QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR CAPITAL GOODS 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

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Introduction

Qualifications Pack: Tungsten Inert Gas Welder (GTAW)

SECTOR: CAPITAL GOODS

SUB-SECTOR:

1. Machine Tools
2. Tools Dies and Press Tools
3. Plastic Manufacturing Machinery
4. Textile Manufacturing Machinery
5. Process Plant Machinery
6. Electrical and Power Machinery
7. Light Engineering Goods

OCCUPATION: Welding

REFERENCE ID: CSC/ Q 0130

Tungsten Inert Gas Welder (GTAW): Perform manual operations for performing tungsten inert arc welding (GTAW) also known as gas tungsten arc welding (GTAW) and independently carry out TIG (GTAW) weld operations for welding joints in all positions as per welding procedure specification (WPS).

Brief Job Description: Perform manual TIG (GTAW) welding for a range of standard welding job requirements. This is for a skilled welder who can weld different materials (carbon steel, aluminum, nickel, titanium, copper and stainless steel) in various positions and prepare various joints including corner, butt, fillet and tee. Set-up and prepare for operations interpreting the right information from the WPS.

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

Job Details

Qualifications Pack Code	CSC/ Q 0130		
Job Role	**Tungsten Inert Gas Welder (GTAW)**		
Credits NSQF [*OPTIONAL*]		**Version number**	**2.0**
Sector	**CAPITAL GOODS**	**Drafted on**	**10/04/14**
Sub-sector	1. Machine Tools 2. Tools Dies And Press Tools 3. Plastic Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery 7. Light Engineering Goods	**Last reviewed on**	
Occupation	**WELDING**	**Next review date**	**15/04/14**

Job Role	Tungsten Inert Gas Welder (GTAW)
Role Description	Perform manual operations for performing Tungsten Inert Arc Welding (GTAW) also known as Gas Tungsten Arc Welding (GTAW) and independently carry out TIG (GTAW) weld operations for welding joints in all positions as per Welding Procedure Specification.
NSQF level	L5
Minimum Educational Qualifications*	12th standard
Maximum Educational Qualifications*	
Training (Suggested but not mandatory)	No Previous Experience Required
Experience	No Previous Experience Required
Applicable National Occupational Standards (NOS)	**Compulsory:** CSC/ N 0141 Perform Tungsten Inert Gas (TIG) Welding also known as Gas Tungsten Arc Welding (GTAW) Welding CSC/ N 0135 Use basic health and safety practices at the workplace CSC/ N 0136 Work effectively with others **Optional:** 1. Nil
Performance Criteria	As described in the relevant OS units

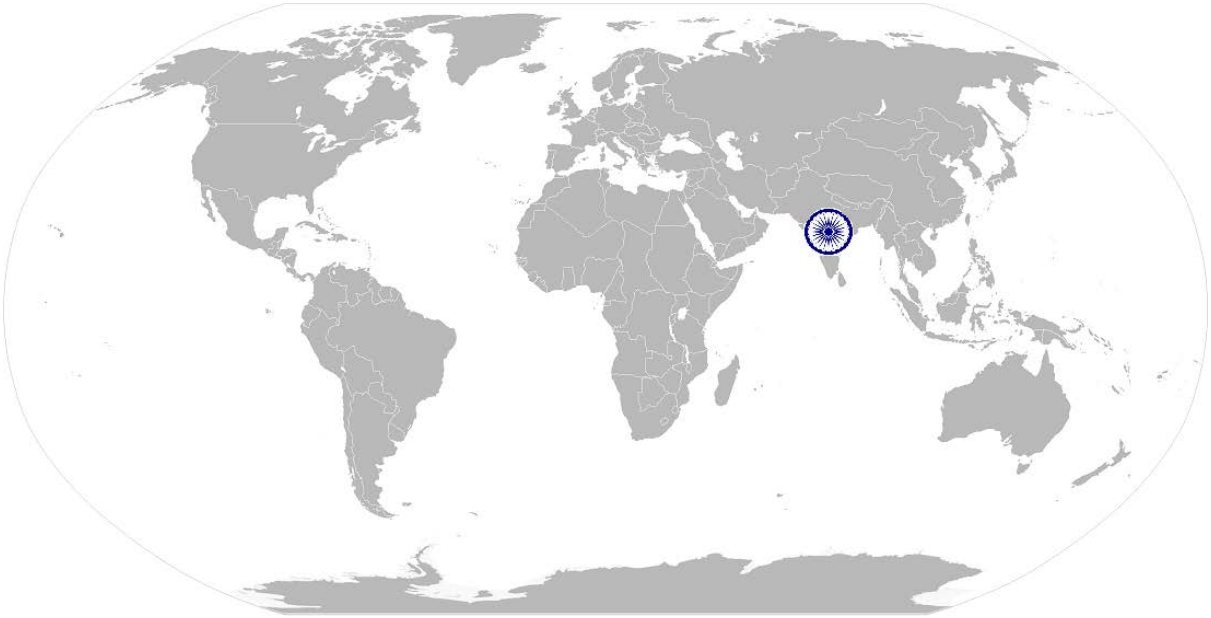
Definitions

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

Acronyms

Keywords /Terms	Description
GTAW	Gas Tungsten Arc Welding
TIG	Tungsten Inert Gas Welding
NDT	Non-Destructive Testing
DT	Destructive Testing
WPS	Welding Procedure Spefication
RT	Radiographic Testing
UT	Ultrasonic Testing
DPT	Dye Penetrant Testing
MPT	Magnetic Particle Testing
FPT	Fluoroscent Penetrant Testing
CO2	Carbon dioxide
CPR	Cardiac Pulmonary Resuscitation

National Occupational Standard



Overview

This unit is about manual operations for performing tungsten inert gas (TIG) welding also known as gas tungsten arc welding (GTAW). The person would be able to independently carry out TIG (GTAW) weld operations for welding joints in all positions as per Welding Procedure Specification (WPS).

