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- Senior Manual Metal Arc Welder/ Shielded Metal Arc Welder

SECTOR/S: CAPITAL GOODS

SUB-SECTOR:

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

OCCUPATION: Welding and Cutting

REFERENCE ID: CSC/Q0208

ALIGNED TO: NCO-2004/NIL

Brief Job Description: Perform manual metal arc welding (MMAW) welding also known as Shielded Metal Arc Welding (SMAW) for a range of standard welding job requirements. This is for a skilled welder who can weld different materials (carbon steel, low alloy steel and austenitic stainless steel) in all positions. The welder can prepare various joints including groove, corner, butt and fillet welds.The welder can 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/Q0208**		
Job Role	**Senior Manual Metal Arc Welder/ Shielded Metal Arc Welder [Applicable for National Scenarios]**		
Credits	**TBD**	**Version number**	**1.0**
Sector	**Capital Goods**	**Drafted on**	**10/04/2014**
Sub-sector	**1. Machine Tools 2. Dies, Moulds and Press Tools 3. Plastics Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery 7. Light Engineering Goods**	**Last reviewed on**	**24/11/2017**
Occupation	**Welding and Cutting**	**Next review date**	**24/11/2021**
NSQC Clearance on	**22/04/2015**		

Job Role	Senior Manual Metal Arc Welder/ Shielded Metal Arc Welder
Role Description	Perform manual metal arc welding also known as shielded metal arc welding for producing a range of joints on various forms of materials (carbon steels, low alloy steel and stainless steel) as per welding specification procedures (WPS).
NSQF level	4
Minimum Educational Qualifications **Maximum Educational Qualifications**	10th Standard pass, preferably Not Applicable
Prerequisite License or Training	No Previous Training Required
Minimum Job Entry Age	18 Years
Experience	No Previous Experience Required
Applicable National Occupational Standards (NOS)	**Compulsory:** 1. CSC/N0208 Manually weld carbon steel/ low alloy steel and austenitic stainless steel using Metal Arc Welding / Shielded Metal Arc Welding 2. CSC/N0207 Manually cut metal materials using plasma arc 3. CSC/N0203 Manually cut metal and metal alloys using oxyfuel gas 4. CSC/N1335 Use basic health and safety practices at the workplace 5. CSC/N1336 Work effectively with others
Performance Criteria	As described in the relevant OS units

Definitions

Keywords /Terms	Description
Sector	Sector is a conglomeration of different business operations having similar business 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.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the knowledge and understanding they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria	Performance criteria are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OSs, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a 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 quality of performance required.
Knowledge and Understanding	Knowledge and understanding are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual need to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.

Core Skills/ Generic Skills	Core skills or generic skills are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. In the context of the OS, these include communication related skills that are applicable to most job roles.

Acronyms

Keywords/ Terms	Description
MMAW	Manual Metal Arc Welding
SMAW	Shielded Metal Arc Welding
WPS	Welding Procedure Speciation
IS	Indian Standards
EN	European Standards
ASME	American Society Of Mechanical Engineers
AC / DC	Alternating Current / Direct Current
VT	Visual Testing
NDT	Non-Destructive Testing
DT	Destructive Testing
RT	Radiographic Testing
UT	Ultrasonic Testing
DPT	Dye Penetrant Testing
MPT	Magnetic Particle Testing
FPT	Fluorescent Penetrant Testing
CO_2	Carbon Dioxide
CPR	Cardiac Pulmonary Resuscitation
ISO	International Organization For Standardization
PQR	Process Qualification Record

CSC/N0208 Manually weld carbon steel/ low alloy steel and austenitic stainless steel using Metal Arc Welding/ Shielded Metal Arc Welding

