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 - Fitter: Levelling, Alignment & Balancing

SECTOR: Iron & Steel

SUB-SECTOR: Steel, Sponge iron, Ferro Alloys, Re-Rollers, Refractory

REFERENCE ID: ISC/Q0905

ALIGNED TO: NCO -2004/NIL

Title of Job: The job is all about ensuring alignment of moving parts (e.g. pumps, blower fans, etc.) , checking the vibration of moving parts (blower fan, pumps, motor gear box etc.) & balancing of equipment shafts (input and output).

Personal Attributes: This job requires the individual to work independently as well as in teams. He should be physically fit, not having colour blindness , having analytical skills, problem solving attitude, high concentration levels and willingness to work in a factory environment.

Job Details

Qualifications Pack Code	ISC/Q0905		
Job Role	Fitter: Levelling, Alignment & Balancing		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron & Steel	Drafted on	08/09/2014
Sub-sector	Steel, Sponge iron, Ferro Alloys, Re-Rollers, Refractory	Last reviewed on	30/12/2014
Occupation	Mechanical Maintenance	Next review date	30/12/2015
NSQC Clearance on	18/06/2015		

Job Role	Fitter: Levelling, Alignment & Balancing
Role Description	The job holder is responsible for alignment of moving parts (e.g. pumps, blowing fans, etc.), checking the vibration of moving parts (blower fan, pumps, motor gearbox etc.) & balancing of equipment shafts (input and output).
NSQF level	3
Minimum Educational Qualifications	10th Pass
Maximum Educational Qualifications	ITI Pass
Training (Suggested but not mandatory)	• 2 weeks hands on training (mandatory) • Machining, welding, gas cutting, assembling • Working knowledge of tools & fixtures • 5S and safety practices • Working at heights, confined spaces & high temperatures
Minimum Job Entry Age	18 years
Experience	• 2-3 years' experience in similar function • In lieu of minimum qualification the incumbent should have minimum 5 to 7 years relevant experience in the similar field/function as utility hand/helper

Occupational Standards (OS)	Compulsory: ISC/N0926: Understand the assigned job of levelling, balancing & alignment ISC/N0927: Prepare for operation of levelling, balancing & alignment ISC/N0928: Carry out the assigned operation of levelling, balancing & alignment ISC/N0008: Use basic health and safety practices at the workplace ISC/N0009: Works effectively with others Optional: 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 NOS is about understanding the job requirements of fitter – levelling, balancing & alignment in accordance with the checklist and seek any clarifications on the same

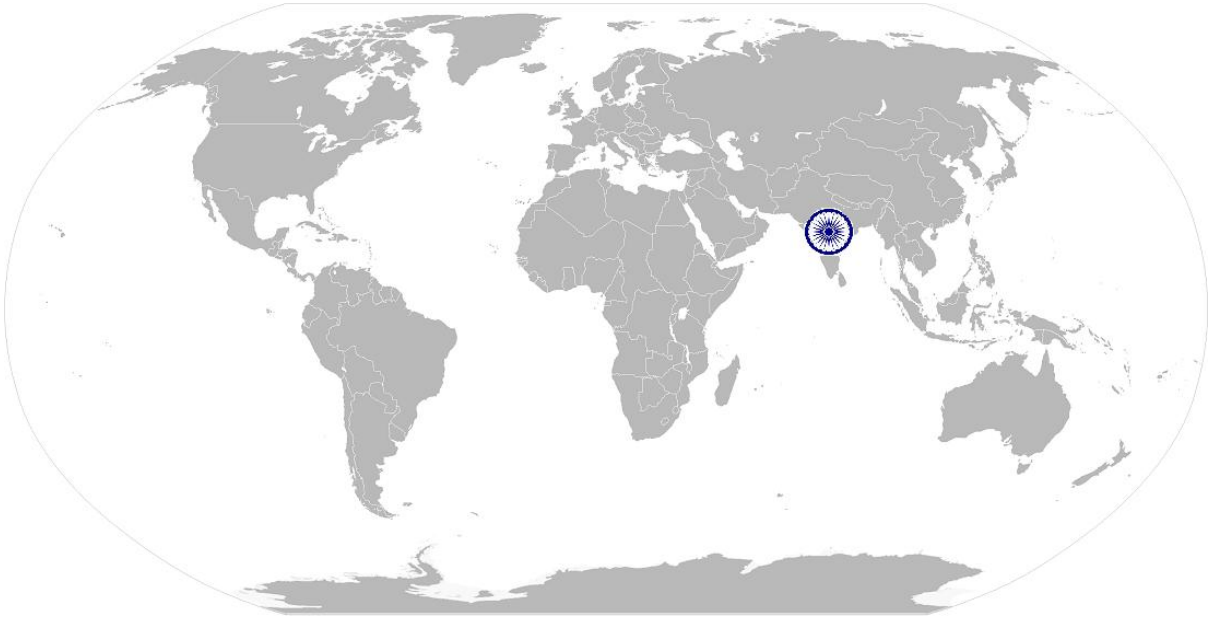
National Occupational Standard

Unit Code	ISC/N0926
Unit Title (Task)	Understand the assigned job of levelling, balancing & alignment
Description	This unit is about understanding the requirements of the job of fitter – levelling, balancing & alignment in accordance with the checklist, seek any clarifications from the supervisor, identify the tools and tackles that would be needed to carry out the job.
Scope	This unit/task covers the following: • Understand the assigned job of levelling, balancing and alignment in accordance with the instructions / checklist • Understand the engineering drawings • Seek clarifications with respect to the equipment, drawings, if any • Identify the tools and tackles that are required to carry out the assigned job of levelling, balancing and alignment

Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Understand the assigned job of fitter – levelling, balancing and alignment in accordance with the instructions / checklist	To be competent, the user/individual on the job must be able to: PC1. Interpret the checklist and understand the job requirements PC2. Understand the levelling / alignment / balancing of rotating equipment e.g. blower fan, motor, pump and gear box etc. PC3. Understand the use of levelling instruments (spirit level, water level, magnetic marking block, dial indicator, laser alignment equipment, strobe light etc.) PC4. Understand the standard code of practice for static and dynamic balancing PC5. Plan, as appropriate to carry out the job
Understand the engineering drawings	To be competent, the user/individual on the job must be able to: PC6. Understand sections, views, scale of measurement used in the drawing PC7. Understand the symbols used in the drawings PC8. Understand other specifications and identify the sequence of activities required to assemble the machine
Seek clarifications with respect to the equipment, drawings, if any	To be competent, the user/individual on the job must be able to: PC9. Identify any clarifications that he/she wants to seek with respect to the given drawing PC10. Identify and seek clarifications with respect to levelling, balancing and alignment of rotating equipment PC11. Recognize whom to contact for clarifications on the engineering drawing PC12. Escalate the concern to the supervisor or shift-in-charge, if needed

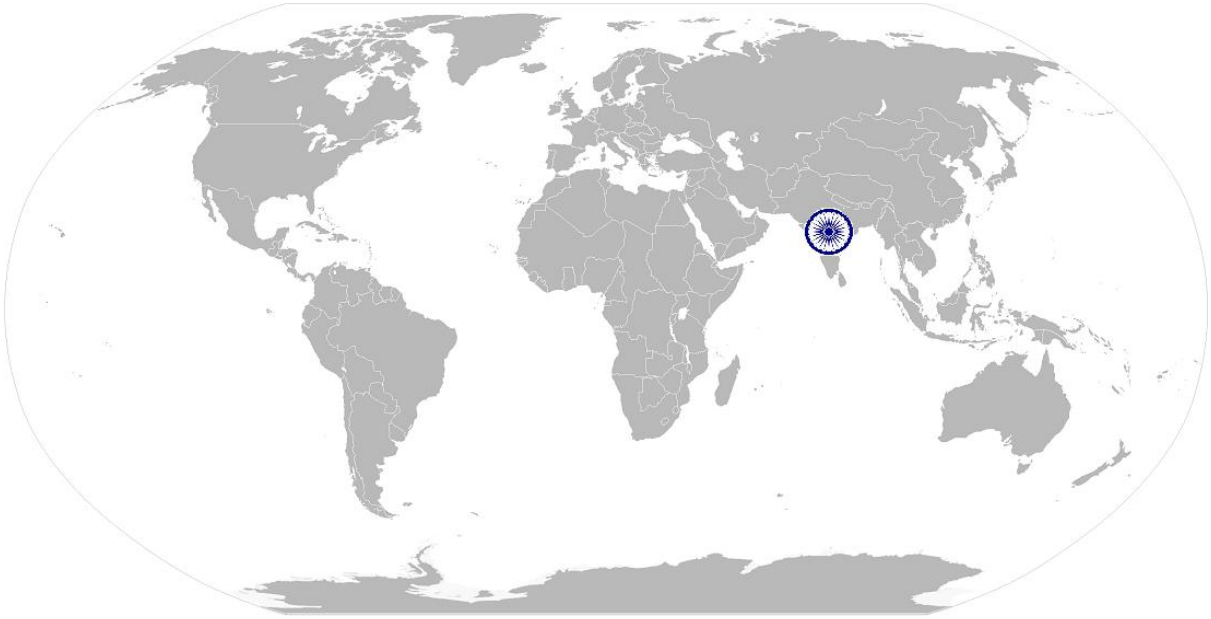
Identify the tools and tackles that are required to carry out the assigned job of levelling, balancing and alignment	To be competent, the user/individual on the job must be able to: PC13. Identify tools, tackles & equipment (spanners, steel scale, torque wrench etc.) required to perform the operation PC14. Identify measuring instruments e.g. Vernier, Micro meter, dial gauge, filler gauge, water level, spirit level, laser alignment equipment etc. PC15. Ask helper to carry tools required to the desired work site PC16. Report to stores / supervisor in case of non-availability of tools & tackles or stock-out
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. Quality and damage checks to be done and importance of the same KA2. Risk and impact of not following defined procedures/work instructions KA3. Escalation matrix for reporting identified issues
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Engineering drawing of the equipment KB2. Knowledge of tools, tackles & equipment (spanners, steel scale, torque wrench etc.) required to perform the operation KB3. Knowledge of measuring instruments e.g. Vernier, Micro meter, dial gauge, filler gauge, water level, spirit level, laser alignment equipment etc. KB4. Checks that need to be made to ensure that equipment is safe and ready to use KB5. Limits, fits and tolerances of the rotating equipment KB6. Normal running characteristics of rotating equipment KB7. Knowledge of levelling, alignment, static and dynamic balancing KB8. Implications of not adhering to sequence of activities and operations
Skills (S) w.r.t. the scope	
Element	**Skills**
A. Core Skills/ Generic Skills	Writing Skills
	The user/ individual on the job needs to know and understand how to: SA1. Construct simple sentences and express ideas clearly through written communication SA2. Fill up appropriate technical forms, process charts, activity logs in required format of the company
	Reading and Understanding Skills
	The user/individual on the job needs to know and understand how to: SA3. Read and interpret engineering and machine drawings SA4. Read and understand manuals, health and safety instructions, memos, reports, job cards, etc.