National Occupational Standard

CSC/ N 0141: Manually welding joints using the TIG (GTAW) Process

Unit Code	CSC / N 0141
Unit Title (Task)	Manually welding joints using the TIG (GTAW) Process
Description	This unit covers the performing of manual TIG (GTAW) welding for a range of standard welding job requirements. This involves welding different materials (carbon steel, aluminum and stainless steel) in various positions. The welder can prepare various joints including corner, butt, fillet and tee. This involves setting-up and preparing for operations interpreting the right information from the WPS, obtaining the right consumables and raw materials, etc. The candidate will be expected to work with a minimum of supervision, taking personal responsibility for own actions, quality and accuracy of the work. The breakdown servicing activity may be carried out as a team effort, but the candidate would be responsible for the overall completion of the installation activities as per specifications. The candidate will have knowledge and understanding pertaining to the TIG (GTAW) welding process, consumables used, setting up of equipment, health and safety requirements, and assessing weld quality through visual inspection. The candidate will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.
Scope	This unit/task covers the following: Welding equipment are: • transformer (variable wave forms and wave balancing) • rectifier (pulsing) • inverter • generator • measuring equipment for electrical output and continuity (voltmeter/multi-meter, ammeter/shunts/coils, tong tester) • equipment for current regulation • high frequency unit • torches • electrodes • filler wires • water cooling and circulation system for TIG torch (water cooled torch) • return clamps • foot pedal • ancillary equipment (table grinders for tungsten electrode, wire brushes, linishers, hammer, power saw, angle, pedestal and straight grinders, chisel) • other equipment Torch components are: • cables • water cooled cables

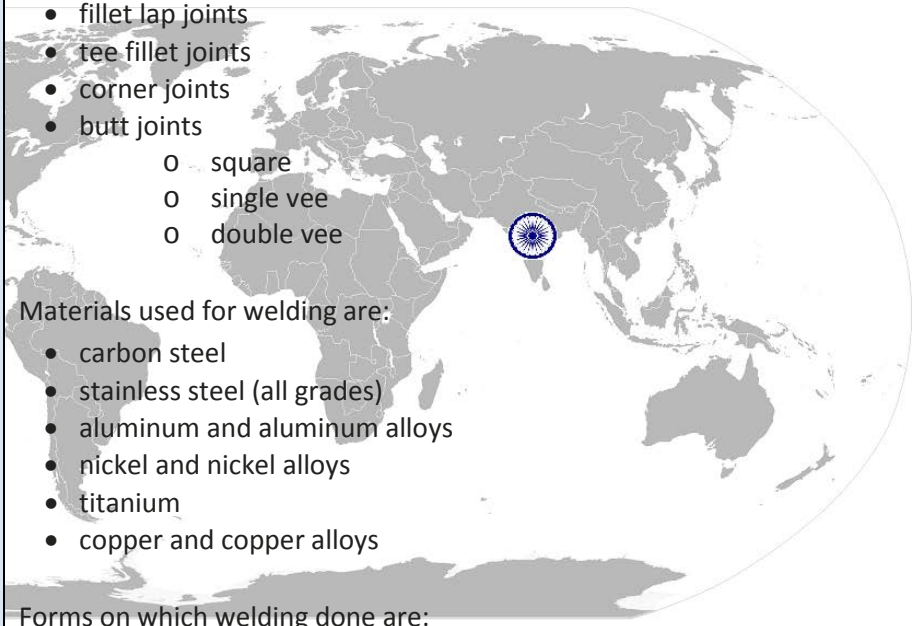
- ceramic nozzle
- collet
- collet holder
- gas lens

Shielding gases equipment are:

- cylinders
- manifold systems
- regulators (fixed, single stage, two-stage)
- gas flow meters
- gas tubes and connectors
- use of solenoid valves
- economisers

Types of joints are:

- fillet lap joints
- tee fillet joints
- corner joints
- butt joints
    - square
    - single vee
    - double vee



Materials used for welding are:

- carbon steel
- stainless steel (all grades)
- aluminum and aluminum alloys
- nickel and nickel alloys
- titanium
- copper and copper alloys

Forms on which welding done are:

- sheet (less than 1.5 mm)
- plate (8 mm)
- section
- pipe/tube
- other forms

Material and joint preparation activities are:

- made rust free
- cleaned – free from scaling, paint, oil/grease
- chemical cleaning
- made dry and free from moisture
- edges to be welded prepared as per job requirement (eg. flat, square or beveled)
- use various machines and techniques for the above (eg. chamfering machine, grinding and stripping, etc.)

