational function of instrumentation system KB18. Procedures and equipment for inspecting and testing instrumentation system KB19. Specifications of each instrumentation system and acceptable deviations from specifications KB20. Procedures for repairing faulty instrumentation system KB21. Dismantling, reassembly and testing techniques KB22. Correct operation of the instrumentation system including the procedures for isolating instrumentation systems KB23. Range of faults in instrumentation system/equipment components

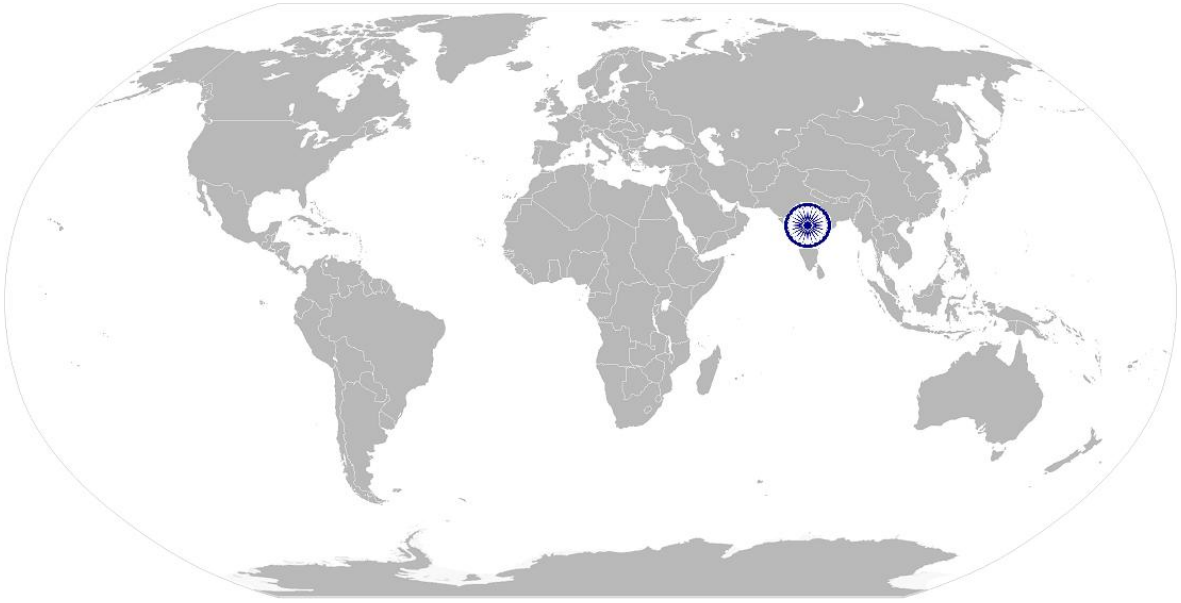
	KB24. Procedures for checking and verifying the operational function of the instrumentation system/equipment KB25. Operational specifications of the instrumentation system/equipment KB26. Variations between test results and operational specifications KB27. Probable causes of faults in instrumentation system/equipment components KB28. action to be taken to rectify the causes of faults in instrumentation systems/equipment KB29. Sequence of events to be undertaken to correct faults in the instrumentation system/equipment components KB30. Errors indicated by built-in devices KB31. Methods of determining procedures KB32. Procedures for reporting faults KB33. Difference between real and potential faults KB34. Procedures for recording/documenting test and calibration results KB35. Function and procedures for zero, span and range checks on instrumentation systems/equipment KB36. Equipment required to carry out the calibration of instrumentation systems/equipment
Skills (S) w.r.t. the scope	
Element	Skills
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/ formulae SA8. Identify and draw various basic, compound and solid shapes as per dimensions given SA9. Use appropriate measuring techniques and units of measurement SA10. Use appropriate units and number systems to express degree of accuracy SA11. Interpret and express tolerance in terms of limits on dimensions SA12. Calculation of the value of angles in a triangle

	Learning
	The user/individual on the job needs to know and understand how to: SA13. Maintain current knowledge of applicable standards, legislation, codes of practice and product/process developments SA14. Participate in on-the-job and other learning, training and development interventions and assessment SA15. Clarify task related information with appropriate personnel or technical adviser SA16. Seek to improve and modify own work practices
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 behaviour and their implications SB2. Identify sources of information and support for problem solving SB3. seek assistance and support from Technician and other sources to solve problems SB4. Identify effective resolution techniques SB5. Select and apply resolution techniques SB6. Seek evidence for problem resolution
	Initiative
	The user/individual on the job needs to know and understand how to: SB7. Importance and impact of initiative and enterprise for achieving better results for self, others and organization SB8. How to undertake and express new ideas and initiatives to others SB9. Modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB10. Participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB11. One's competencies can and should be applied in new and different situations and contexts to achieve more
	Self-Management