	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA5. Express statements, opinions or information clearly so that others can hear and understand SA6. Respond appropriately to queries SA7. Communicate with team members and supervisor
B. Professional Skills	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB1. Diagnose common problems in the rotating equipments based on visual inspection, sound, vibration, temperature etc. SB2. Suggest improvements(if any) in maintenance processes based on experience



NOS Version Control

NOS Code	ISC/N0926		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron and steel	Drafted on	08/09/2014
Industry Sub-sector	Steel, Sponge iron, Ferro Alloys, Re-Rollers, Refractory	Last reviewed on	30/12/2014
Occupation	Mechanical Maintenance	Next review date	30/12/2015



National Occupational Standards

Overview

This NOS is about inspecting the equipment for scheduled maintenance or defects and preparing the equipment for carrying out the operation for fitter – levelling, balancing & alignment

National Occupational Standard

Unit Code	ISC/N0927
Unit Title (Task)	Prepare for operation of levelling, balancing and alignment
Description	This unit is about inspecting the equipment for scheduled maintenance or defects and preparing the equipment for carrying out the operation for fitter – levelling, balancing and alignment.
Scope	This unit/task covers the following: • Prepare spares, material required for operation for fitter – levelling, balancing and alignment

Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Prepare spares, material required for operation of levelling, balancing and alignment	To be competent, the user/individual on the job must be able to: PC1. Prepare the equipment, spares, tools and tackles (spanners, steel scale, torque wrench etc.) PC2. Plan for job duration and prepare the team to comply with PC3. Ensure that sequence of activities are followed correctly PC4. Calibrate the instrument (Vernier, Micro meter, dial gauge, filler gauge, water level, spirit level, laser alignment equipment etc.) before use PC5. Prepare the list of spares required for completion of job and ensure availability at work site PC6. Ensure that tools match the desired specifications PC7. Ensure tools and equipment required for assembly are free from physical damage and ready for operation PC8. Report damaged / defective components of equipment as per the escalation matrix
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. Quality and damage checks to be done and importance of the same KA2. Risk and impact of not following defined procedures/work instructions KA3. Escalation matrix for reporting identified issues KA4. Plant layout and location of various departments
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Normal running characteristics of rotating equipment KB2. Possible causes of common problems during assembly & their remedies KB3. Engineering drawing of the equipment KB4. Knowledge of tools, tackles & equipment (spanners, steel scale, torque wrench etc.) required to perform the operation

	KB5. Knowledge of measuring instruments e.g. Vernier, Micro meter, dial gauge, filler gauge, water level, spirit level, laser alignment equipment etc. KB6. Checks that need to be made to ensure that equipment is safe and ready to use KB7. Limits, fits and tolerances of the rotating equipment KB8. Knowledge of levelling, alignment, static and dynamic balancing KB9. Implications of not adhering to sequence of activities and operations
Skills (S) w.r.t. the scope	
Element	Skills
A. Core Skills/ Generic Skills	Writing Skills
	The user/ individual on the job needs to know and understand how to: SA1. Construct simple sentences and express ideas clearly through written communication SA2. Fill up appropriate technical forms, activity logs in required format of the company
	Reading and Understanding Skills
	The user/individual on the job needs to know and understand how to: SA3. Read and understand manuals, health and safety instructions, memos, reports, job cards, specifications of spare parts etc.
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA4. Express statements, opinions or information clearly so that others can hear and understand SA5. Respond appropriately to queries SA6. Communicate with supervisor, team members, other departments e.g. – stores, operations, etc.
B. Professional Skills	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB1. Diagnose common problems in the rotating equipments based on visual inspection, sound, vibration, temperature etc. SB2. Suggest improvements(if any) in assembly process based on experience