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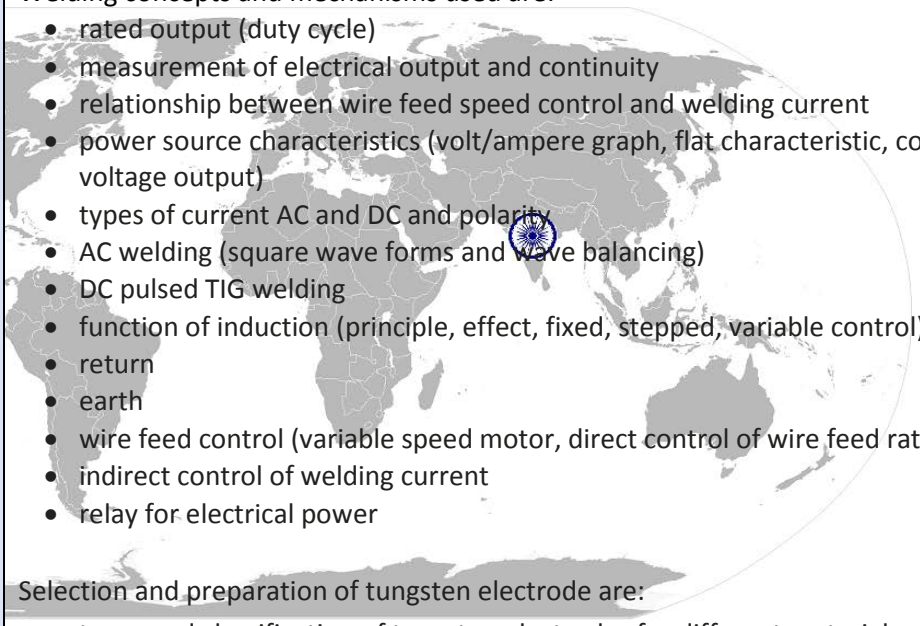
- correctly positioned
    - Positioning: devices and techniques
        - jigs and fixtures
        - restraining devices such as clamps and weights/blocks
        - setting up the joint in the correct position and alignment

Basic principles of TIG welding are:

- the arc burns between a non- consumable tungsten electrode and the workpiece
- exclusively inert gases (Argon, Helium) are used as shielding gases
- TIG welding installation
- for most applications an electrode with a negative polarity is used
- for welding of aluminum, alternating current must be used
- for arc ignition a high-frequency high voltage is used

Welding concepts and mechanisms used are:



- rated output (duty cycle)
- measurement of electrical output and continuity
- relationship between wire feed speed control and welding current
- power source characteristics (volt/ampere graph, flat characteristic, constant voltage output)
- types of current AC and DC and polarity
- AC welding (square wave forms and wave balancing)
- DC pulsed TIG welding
- function of induction (principle, effect, fixed, stepped, variable control)
- return
- earth
- wire feed control (variable speed motor, direct control of wire feed rate)
- indirect control of welding current
- relay for electrical power

Selection and preparation of tungsten electrode are:

- types and classification of tungsten electrodes for different materials
- angle and technique of preparation of the tungsten electrode tips
- selection of the tungsten electrode diameter as per current

Activities to be checked before start of welding are:

- correct set-up of the joint
- proper condition of electrical connections
- welding return and earthing arrangements
- operating parameters

Welding Positions are:

- flat (PA) IG/1F
- horizontal vertical (PB) 2F
- horizontal (PC) 2G
- vertical upwards (PF) 3F / 3G

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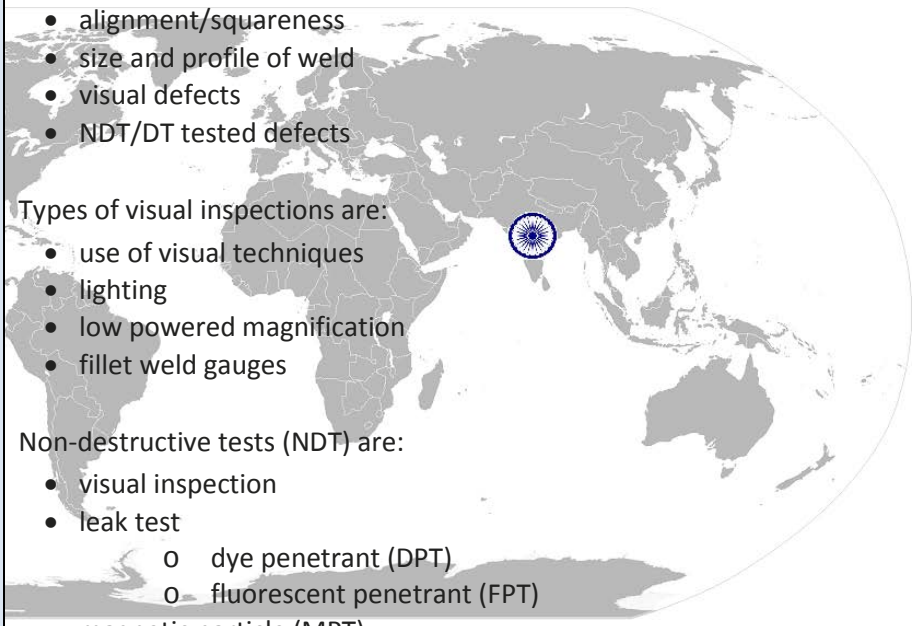
- vertical downwards (PG) 3F / 3G
- Plate to Pipe (Fixed) 5F
- Pipe to Pipe 5G
- Pipe welding at inclined position 6G

Welding techniques used are:

- fine adjustment of parameters (current and gas flow)
- selection of gas nozzle if required
- selection of the outer nozzle
- correct manipulation of the torch
- blending in stops/starts and tack welds
- starting techniques

Quality parameters a to be checked are:

- dimensional accuracy
- alignment/squareness
- size and profile of weld
- visual defects
- NDT/DT tested defects