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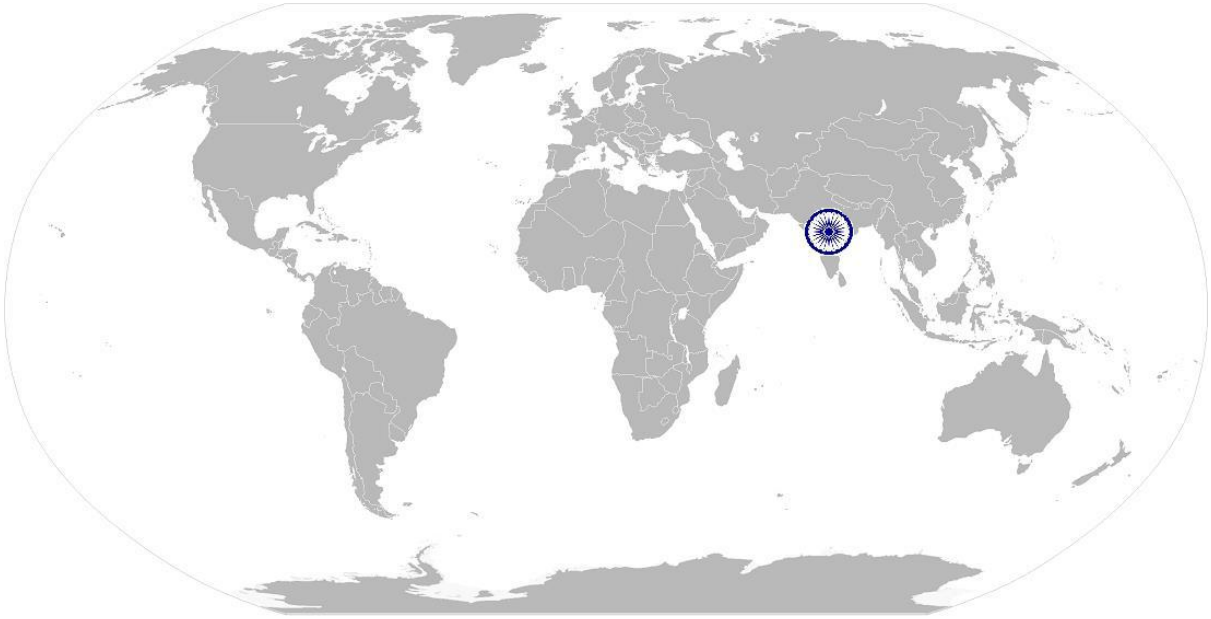
National Occupational Standard



Overview

This unit covers the performing of manual metal arc welding (MMAW) also known as shielded metal arc welding (SMAW) for producing a range of joints on various forms of metal and metal alloys including carbon steels, low alloy steels and austenitic stainless steel as per welding specification procedures (WPS).

CSC/N0208 Manually weld carbon steel/ low alloy steel and austenitic stainless steel using Metal Arc Welding /Shielded Metal Arc Welding

National Occupational Standard

Unit Code	CSC/N0208
Unit Title (Task)	Manually weld carbon steel/ low alloy steel and austenitic stainless steel using Metal Arc Welding/ Shielded Metal Arc Welding
Description	This OS unit is about performing manual metal arc welding (MMAW) also known as Shielded Metal Arc Welding (SMAW) for a range of standard welding job requirements. This is for a skilled welder who can weld different materials (carbon steel, low alloy steel and austenitic stainless steel) in 1G/1F, 2G/2F, 3G/3F, 4G/4F, 5G/5F and 6G positions.
Scope	This unit/ task covers the following: • Work safely • Prepare for welding operations • Carry out welding operations • Test for quality • Post-welding activities • Deal with contingencies

Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Work safely	To be competent, the user/individual on the job must be able to: PC1. work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines PC2. adhere to procedures or systems in place for health and safety, personal protective equipment (PPE) and other relevant safety regulations Safety precautions (general): general workshop safety; fire prevention; general hazards; manual lifting; overhead lifting; shopfloor housekeeping including surface conditions; waste disposal; stability of surrounding structures, furniture etc. PC3. check the condition of, and correctly connect, welding leads, earthing arrangements and electrode holder PC4. deal with any faults or differential as per laid procedures PC5. follow fume extraction safety procedures
Prepare for welding operations	To be competent, the user/individual on the job must be able to: PC6. read and interpret routine information on written job instructions, welding procedure specifications (WPS) and standard operating procedures WPS: e.g. welding process (ISO codes); parent metal; consumables; pre welding joint preparation (edge preparation, assembly, pre-heat); welding parameters; welding positions (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; electrode sizes for joint thicknesses; electrode and covering; electrical