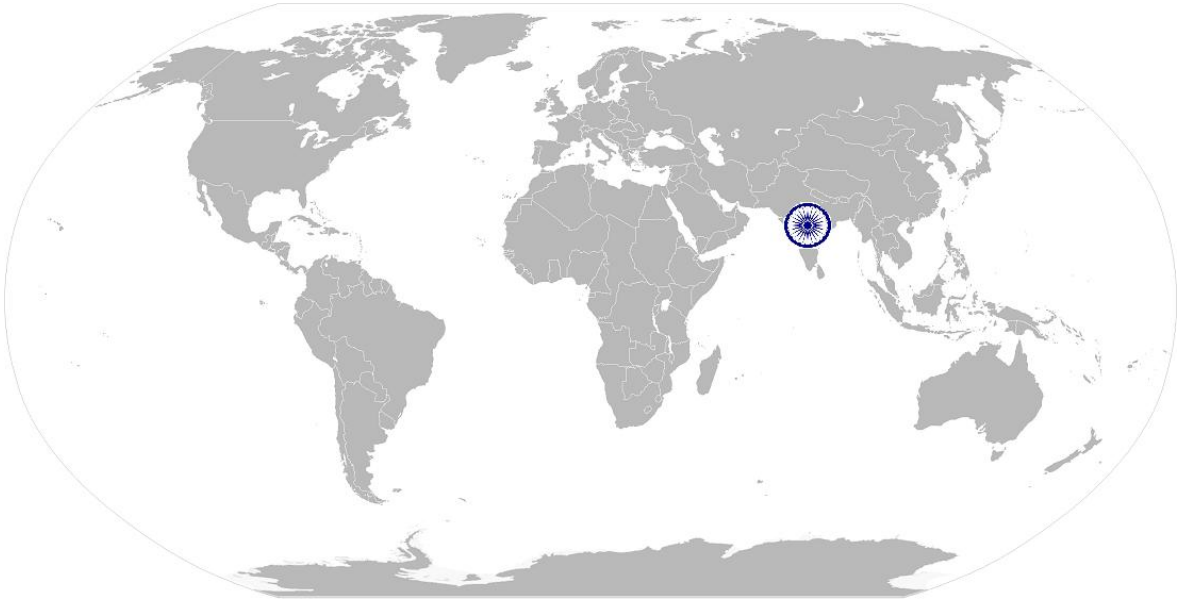
	The user/individual on the job needs to know and understand how to: SB12. Importance of taking responsibility for own work outcomes SB13. Importance of adherence to work timings, dress code and other organizational policies SB14. Importance of following laid down rules, procedures, instructions and policies SB15. Importance of exercising restraint while expressing dissent and during conflict situations SB16. How to avoid and manage distractions to be disciplined at work SB17. Importance of time management 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 SB21. Seek assistance from fellow team members
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB22. Apply, analyze, and evaluate the information gathered from observation, experience, reasoning, or communication, as a guide to thought and action

NOS Version Control

NOS Code	ISC/0938		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron and steel	Drafted on	23/07/2014
Industry Sub-sector	Electrical Maintenance	Last reviewed on	30/12/2014
Occupation	Fitter	Next review date	30/12/2015



National Occupational Standards



Overview

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

National Occupational Standard

Unit Code	ISC/N0008
Unit Title (Task)	Use basic health and safety practices at the work place
Description	This OS unit is about knowledge and practices relating to health, safety and security that candidates need to use in the workplace. 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.
Scope	This unit/task covers the following: • Health and safety procedures • Fire safety procedures • Emergencies, rescue and first aid procedures

Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Health and safety procedures	The user/individual on the job should be able to: PC1. Use protective clothing/equipment for specific tasks and work conditions Protective clothing includes: • Leather or asbestos gloves • Flame proof aprons • Flame proof overalls buttoned to neck • Cuff less (without folds) trousers • Reinforced footwear • Helmets/hard hats • Cap and shoulder covers • Ear defenders/plugs • Safety boots • Knee pads • Particle masks • Glasses/gloves/visors Equipment includes: • Hand 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

Various areas are listed below:

- On chemical containers
- Equipment
- Packages
- Inside buildings
- Open areas and public spaces, etc.

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 include:

- Working with electrical and thermal tools and equipment
- Sharp edged and heavy tools
- Heated metals
- Oxyfuel and gas cylinders
- Welding radiation
- Surfaces: sharp, slippery, uneven, chipped, broken, etc.
- Substances: chemicals, gas, oxy-fuel, fumes, dust, etc.
- Physical: working at heights, large and heavy objects and machines, sharp and piercing objects, tolls and machines, intense light, load noise, obstructions in corridors, by doors, blind turns, noise, over stacked shelves and packages, etc.
- Electrical: power supply and points, loose and naked cables and wires, electrical machines and appliances, etc.