Types of visual inspections are:

- use of visual techniques
- lighting
- low powered magnification
- fillet weld gauges

Non-destructive tests (NDT) are:

- visual inspection
- leak test
  - dye penetrant (DPT)
  - fluorescent penetrant (FPT)
- magnetic particle (MPT)
- radiographic (RT)
- ultrasonic (UT)

Destructive tests (DT) are:

- nick break test
- bend tests (such as face, root or side, as appropriate)
- metallographic
- mechanical (peel, tensile and shear, fatigue, impact tests)
- chemical

Handling specimens for tests

- handling hot materials
- using chemicals for cleaning and etching
- using equipment to fracture welds

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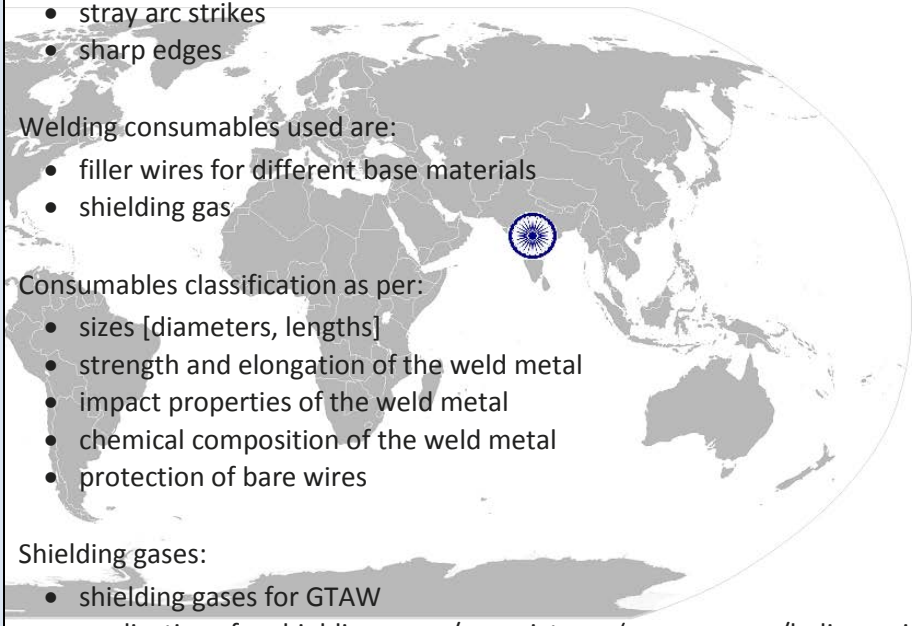
Types of weld defects are:

- lack of continuity of the weld
- uneven and irregular ripple formation
- incorrect weld size or profile
- undercutting
- overlap
- inclusions
- porosity
- internal cracks
- surface cracks
- lack of fusion
- lack of penetration
- welding spatter
- gouges,
- stray arc strikes
- sharp edges



Welding consumables used are:

- filler wires for different base materials
- shielding gas

Consumables classification as per:

- sizes [diameters, lengths]
- strength and elongation of the weld metal
- impact properties of the weld metal
- chemical composition of the weld metal
- protection of bare wires

Shielding gases:

- shielding gases for GTAW
- applications for shielding gases/gas mixtures (argon, argon/helium mixtures, argon/hydrogen mixtures, nitrogen argon/nitrogen mixtures)
- gas pressure requirements
- flow rates for applications
- back purging

Interpreting the WPS:

- welding process (ISO Codes)
- parent metal
- consumables
- pre welding joint preparation (cleaning, edge preparation, assembly, pre-heat)
- welding parameters
- welding positions (EN ISO 6947 – PA, PB, PC, PD, PE, PF, PG; ASME IX – I-6 G/1-6 F)
- number and arrangement of runs to fully fill/weld joints

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- electrode (W)
- filler wire
- electrical conditions required (type of current, alternating [A.C.] direct [D.C.], electrode polarity (negative), welding current ranges,
- methods of arc ignition (scratch, high frequency, lift start),
- shielding gas (type, flow rate, pre-weld gas flow, post-weld gas flow),
- techniques (including autogenous)
- control of heat input
- interpass/run cleaning/back gouging methods,
- post welding activities (wiring brushing, removal of excess weld metal where required),
- post-weld heat treatment (normalising, stress relief)

Electrical characteristics are:

- power source characteristics (volt/ampere graph, drooping characteristic, constant current output)
- effects of types of current and electrode polarity:
  - heat input/distribution,
  - electrode,
  - weld bead profile,
  - penetration;
  - methods of a.c. arc stabilisation (including: square wave);
  - welding current features (pulse current, slope in, slope out)
  - voltage (open circuit, arc)

Weld quality check standards are:

- required parameters for dimensional accuracy
- weld finishes are built up to the full section of the weld
- joins at stop/start positions merge smoothly
- weld surface is
  - free from cracks
  - substantially free from porosity
  - free from any pronounced hump or crater
  - substantially free from shrinkage cavities
  - substantially free from arcing or chipping marks
- fillet welds are
  - equal in leg length
  - slightly convex in profile (where applicable)
  - size of the fillet equivalent to the thickness of the material welded
- weld contour is
  - of linear and of uniform profile
  - smooth and free from excessive undulations
  - regular and has an even ripple formation
- welds are adequately fused, and there is minimal undercut, overlap and surface inclusions
- tack welds are blended in to form part of the finished weld, without excessive hump