NOS Version Control

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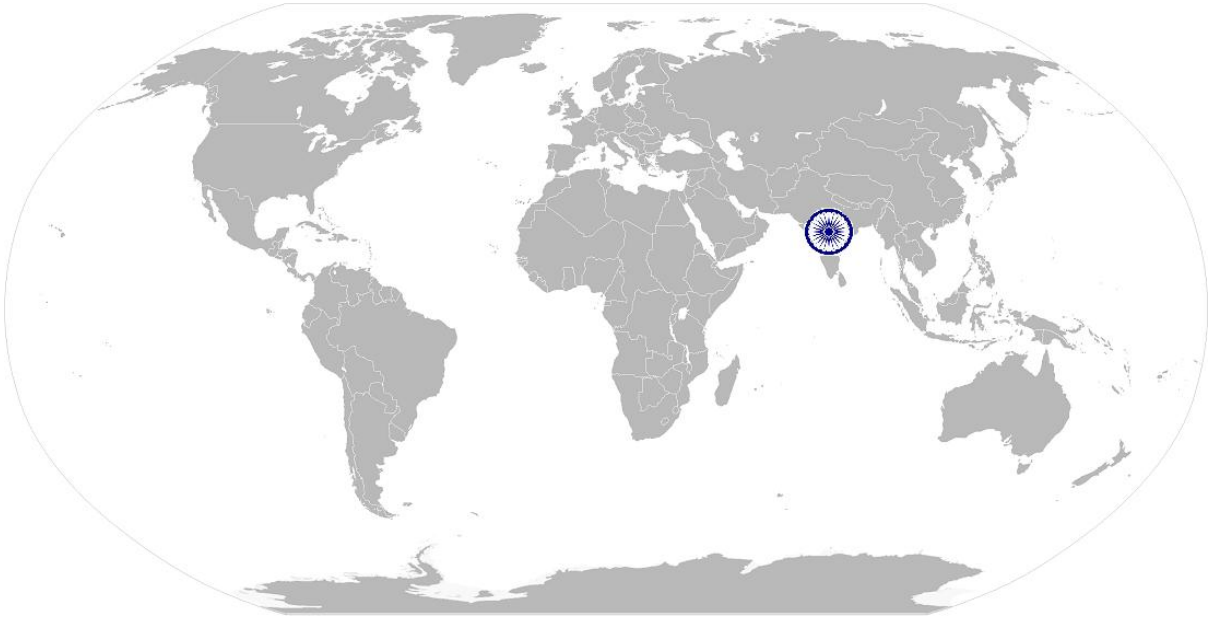

National Occupational Standards

Overview

This NOS is about carrying out the operations of fitter – levelling, balancing and alignment in terms of rectifying the identified problem or carrying out scheduled maintenance

National Occupational Standard

Unit Code	ISC/N0928
Unit Title (Task)	Carry out the assigned operation of levelling, balancing and alignment
Description	This NOS is about carrying out the operations of fitter – levelling, balancing and alignment in terms of rectifying the identified problem or carrying out scheduled maintenance
Scope	This unit/task covers the following: • Conduct routine maintenance or rectify the problem, as appropriate • Check levelling, alignment & balancing (static and dynamic) • Monitor and record the temperature & vibration • Conduct tests to ensure fitness • Communicate to supervisor about completion of work
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Conduct routine maintenance or rectify the problem, as appropriate	To be competent, the user/individual on the job must be able to: PC1. Dismantle the equipment, as needed PC2. Repair or replace the defective parts PC3. Assemble the parts according to the drawings, as required PC4. Assemble mechanical components/ subassemblies together using screws, bolts, and collars using hand/ power tools PC5. Check the levelling, balancing and alignment of rotating equipment for routine maintenance PC6. Re assemble the parts post correcting the defect
Check levelling, alignment & balancing (static and dynamic)	To be competent, the user/individual on the job must be able to: PC7. Understand the process of levelling, alignment & balancing and the need for them PC8. Understand the basics of levelling, alignment & balancing PC9. Understand the manual alignment process with dial gauge PC10. Understand machine based alignment process PC11. Carry out levelling, alignment & balancing through dial gauge, spirit level, water level, laser driven shaft alignment device PC12. Understand and able to execute static and dynamic balancing process Pc13. Understand static balance by identification of heavy point (rest at the bottom) upon slow rotation of the equipment with low friction bearings PC14. Understand the amount of measured weight to be added on the opposite side of the heavy point of equipment PC15. Understand and able to execute different types of balancing like vector method, stroboscope light method (dynamic balancing) etc.

	PC16. Rectify any defects in the rotating equipments PC17. Test the rotating equipment and ensure fitness PC18. Report to the supervisor in case of any problem that has to be escalated
Monitor and record the temperature & vibration	To be competent, the user/individual on the job must be able to: PC19. Operate instruments to monitor and record temperature and vibration (thermometer, vibration measuring meter) PC20. Concentrate and record the observations at prescribed time intervals PC21. Identify any deviations from usual temperature &/or vibration PC22. Report any deviations to supervisor so as to take necessary actions to rectify them
Conduct tests to ensure fitness	To be competent, the user/individual on the job must be able to: PC23. Ensure alignment of parts and with the engineering drawings PC24. Check vibrations to ensure they are within desired limits PC25. Test the machine to ensure it is fit to use before handover PC26. Record the test results in the prescribed format of the organization
Communicate to supervisor about completion of work	To be competent, the user/individual on the job must be able to: PC27. Ensure all activities are complete according to checklist PC28. Communicate to supervisor on completion of given job and/or in case of any deviations from checklist
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. Quality and damage checks to be done and importance of the same KA2. Risk and impact of not following defined procedures/work instructions KA3. Escalation matrix for reporting identified issues KA4. Contact person across departments for spare parts, information etc. KA5. Types of documentation in organization and importance of the same KA6. Records to be maintained and implications of non-maintenance of the same KA7. Importance of housekeeping & good shop floor practices (e.g. 3S & 5S) KA8. Health, Safety and Environment guidelines, legislation and regulations as applicable KA9. Personal protection(Which protective equipment to be used and how) KA10. Quality Management tools like Quality circle, 5S
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Normal running characteristics of rotating equipment KB2. Possible causes of common problems during assembly & their remedies KB3. Engineering drawing of the rotating equipment KB4. Knowledge of tools, tackles & equipment (spanners, steel scale, torque wrench etc.) required to perform the operation KB5. Knowledge of measuring instruments e.g. Vernier, Micro meter, dial gauge, filler gauge, water level, spirit level, laser alignment equipment etc.