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	conditions required (type of current, alternating [A.C.] direct [D.C.], electrode polarity (positive or negative), welding current ranges); welding techniques; sequence of welding; control of heat input; preheat/post heat; interpass/run cleaning/back gouging methods; post welding activities (wire brushing and grinding, removal of excess weld metal where required); post-weld heat treatment (normalising, stress relief), etc. PC7. select welding machines (e.g. transformers, rectifiers, inverters and generators, etc.) according to the task PC8. select type and size of electrodes according to classification and specifications PC9. re-dry electrodes as per electrode classification requirement PC10. prepare the work area for the welding activities PC11. perform measurements for joint preparation and routine MMAW PC12. prepare the various forms of materials and the joint in readiness for welding Materials: Carbon steel, low alloy steel and stainless steels Forms: plate, sheet (1.5mm), structural section, other forms (hollow tubes, sections, shapes, etc.) Joint preparation: made rust free; cleaned – free from scaling, paint, oil/ grease; made dry and free from moisture; edges to be welded prepared as per job requirement - such as flat, square or bevelled; use various machines and techniques for the above (eg. chamfering machine, grinding and stripping, gas or plasma cutting, etc.); 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 PC13. tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding PC14. use manual metal-arc welding and related equipment to include a. alternating current (AC) equipment b. direct current (DC) equipment MMAW equipment: e.g. transformers; rectifiers; generators; invertors; consumables – electrodes, dyes; welding accessories - holders, cables and accessories; ancillary equipment - (power saw, angle, pedestal and straight grinders, tong tester, etc.); electrode drying oven, etc. PC15. connect equipment to power source PC16. connect cables, electrode holders, return leads and ground clamps to appropriate terminal PC17. set, read and adjust amperage controls PC18. verify setup by running test and appropriately handle weld specimen/scrap plate PC19. tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding

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Carry out welding operations	To be competent, the user/individual on the job must be able to: PC20. strike and maintain a stable arc PC21. stop and properly re-start arc to avoid welding defects (scratch start, tapping techniques) PC22. manipulate electrode angle using various methods as per WPS PC23. maintain constant puddle by using appropriate travel speed PC24. remove slag in an appropriate manner (eg. wire brush, hammer, etc.) PC25. weld the joint to the specified quality, dimensions and profile applicable to range of material PC26. produce range of welded joints to within the mentioned standard using single or multi-run welds (as appropriate) Joints: fillet and groove PC27. produce joints of the required quality and of specified dimensional accuracy which achieve a weld quality equivalent to Level C of ISO 5817 Weld quality standards: 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 trapped slag, 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 PC28. produce range of welded joints in various positions as per the WPS specified Positions: flat (PA) IG/1F, horizontal vertical (PB) 2F, horizontal (PC) 2G, vertical upwards (PF) 3F / 3G, vertical downwards (PG) 3F / 3G, 4G Plate (overhead) Plate to Pipe (Fixed) 5F, pipe welding 5G/5F and 6G PC29. shut down and make safe the welding equipment on completion of the welding activities
Test for quality	To be competent, the user/individual on the job must be able to: PC30. identify various weld defects, use appropriate methods and equipment to check the quality, and that all dimensional and geometrical aspects of the weld are to the specification Weld defects: lack of continuity of the weld; uneven and irregular ripple formation; excessive spatter; incorrect weld size or profile; burn through;