	• corner joints have minimal burn through to the underside of the joint or, where appropriate Safety precautions (general) are: • general workshop safety; • fire prevention; • general hazards • manual lifting • overhead lifting • surface conditions • stability of surrounding structures, furniture, etc. Safety precautions (TIG Welding) are: • protection from live and other electrical components, including insulation, proper earthing, proper loading, etc. • proper handling and placement of hot metal • taking account of splatter and related safe distance • adequate lighting • appropriate personal protective equipment o suitable aprons o welding gloves o safety boots o correctly fitting overalls o suitable eye shields/goggles • protection of self and others from the effects of the welding arc • fume extraction/control measures • safety measures for elevated and trench working • reduction in the local air concentration due to release of argon gas during welding in confined places

Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Working Safely	The user/individual on the job should be able to: PC1. work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines PC2. take necessary safety precautions for TIG welding operations
Preparing for welding operations	The user/individual on the job should be able to: PC3. interpret weld procedure data sheets specifications PC4. select welding machines eg. transformer, inverters, rectifiers and generators, according to the materials and task PC5. select proper welding torch and electrode(W) that meet the job requirement and specification PC6. obtain filler wire according to specifications PC7. prepare for the TIG welding process PC8. prepare the materials and joint in readiness for welding PC9. select tungsten electrode by the colour of the tip according to base metal, and correct diameter

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	PC10. select and fit the welding shielding gases for a range of given applications PC11. plan the welding activities before they start them effectively and efficiently for achieving specifications as per WPS PC12. obtain and prepare the appropriate welding equipment and welding consumables as per task PC13. connect torches and components PC14. connect and adjust regulators and flow meters to cylinders PC15. read, set and adjust current (amperage) as required PC16. set pre-purge with shielding gas as required PC17. prepare tungsten by sharpening or balling it to desired tip shape PC18. set and verify gas flow rates PC19. prepare and support the joint, using the appropriate methods PC20. tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding PC21. match feed and travel speed as required
Carrying out welding operations	The user/individual on the job should be able to: PC22. perform TIG welding operations to meet welding procedure specification requirements PC23. use correct technique for starting the arc (using HF (high frequency) unit, scratching the electrode on the job material, lifting the electrode immediately after touching the job material) PC24. use correct angle of torch and filler wire PC25. weld the joint to the specified quality, dimensions and profile PC26. use manual welding and related equipment, to carry out TIG welding processes PC27. use welding consumables appropriate to the material and application, to include AC current types and DC current types PC28. produce joints of the required quality and of specified dimensional accuracy which achieve a weld quality equivalent to Level B of ISO 5817 PC29. use both methods to produce the various joints a) with filler wire b) without filler wire (autogenously) PC30. produce joints from various materials in different forms PC31. weld joints in good access situations, in select positions PC32. make sure that the work area is maintained and left in a safe and tidy condition
Testing for quality	The user/individual on the job should be able to: PC33. use appropriate methods and equipment to check the quality, and that all dimensional and geometrical aspects of the weld are to the specification PC34. check that the welded joint conforms to the specification, by checking various quality parameters using visual inspection PC35. identify various weld defects PC36. detect surface imperfections and deal with them appropriately PC37. carry out DPT tests to assess fine defect open to the surface not detected by visual inspection (VT)
Post welding techniques	The user/individual on the job should be able to: PC38. prepare for non-destructive testing of the welds for a range of tests PC39. prepare for destructive tests on weld specimens for select tests

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	PC40. shut down and make safe the welding equipment on completion of the welding activities
Dealing with contingencies	The user/individual on the job should be able to: PC41. detect equipment malfunctions and deal with them appropriately PC42. deal promptly and effectively with problems within their control, and seek help and guidance from the relevant people if they have problems that they cannot resolve
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. relevant legislation, standards, policies, and procedures followed in the company KA2. key purpose of the organization KA3. department structure and hierarchy protocols KA4. work flow and own role in the workflow KA5. dependencies and interdependencies in the workflow KA6. support functions and types of support available for incumbents in this role
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. the types of fire extinguishers and their suitable uses in case of welding related fires KB2. the effects of exposure to welding fume KB3. range of welding equipment available KB4. functions of welding equipment KB5. different types of power source KB6. how to compare welding consumables for suitability for a range of given applications KB7. welding consumables classification KB8. safe working practices and procedures to be followed when preparing and using TIG welding equipment KB9. hazards associated with TIG welding and safety precautions to minimize risk KB10. different variants of the TIG welding (eg. orbital welding, internal bore welding, NG-TIG etc.) KB11. personal protective equipment to be worn for the welding activities KB12. correct handling and storage of gas cylinders KB13. manual TIG welding process KB14. type and thickness of base metals KB15. current types and polarity KB16. types of tungsten KB17. types, selection and application of filler wires and welding electrodes KB18. reasons for using shielding gases, and the types and application of the various gases KB19. impact of shielding gas composition and purity on welding quality KB20. use, impact and importance of gas pressures and flow rates in relationship to the type of material being welded KB21. pre- and post-flow purge and its importance KB22. importance and application of back purging KB23. types of welded joints to be produced