	KB6. Checks that need to be made to ensure that equipment is safe and ready to use KB7. Limits, fits and tolerances of the rotating equipment KB8. Knowledge of levelling, alignment, static and dynamic balancing KB9. Knowledge of desirable temperature and vibrations KB10. Understanding of instruments for measuring temperature and vibration KB11. Knowledge of analysing the readings as displayed by vibration analyser KB12. Knowledge to execute the addition of balancing weight both in value and angular position KB13. Implications of not adhering to sequence of activities and operations KB14. Compilation of test results in prescribed format
Skills (S) w.r.t. the scope	
Element	Skills
A. Core Skills/ Generic Skills	Writing Skills
	The user/ individual on the job needs to know and understand how to: SA1. Construct simple sentences and express ideas clearly through written communication SA2. Fill up appropriate technical forms, process charts, activity logs in required format of the company
	Reading and Understanding Skills
	The user/individual on the job needs to know and understand how to: SA3. Read and interpret engineering and machine drawings SA4. Read and understand manuals, memos, reports, job cards, etc.
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA5. Express statements, opinions or information clearly so that others can hear and understand SA6. Respond appropriately to queries SA7. Communicate with supervisor, team members, other departments e.g. operations, stores etc.
B. Professional Skills	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB1. Diagnose common problems in the rotating equipments based on visual inspection, sound, vibration, temperature etc. SB2. Suggest improvements(if any) in process based on experience

NOS Version Control

NOS Code	ISC/N0928		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron and steel	Drafted on	08/09/2014
Industry Sub-sector	Steel, Sponge iron, Ferro Alloys, Re-Rollers, Refractory	Last reviewed on	30/12/2014
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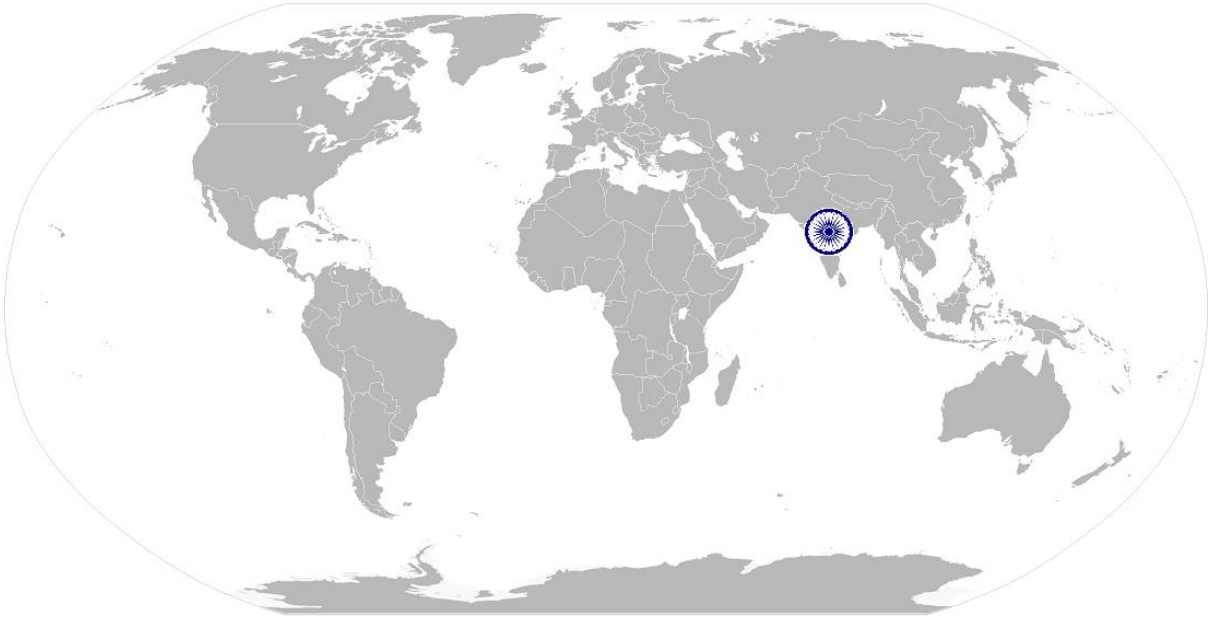
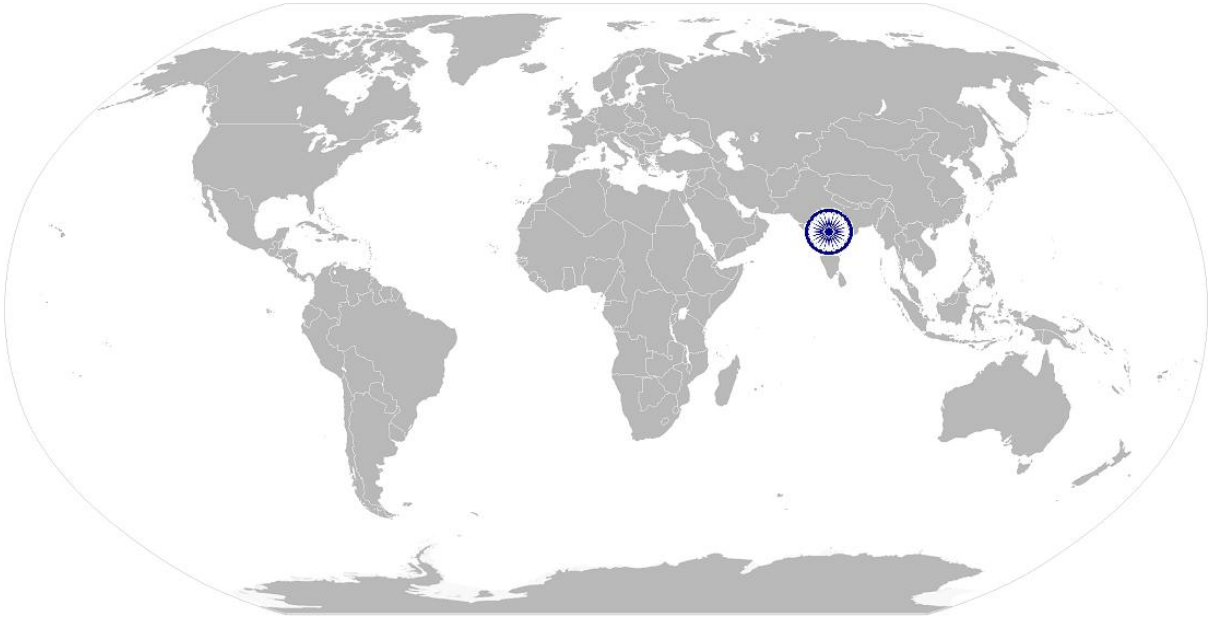