PC5. Carry out safe working practices while dealing with hazards to ensure the safety of self and others state methods of accident prevention in the work environment of the job role

Safe working practices include:

- 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 in confined places, trenches or at heights, etc. Including safety harness, fall arrestors, etc.

Methods are:

- 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

	PC6. State location of general health and safety equipment in the workplace PC7. Inspect for faults, set up and safely use steps and ladders in general use Faults : • Corrosion of metal components • Deterioration • Splits and cracks timber components • Imbalance • Loose rungs • Nuts or bolts, etc. Set up: • Firm/level base • Clip/lash down • Leaning at the correct angle, etc. PC8. Work safely in and around trenches, elevated places and confined areas PC9. Lift heavy objects safely using correct procedures PC10. Apply good housekeeping practices at all times. Good housekeeping practices: • Clean/tidy work areas • Removal/disposal of waste products • Protect surfaces PC11. Identify common hazard signs displayed in various areas PC12. Retrieve and/or point out documents that refer to health and safety in the workplace
Fire safety procedures	The user/individual on the job should be able to: PC13. Use the various appropriate fire extinguishers on different types of fires correctly. Fire extinguishers: • Sand • Water • Foam • Co2 • Dry powder Fires: • Class A: Ordinary solid combustibles, e.g. wood, paper, cloth, plastic, charcoal etc. • Class B: Flammable liquids and gases, e.g. gasoline, propane, diesel fuel, tar, cooking oil and similar substances • Class C: Electrical equipment e.g. appliances, wiring, breaker panels etc. (these categories of fires become Class A, B, and D fires when the electrical equipment that initiated the fire is no longer receiving electricity) • Class D: Combustible metals such as magnesium, titanium, and sodium (these fires burn at extremely high temperatures and require special suppression agents) Causes of fires: • Heating of metal

	• Spontaneous ignition • Sparking, • Electrical heating • Loose fires (e.g. Smoking, welding, etc.) • Chemical fires, etc. PC14. Demonstrate rescue techniques applied during fire hazard PC15. Demonstrate good housekeeping in order to prevent fire hazards PC16. Demonstrate the correct use of a fire extinguisher
Emergencies, rescue and first-aid procedures	The user/individual on the job should be able to: PC17. Demonstrate how to free a person from electrocution PC18. Administer appropriate first aid to victims as required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc. PC19. Demonstrate basic techniques of bandaging PC20. Respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments. few General health and safety equipment are mentioned below : • Fire extinguishers • First aid equipment • Safety instruments and clothing • Safety installations, e.g. Fire exits, exhaust fans etc. PC21. Perform and organize loss minimization or rescue activity during an accident in real or simulated environments PC22. 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 PC23. Demonstrate the artificial respiration and the CPR Process PC24. Participate in emergency procedures. Emergency procedures are: • Raising alarm • Safe/efficient evacuation • Correct means of escape • Correct assembly point • Roll call • Correct return to work PC25. Complete a written accident/incident report or dictate a report to another person, and send report to person responsible Incident Report should capture: • Name • Date/time of incident • Date/time of report, • Location • Environment conditions • Persons involved • Sequence of events • Injuries sustained • Damage sustained • Actions taken • Witnesses