	KB24. terminology used for the appropriate welding positions KB25. types of torches such as air cooled and liquid cooled KB26. how to prepare the materials in readiness for the welding activity KB27. how to set up and restrain the joint, and the tools and techniques to be used KB28. appropriate tack welding size and spacing (in relationship to material thickness) KB29. checks to be made prior to welding KB30. techniques of operating the welding equipment to produce a range of joints in the various joint positions KB31. effects of the electrical characteristics of the TIG welding arc KB32. how to control distortion (such as welding sequence; deposition technique) KB33. problems that can occur with the welding activities KB34. how to close down the welding equipment safely and correctly KB35. how to prepare the welds for examination KB36. how to check the welded joints for uniformity, alignment, position, weld size and profile KB37. various procedures for visual examination of the welds for cracks KB38. non-destructive and destructive tests KB39. methods of removing a test piece of weld from a suitable position in the joint KB40. safe working practices and procedures to be adopted when preparing the welds for examination KB41. importance of leaving the work area and equipment in a safe condition on completion of the welding activities
Skills (S) [Optional]	
A. Core Skills/ Generic Skills	**Communication**
	The user/ individual on the job needs to know and understand how to: SA1. read and interpret information correctly from various job specification documents, manuals, health and safety instructions, memos, etc. applicable to the job in English and/or local language SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. convey and share technical information clearly using appropriate language SA4. check and clarify task-related information SA5. liaise with appropriate authorities using correct protocol SA6. communicate with people in respectful form and manner in line with organizational protocol
	Numerical and computational skills
	The user/individual on the job needs to know and understand how to: SA7. undertake numerical operations, geometry and calculations/ formulae (including addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages) SA8. use appropriate measuring techniques SA9. use and convert imperial and metric systems of measurements SA10. apply appropriate degree of accuracy to express numbers SA11. use and understand tolerance in terms of limits of size SA12. check measurements, angles, orientation and slopes

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	SA13. types of reference lines such as tangent lines, datum lines, centre lines and work points SA14. check square of material using corner-to-corner dimensions and triangulation (3-4-5) method SA15. select and use tools and equipment such as measuring tapes, levels, squares, protractors and dividers SA16. ability to check dimensions of components SA17. calculate the value of angles in a triangle
	Learning
	The user/individual on the job needs to know and understand how to: SA18. participate in on-the-job and other learning, training and development interventions and assessments SA19. clarify task related information with appropriate personnel or technical adviser SA20. seek to improve and modify own work practices SA21. maintain current knowledge of application standards, legislation, codes of practice and product/process developments
B. Professional Skills	**Problem Solving**
	The user/individual on the job needs to know and understand how to: SB1. identify problems with work planning, procedures, output and behavior and their implications SB2. prioritize and plan for problem solving SB3. communicate problems appropriately to others SB4. identify sources of information and support for problem solving SB5. seek assistance and support from other sources to solve problems SB6. identify effective resolution techniques SB7. select and apply resolution techniques SB8. seek evidence for problem resolution
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB9. plan, prioritize and sequence work operations as per job requirements SB10. organize and analyze information relevant to work SB11. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	Initiative and Enterprise
	The user/individual on the job needs to know and understand: SB12. importance and impact of initiative and enterprise for achieving better results for self, others and organization SB13. how to undertake and express new ideas and initiatives to others SB14. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB15. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB16. one's competencies can and should be applied in new and different situations and contexts to achieve more

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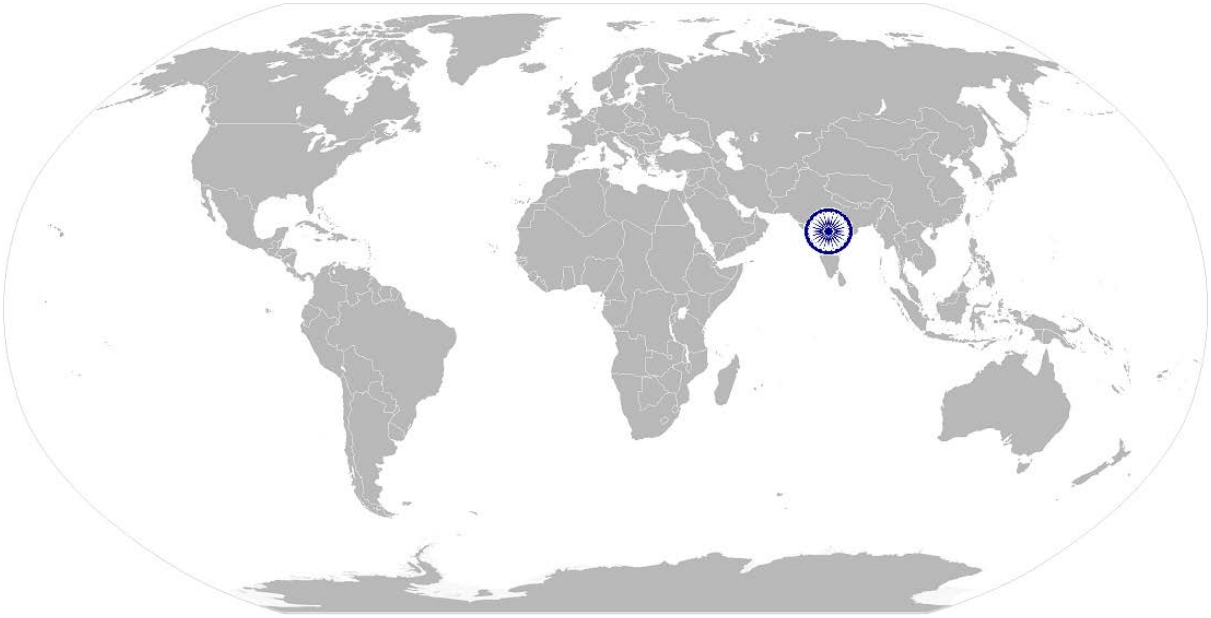
	Self-Management
	The user/individual on the job needs to know and understand: SB17. importance of taking responsibility for own work outcomes SB18. importance of adherence to work timings, dress code and other organizational policies SB19. importance of following laid down rules, procedures, instructions and policies SB20. importance of exercising restraint while expressing dissent and during conflict situations SB21. how to avoid and manage distractions to be disciplined at work SB22. importance of time management for achieving better results
	Teamwork
	The user/individual on the job needs to know and understand how to: SB23. work in a team in order to achieve better results SB24. identify and clarify work roles within a team SB25. communicate and cooperate with others in the team SB26. seek assistance from fellow team members