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	undercutting; overlap; inclusions; distortion; porosity; internal cracks; surface penetration; gouges; stray arc strikes; sharp edges; excessive convexity PC31. check that the welded joint conforms to the specification, by checking various quality parameters by visual inspection Quality parameters: dimensional accuracy; alignment/squareness; size and profile of weld; visual defects; NDT/DT tested defects Visual inspections: e.g. use of visual techniques, distance from workpiece, angle of observation, adequate lighting, low powered magnification, fillet weld gauges, etc. PC32. detect surface imperfections and deal with them appropriately PC33. carry out DPT tests to assess fine defect open to the surface not detected by visual inspection (VT)
Post-welding activities	To be competent, the user/individual on the job must be able to: PC34. assist in preparation for non-destructive testing of the welds, for a range of tests Non-destructive tests (NDT): Penetrant testing- dye penetrant (DPT), fluorescent penetrant (FPT); magnetic particle (MPT); radiographic (RT); ultrasonic (UT) PC35. prepare for destructive tests on weld specimens for fillet, butt and corner Destructive tests (DT): macro examination; fractured test- nick break test; bend tests (such as face, root or side, as appropriate); mechanical (tensile and shear, impact); chemical
Deal with contingencies	To be competent, the user/individual on the job must be able to: PC36. 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. health and safety, hazards and precautions associated with MMAW/SMAW welding Safety precautions (MMAW/SMAW Welding): protection from live and other

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	electrical components, including insulation, proper earthing, etc.; proper handling and placement of hot metal; taking account of spatter and related safe distance; adequate lighting; appropriate personal protective equipment suitable aprons, welding gloves, respirators, safety boots, correctly fitting overalls, suitable eye shields/goggles, hard hat/helmet; protection of self and others from the effects of the welding arc; fume extraction/control measures; safety measures for elevated and trench workings (eg. harness, etc.) KB2. applications of manual metal arc welding KB3. effects of exposure to the electric arc KB4. types of fire extinguishers and their suitable uses KB5. effects of exposure to welding fume KB6. methods of managing welding fume hazards KB7. personal protective equipment (PPE) and clothing to be worn during MMAW/SMAW welding Personal protective equipment (PPE): (suitable aprons, welding gloves, respirators, safety boots, correctly fitting overalls, suitable eye shields/goggles, hard hat/helmet KB8. welding specific equipment requirements for MMAW/SMAW welding MMAW equipment: e.g. transformers; rectifiers; generators; invertors; consumables – electrodes, dyes; welding accessories - holders, cables and accessories; ancillary equipment - (power saw, angle, pedestal and straight grinders, tong tester, etc.); electrode drying oven, etc. KB9. main components and controls of welding equipment KB10. how to connect electrical components correctly KB11. type of current used and implication KB12. welding symbols used and their correct interpretation KB13. consumables used for MMAW/SMAW welding KB14. various types of electrodes (classification) based on covering Electrodes: rutile, basic, cellulosic, acid KB15. function of covering KB16. various defects associated with the MMAW/SMAW welding process Weld defects: lack of continuity of the weld; uneven and irregular ripple formation; excessive spatter; incorrect weld size or profile; burn through; undercutting; overlap; inclusions; distortion; porosity; internal cracks; surface cracks; lack of fusion or incomplete fusion; lack of penetration; excessive penetration; gouges; stray arc strikes; sharp edges; excessive convexity KB17. types of joint configurations Joints: fillet and groove (lap joints, tee fillet joints, corner joints, butt joints square, single vee, double vee)

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	KB18. factors that determine weld bead shape Factors: electrode angles and welding technique (push, perpendicular, drag); arc length; thickness of base metal; travel speed (slow, normal, fast) KB19. types of beads, their characteristics and uses (stringer, weave, weave patterns) Bead characteristics: spatter deposits, roughness, evenness, fill, crater, overlap KB20. factors that affect weld quality Quality standards: 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 trapped slag; 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 formations); 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 KB21. weld positions such as flat, horizontal, vertical and overhead KB22. types of equipment components such as electrode holders, work leads cables and ground clamps KB23. awareness and importance of cable size and length KB24. types of polarity such as AC and DC electrode negative and DC electrode positive for welding purposes KB25. various types of base metals used in welding and their implications KB26. type and thickness of base metals to be welded Base metals: e.g. mild or low carbon steel, austenitic stainless steel, etc. KB27. distortion and how to control distortion Distortion (causes and control methods): Causes: improper sequence of weld runs; direction of weld runs; heat input errors; lack of inaccuracy of jigs and fixture; Control Methods: sequence of welding as materials; proper direction; tacking and its frequency (where applicable; use clamping and jigs and fixtures (where applicable) KB28. magnetic arc blow or arc deflection, causes and methods to avoid or compensate KB29. storage requirements for consumable electrodes