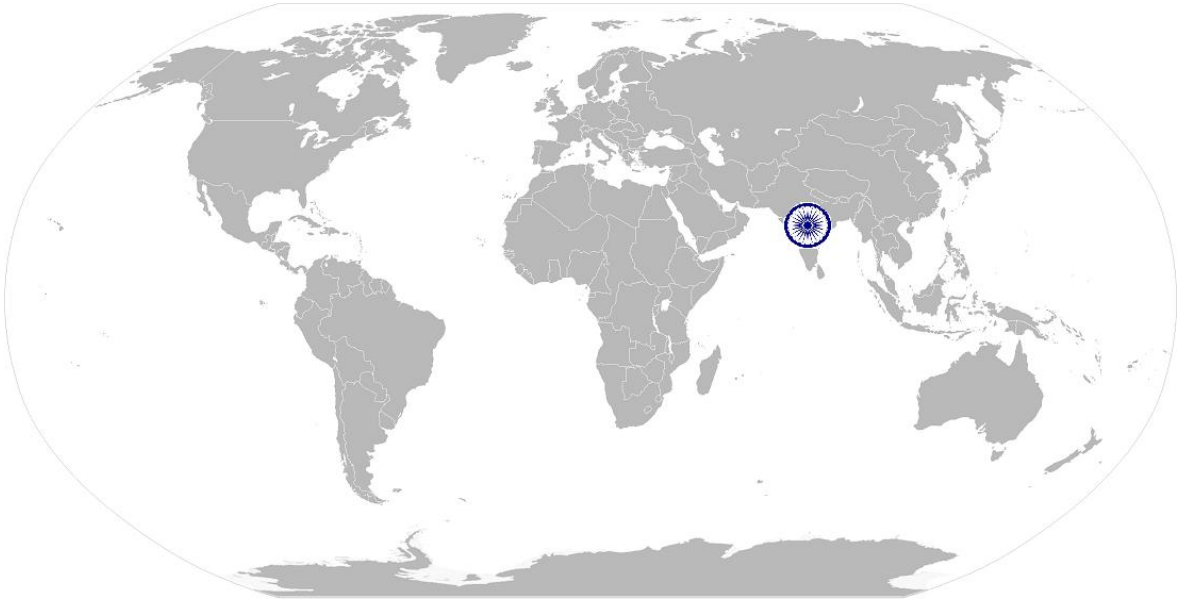
	• Supervisor/manager notified Documents: • Fire notices • Accident reports • Safety instructions for equipment and procedures • Company notices and documents • Legal documents (e.g. Government notices) Job titles: • Health and safety officer • First aid officer • Fire officer PC26. Demonstrate correct method to move injured people and others during an emergency
Element	Knowledge and Understanding
A. Organisational Context (Knowledge of the Company/ Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. State the names (and job titles if applicable), and describe where to find, all the people responsible for health and safety in a workplace KA2. State the 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: KB3. Meaning of "hazards" and "risks" KB4. Health and safety hazards commonly present in the work environment and related precautions KB5. Possible causes of risk, hazard or accident in the workplace and why risk and/or accidents are possible KB6. Activities and causes of risk and accident KB7. Methods of accident prevention KB8. Safe working practices when working with tools and machines KB9. Safe working practices while working at various hazardous sites KB10. Where to find all the general health and safety equipment in the workplace KB11. Various dangers associated with the use of electrical equipment KB12. 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 • Materials: solvents, flux, lead KB13. Importance of using protective clothing/equipment while working KB14. Precautionary activities to prevent the fire accident Activities and causes: • Physical actions • Reading • Listening to and giving instructions

	• Inattention • Sickness and incapacity (e.g. Drunkenness) • Health hazards (e.g. Untreated injuries and contagious illness) KB15. Various causes of fire KB16. Techniques of using the different fire extinguishers KB17. Different methods of extinguishing fire KB18. Rescue techniques applied during a fire hazard KB19. Various types of safety signs and what they mean KB20. Appropriate basic first aid treatment relevant to the condition e.g. Shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries KB21. Content of written accident report KB22. Potential injuries and ill health associated with incorrect manual handing KB23. Safe lifting and carrying practices KB24. Personal safety, health and dignity issues relating to the movement of a person by others KB25. Potential impact to a person who is moved incorrectly
Skills (S) w.r.t. the scope	
Element	Skills
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, signage's 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 co-workers appropriately in order to clarify instructions and other issues SA5. Give clear instructions to co-workers, 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: 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 co-workers for any assistance received SB6. Offer appropriate respect based on mutuality and respect for fellow workmanship 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
	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

NOS Version Control

NOS Code	ISC/N0008		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron and steel	Drafted on	23/07/2014
Industry Sub-sector	All Departments	Last reviewed on	30/12/2014
Occupation	Fitter	Next review date	30/12/2015



ISC/N0009: Work effectively with others

National Occupational Standards

Overview

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

National Occupational Standard

Unit Code	ISC/N0009
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 behaviour and interactions with others at the workplace.
Scope	This unit/task covers the following: • Ensure appropriate communication with superiors, peers and others as applicable at work place • Demonstrate appropriate behaviour and etiquette at work place
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Ensure appropriate communication with superiors, peers and others as applicable at work place	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. Provide information to others clearly, at a pace and in a manner that helps them to understand
Demonstrate appropriate behaviour and etiquette at work place	The user/individual on the job should be able to: PC4. Display helpful behaviour 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 behaviours at the workplace PC10. Escalate grievances and problems to
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/ Organisation 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

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 behaviour 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) w.r.t. the scope	
Element	Skills
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, signage's 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 co-workers appropriately in order to clarify instructions and other issues SA5. Provide clear instructions to co-workers, 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: 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 co-workers for any assistance received SB6. Offer appropriate respect based on mutuality and respect for fellow workmanship 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
	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

NOS Version Control

NOS Code	ISC/N0009		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron and steel	Drafted on	23/07/2014
Industry Sub-sector	All Departments	Last reviewed on	30/12/2014
Occupation	Fitter	Next review date	30/12/2015