NOS Version Control

NOS Code	CSC / N 0141		
Credits(NSQF) [*OPTIONAL*]		Version number	2.0
Industry	Capital Goods	Drafted on	10/04/14
Industry Sub-sector	1. Machine Tools 2. Tools Dies And Press Tools 3. Plastic Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery 7. Light Engineering Goods	Last reviewed on	
		Next review date	15/04/14

National Occupational Standard



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.

CSC/ N 0135: Use basic health and safety practices at the workplace

National Occupational Standard

Unit Code	CSC / N 0135
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, alongwith common techniques to minimize risk, deal with accidents, emergencies, etc. It covers knowledge of fire safety, common first aid applications, safe practices and emergency procedures.
Scope	This unit/task covers the following: Protective clothing includes: • leather or asbestos gloves • flame proof aprons • flame proof overalls buttoned to neck • cuffless (without folds) trousers • reinforced footwear • helmets/hard hats • cap and shoulder covers • ear defenders/plugs, • safety boots, • knee pads • particle masks, • glasses/goggles/visors  Equipment includes: • hand shields, • machine guards, • residual current devices, • shields, • dust sheets, • respirator 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. 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 Faults include: • corrosion of metal components • deterioration • splits and cracks timber components • imbalance • loose rungs • nuts or bolts, etc. Ladders set up includes: • firm/level base • clip/lash down • leaning at the correct angle, etc. Good housekeeping practices include: • clean/tidy work areas • removal/disposal of waste products • protect surfaces Emergency procedures include: • raising alarm

- safe/efficient evacuation
- correct means of escape
- correct assembly point
- roll call
- correct return to work

Various areas are:

- on chemical containers
- equipment
- packages
- inside buildings
- in open areas and public spaces, etc.

General health and safety equipment includes:

- fire extinguishers,
- first aid equipment,
- safety instruments and clothing,
- safety installations, eg fire exits, exhaust fans

Incident Report includes details of:

- name
- date/time of incident
- date/time of report,
- location
- environment conditions
- persons involved
- sequence of events
- injuries sustained
- damage sustained
- actions taken
- witnesses
- supervisor/manager notified

Job titles include:

- health and safety officer
- first aid officer
- fire officer

Documents include:

- fire notices
- accident reports
- safety instructions for equipment and procedures
- company notices and documents
- legal documents (eg government notices)

Activities and causes include:

	• physical actions, • reading, • listening to and giving instructions, • inattention, • sickness and incapacity (such as drunkenness), • health hazards (such as untreated injuries and contagious illness) Exposure to toxic materials could be by: • 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 Types of fires are: • Class A: eg. ordinary solid combustibles, such as wood, paper, cloth, plastic, charcoal, etc. • Class B: flammable liquids and gases, such as gasoline, propane, diesel fuel, tar, cooking oil, and similar substances • Class C: eg. electrical equipment such as 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 are: • heating of metal, • spontaneous ignition, • sparking, • electrical heating, • loose fires (smoking, welding, etc.), • chemical fires, etc. Fire extinguishers use: • sand • water • foam • CO2 • dry powder
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Health and safety	The user/individual on the job should be able to:

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	PC1. use protective clothing/equipment for specific tasks and work conditions PC2. state the name and location of people responsible for health and safety in the workplace. PC3. state the names and location of documents that refer to health and safety in the workplace. PC4. identify job-site hazardous work and state possible causes of risk or accident in the workplace. PC5. 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 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 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 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	The user/individual on the job should be able to: PC13. use the various appropriate fire extinguishers on different types of fires correctly 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 where required eg. 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 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. PC25. complete a written accident/incident report or dictate a report to another person, and send report to person responsible PC26. demonstrate correct method to move injured people and others during an emergency
Knowledge and Understanding (K)	

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A. Organizational Context (Knowledge of the company / organization 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: KA3. meaning of "hazards" and "risks" KA4. health and safety hazards commonly present in the work environment and related precautions KA5. possible causes of risk, hazard or accident in the workplace and why risk and/or accidents are possible. KA6. activities and causes of risk and accident KA7. methods of accident prevention KA8. safe working practices when working with tools and machines KA9. safe working practices while working at various hazardous sites KA10. where to find all the general health and safety equipment in the workplace KA11. various dangers associated with the use of electrical equipment KA12. preventative and remedial actions to be taken in the case of exposure to toxic materials. KA13. importance of using protective clothing/equipment while working KA14. precautionary activities to prevent the fire accident KA15. various causes of fire KA16. techniques of using the different fire extinguishers KA17. different methods of extinguishing fire KA18. rescue techniques applied during a fire hazard KA19. various types of safety signs and what they mean KA20. appropriate basic first aid treatment relevant to the condition eg. shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries KA21. content of written accident report. KA22. potential injuries and ill health associated with incorrect manual handing KA23. safe lifting and carrying practices KA24. personal safety, health and dignity issues relating to the movement of a person by others. KA25. potential impact to a person who is moved incorrectly
Skills (S) [Optional]	
A. Core Skills/ Generic Skills	**Reading and Writing Skills**
	The user/individual on the job needs to know and understand how to: SA1. read and comprehend basic content to read labels, charts, signages SA2. read and comprehend basic English to read manuals of operations SA3. read and write an accident/incident report in local language or English