National Occupational Standards



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 workplace
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, public places 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

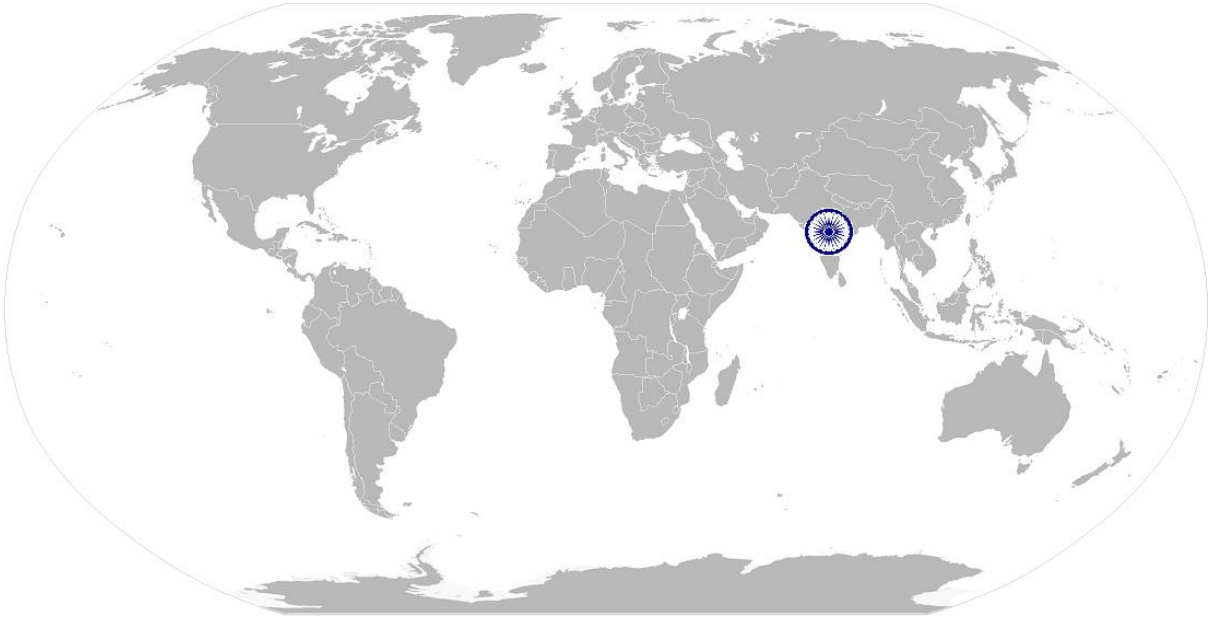
	• Witnesses • Supervisor/manager notified Documents: • Fire notices • Accident reports • Safety instructions for equipment and procedures • Company notices and documents • Legal documents (e.g. Government notices) Job titles: • Health and safety officer • First aid officer • Fire officer PC26. Demonstrate 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	Mechanical Maintenance	Next review date	30/12/2015