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

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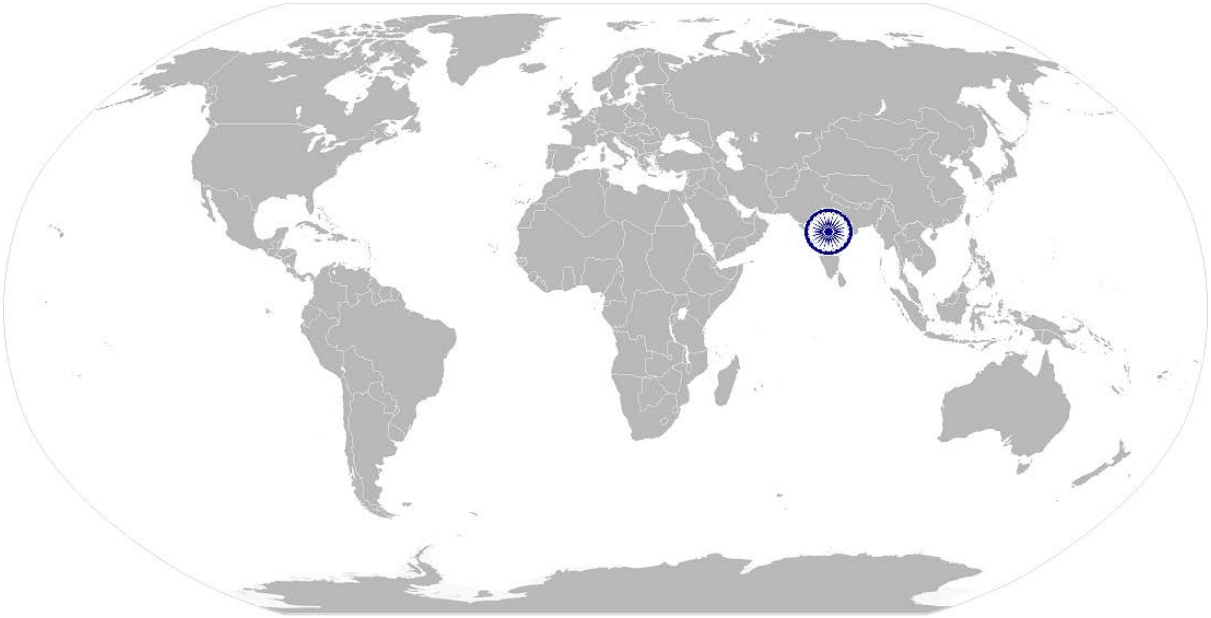
NOS Version Control

NOS Code	**CSC / N 0135**		
Credits(NSQF) [*OPTIONAL*]		**Version number**	**2.0**
Industry	**Capital Goods**	**Drafted on**	**10/04/14**
Industry Sub-sector	1. Machine Tools 2. Tools Dies And Press Tools 3. Plastic Manufacturing Machinery **4.** Textile Manufacturing Machinery **5.** Process Plant Machinery **6.** Electrical and Power Generation Machinery **7.** Light Engineering Goods	**Last reviewed on**	
		Next review date	**15/04/14**

National Occupational Standard



Overview

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

National Occupational Standard

CSC/ N 0136: Work effectively with others

Unit Code	**CSC / N 0136**
Unit Title (Task)	**Work effectively with others**
Description	This unit covers basic etiquette and competencies that a candidate is required to possess and demonstrate in their behavior and interactions with others at the workplace. These cover areas such as communication etiquette, discipline, listening, handling conflict and grievances.
Scope	This unit/task covers the following: Etiquette includes: • do not use abusive language • use appropriate titles and terms of respect • do not eat or chew while talking (vice versa)etc. Behaviors include: • punctuality • completing tasks as per given time and standards • not gossiping and idling time • eliminating waste • honesty, etc.

Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
	The user/individual on the job should be able to: PC1. accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required PC2. accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt PC3. give information to others clearly, at a pace and in a manner that helps them to understand PC4. display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible PC5. consult with and assist others to maximize effectiveness and efficiency in carrying out tasks PC6. display appropriate communication etiquette while working PC7. display active listening skills while interacting with others at work PC8. use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism PC9. demonstrate responsible and disciplined behaviors at the workplace PC10. escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict
Knowledge and Understanding (K)	
A. Organizational Context	The user/individual on the job needs to know and understand:

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(Knowledge of the company / organization and its processes)	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 behavior for a working professional KB14. common reasons for interpersonal conflict KB15. importance of developing effective working relationships for professional success KB16. Expressing and addressing grievances appropriately and effectively KB17. importance and ways of managing interpersonal conflict effectively
Skills (S) [Optional]	

CSC/ N 0136: Work effectively with others

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Industry Sub-sector	1. Machine Tools 2. Tools Dies And Press Tools 3. Plastic Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery **7.** Light Engineering Goods	**Last reviewed on**	
		Next review date	**15/04/14**