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)	Works 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)
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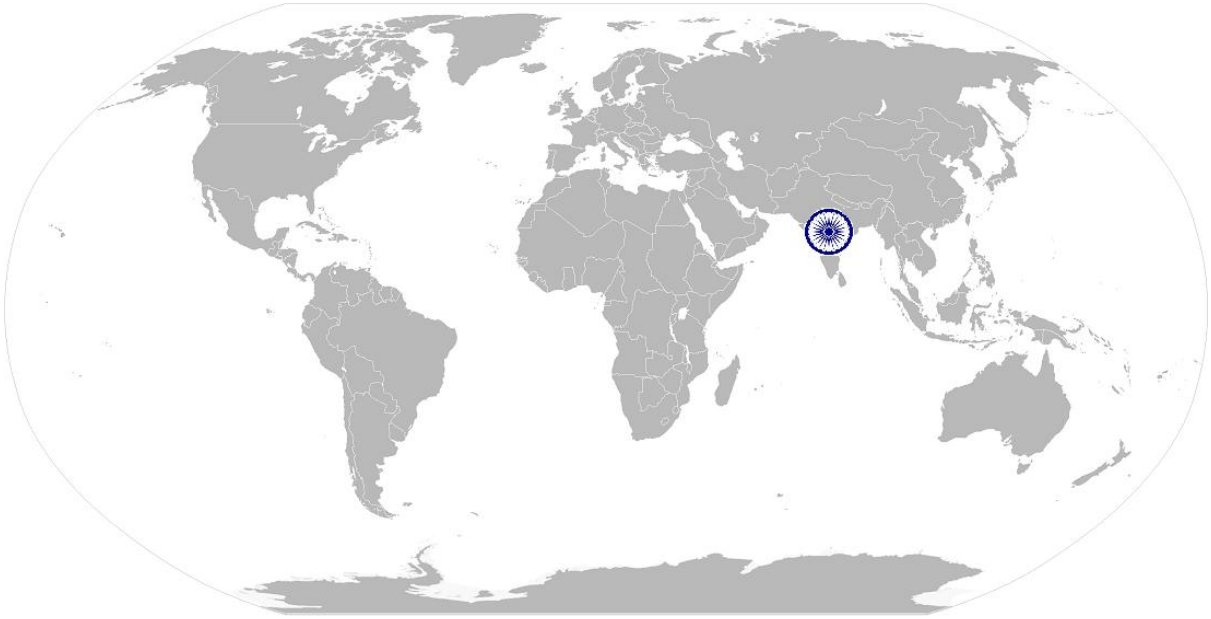
	Decision Making
	The user/individual on the job needs to know and understand how to: SA6. Make appropriate decisions pertaining to the concerned area of work with

	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	Mechanical Maintenance	Next review date	30/12/2015



CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role: Fitter: Levelling, Alignment & Balancing
Qualification Pack: ISC/Q0905
Sector Skill Council: Indian Iron & Steel Sector Skill Council

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 60% in every NOS.
6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.

				Marks Allocated	
NOSs	PCs	Total Marks 1000	Out Of	Theory	Practical
ISC/N0926: Understand the assigned job of levelling, balancing & alignment	PC1. Interpret the checklist and understand the job requirements	150	5	0	5
	PC2. Understand the levelling / alignment / balancing of rotating equipment e.g. blower fan, motor, pump and gear box etc.		15	10	5
	PC3. Understand the use of levelling instruments (spirit level, water level, magnetic marking block, dial indicator, laser alignment equipment, strobe light etc.)		15	5	10
	PC4. Understand the standard code of practice for static and dynamic balancing		10	5	5
	PC5. Plan, as appropriate to carry out the job		10	5	5

	PC6. Understand sections, views, scale of measurement used in the drawing		10	5	5
	PC7. Understand the symbols used in the drawings		5	0	5
	PC8. Understand other specifications and identify the sequence of activities required to assemble the machine		15	5	10
	PC9. Identify any clarifications that he/she wants to seek with respect to the given drawing		10	0	10
	PC10. Identify and seek clarifications with respect to levelling, balancing and alignment of rotating equipment		5	0	5
	PC11. Recognize whom to contact for clarifications on the engineering drawing		5	0	5
	PC12. Escalate the concern to the supervisor or shift-in-charge, if needed		5	0	5
	PC13. Identify tools, tackles & equipment (spanners, steel scale, torque wrench etc.) required to perform the operation		10	5	5
	PC14. Identify measuring instruments e.g. Vernier, Micro meter, dial gauge, filler gauge, water level, spirit level, laser alignment equipment etc.		5	0	5
	PC15. Ask helper to carry tools required to the desired work site		15	5	10
	PC16. Report to stores / supervisor in case of non-availability of tools & tackles or stock-out		10	0	10
		Total	150	45	105
ISC/N0927: Prepare for operation of levelling, balancing & alignment	PC1. Prepare the equipment, spares, tools and tackles (spanners, steel scale, torque wrench etc.)	150	20	5	15
	PC2. Plan for job duration and prepare the team to comply with		20	5	15
	PC3. Ensure that sequence of activities are followed correctly		20	5	15
	PC4. Calibrate the instrument (Vernier, Micro meter, dial gauge, filler gauge, water level, spirit level, laser alignment equipment etc.) before use		25	5	20

	PC5. Prepare the list of spares required for completion of job and ensure availability at work site		20	5	15
	PC6. Ensure that tools match the desired specifications		25	5	20
	PC7. Ensure tools and equipment required for assembly are free from physical damage and ready for operation		15	5	10
	PC8. Report damaged / defective components of equipment as per the escalation matrix		5	0	5
		Total	150	35	115
ISC/N0928: Carry out the assigned operation of levelling, balancing & alignment	PC1. Dismantle the equipment, as needed	450	10	0	10
	PC2. Repair or replace the defective parts		15	0	15
	PC3. Assemble the parts according to the drawings, as required		20	5	15
	PC4. Assemble mechanical components/ subassemblies together using screws, bolts, and collars using hand/ power tools		20	5	15
	PC5. Check the levelling, balancing and alignment of rotating equipment for routine maintenance		20	5	15
	PC6. Re assemble the parts post correcting the defect		20	5	15
	PC7. Understand the process of levelling, alignment & balancing and the need for them		20	5	15
	PC8. Understand the basics of levelling, alignment & balancing		20	5	15
	PC9. Understand the manual alignment process with dial gauge		20	5	15
	PC10. Understand machine based alignment process		15	5	10
	PC11. Carry out levelling, alignment & balancing through dial gauge, spirit level, water level, laser driven shaft alignment device		15	5	10
	PC12. Understand and able to execute static and dynamic balancing process		15	5	10

	Pc13. Understand static balance by identification of heavy point (rest at the bottom) upon slow rotation of the equipment with low friction bearings		15	5	10
	PC14. Understand the amount of measured weight to be added on the opposite side of the heavy point of equipment		15	5	10
	PC15. Understand and able to execute different types of balancing like vector method, stroboscope light method (dynamic balancing) etc.		15	5	10
	PC16. Rectify any defects in the rotating equipments		15	5	10
	PC17. Test the rotating equipment and ensure fitness		15	5	10
	PC18. Report to the supervisor in case of any problem that has to be escalated		10	0	10
	PC19. Operate instruments to monitor and record temperature and vibration (thermometer, vibration measuring meter)		15	5	10
	PC20. Concentrate and record the observations at prescribed time intervals		15	5	10
	PC21. Identify any deviations from usual temperature &/or vibration		15	5	10
	PC22. Report any deviations to supervisor so as to take necessary actions to rectify them		15	5	10
	PC23. Ensure alignment of parts and with the engineering drawings		20	5	15
	PC24. Check vibrations to ensure they are within desired limits		15	5	10
	PC25. Test the machine to ensure it is fit to use before handover		15	5	10
	PC26. Record the test results in the prescribed format of the organization		15	5	10
	PC27. Ensure all activities are complete according to checklist		15	5	10
	PC28. Communicate to supervisor on completion of given job and/or in case of any deviations from checklist		15	5	10

		Total	450	125	325
ISC/N0008: Use basic health and safety practices at the workplace	PC1. Use protective clothing/equipment for specific tasks and work conditions	150	10	5	5
	PC2. State the name and location of people responsible for health and safety in the workplace		5	0	5
	PC3. State the names and location of documents that refer to health and safety in the workplace		1	0	1
	PC4. Identify job-site hazardous work and state possible causes of risk or accident in the workplace		9	5	4
	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		10	5	5
	PC6. State location of general health and safety equipment in the workplace		5	0	5
	PC7. Inspect for faults, set up and safely use steps and ladders in general use		5	0	5
	PC8. Work safely in and around trenches, elevated places and confined areas		5	0	5
	PC9. Lift heavy objects safely using correct procedures		4	0	4
	PC10. Apply good housekeeping practices at all times		1	0	1
	PC11. Identify common hazard signs displayed in various areas		6	5	1
	PC12. Retrieve and/or point out documents that refer to health and safety in the workplace		4	0	4
	PC13. Use the various appropriate fire extinguishers on different types of fires correctly		10	5	5
	PC14. Demonstrate rescue techniques applied during fire hazard		10	5	5
	PC15. Demonstrate good housekeeping in order to prevent fire hazards		1	0	1
	PC16. Demonstrate the correct use of a fire extinguisher		4	0	4

	PC17. Demonstrate how to free a person from electrocution		5	0	5
	PC18. Administer appropriate first aid to victims as required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc.		10	5	5
	PC19. Demonstrate basic techniques of bandaging		5	0	5
	PC20. Respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		10	5	5
	PC21. Perform and organize loss minimization or rescue activity during an accident in real or simulated environments		5	0	5
	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		5	0	5
	PC23. Demonstrate the artificial respiration and the CPR Process		5	0	5
	PC24. Participate in emergency procedures		5	0	5
	PC25. Complete a written accident/incident report or dictate a report to another person, and send report to person responsible		9	5	4
	PC26. Demonstrate correct method to move injured people and others during an emergency		1	0	1
		Total	150	45	105
ISC/N0009: Works effectively with others	PC1. Accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required	100	10	5	5
	PC2. Accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt		10	5	5

	PC3. Provide information to others clearly, at a pace and in a manner that helps them to understand		10	0	10
	PC4. Display helpful behaviour by assisting others in performing tasks in a positive manner, where required and possible		10	5	5
	PC5. Consult with and assist others to maximize effectiveness and efficiency in carrying out tasks		10	5	5
	PC6. Display appropriate communication etiquette while working		10	0	10
	PC7. Display active listening skills while interacting with others at work		10	0	10
	PC8. Use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	5	5
	PC9. Demonstrate responsible and disciplined behaviours at the workplace		15	5	10
	PC10. Escalate grievances and problems to supervisor		5	0	5
		Total	100	30	70