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	KB30. electrode classifications such as tensile strength, position and composition KB31. electrode types based on covering, their characteristics and uses KB32. purpose of re-drying and procedure for different classification of electrode KB33. welding process and method specification sheet, process qualification record (PQR) and related essential variables KB34. travel speed and heat inputs KB35. amperage requirements for different classification of electrodes and positions KB36. importance and implications of various diameters of electrodes KB37. gouging and back gouging principles, methods and procedures KB38. purpose and importance of pre-heating requirements for base metals KB39. purpose and importance of post-heating in welding KB40. methods to achieve pre-heat and post heat requirements KB41. tools and methods to measure temperature for pre-heat and post-heat requirements such as thermal chalk, thermocouple, etc. KB42. significance of diffusible hydrogen for welds KB43. importance of maintaining welding standards specified for the job KB44. impact of a welding job done right, acceptable or non-acceptable KB45. types of visual inspection indicators and methods Visual inspections: e.g. use of visual techniques, distance from workpiece, angle of observation, adequate lighting, low powered magnification, fillet weld gauges, etc. KB46. types of NDT and DT inspection methods KB47. procedure to conduct DP testing KB48. common welder testing codes and their purpose Testing codes: ASME section IX, EN 287, ISO 9606, IS 731
Skills (S)	
A. Core Skills/ Generic Skills	**Reading Skills**
	The user/ individual on the job needs to know and understand how to: SA1. read and interpret information correctly from various job specification documents, health and safety instructions, memos, etc. applicable to the job in English and/or local language
	Writing Skills
	The user/individual on the job needs to know and understand how to: SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. undertake numerical operations, geometry and calculations/ formulae arithmetic: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages

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	SA4. use appropriate measuring techniques SA5. use and convert imperial and metric systems of measurements SA6. apply appropriate degree of accuracy to express numbers SA7. calculate tolerance in terms of limits of size SA8. check measurements, angles, orientation and slopes SA9. types of reference lines such as tangent lines, datum lines, centre lines and work points SA10. check square of material using corner-to-corner dimensions and triangulation (3-4-5) method SA11. select and use tools and equipment such as measuring tapes, levels, squares, protractors and dividers SA12. ability to check dimensions of components SA13. calculate the value of angles in a triangle SA14. interpret straight line graphs using given data
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA15. convey and share technical information clearly using appropriate language SA16. check and clarify task-related information SA17. liaise with appropriate authorities using correct protocol SA18. communicate with people in respectful form and manner in line with organizational protocol
B. Professional Skills	**Decision Making**
	NA
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB1. plan, prioritize and sequence work operations as per job requirements SB2. organize and analyze information relevant to work SB3. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB4. exercise restraint while expressing dissent and during conflict situations SB5. avoid and manage distractions to be disciplined at work SB6. manage own time for achieving better results SB7. work in a team in order to achieve better results SB8. identify and clarify work roles within a team SB9. communicate and cooperate with others in the team for better results SB10. seek assistance from fellow team members

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	Problem Solving
	The user/individual on the job needs to know and understand how to: SB11. identify problems with work planning, procedures, output and behavior and their implications SB12. prioritize and plan for problem solving SB13. communicate problems appropriately to others SB14. identify sources of information and support for problem solving SB15. seek assistance and support from other sources to solve problems SB16. identify effective resolution techniques SB17. select and apply resolution techniques SB18. seek evidence for problem resolution
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB19. undertake and express new ideas and initiatives to others SB20. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB21. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB22. enhance one's competencies in new and different situations and contexts to achieve more
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB23. participate in on-the-job and other learning, training and development interventions and assessments SB24. clarify task related information with appropriate personnel or technical adviser SB25. seek to improve and modify own work practices SB26. maintain current knowledge of application standards, legislation, codes of practice and product/process developments

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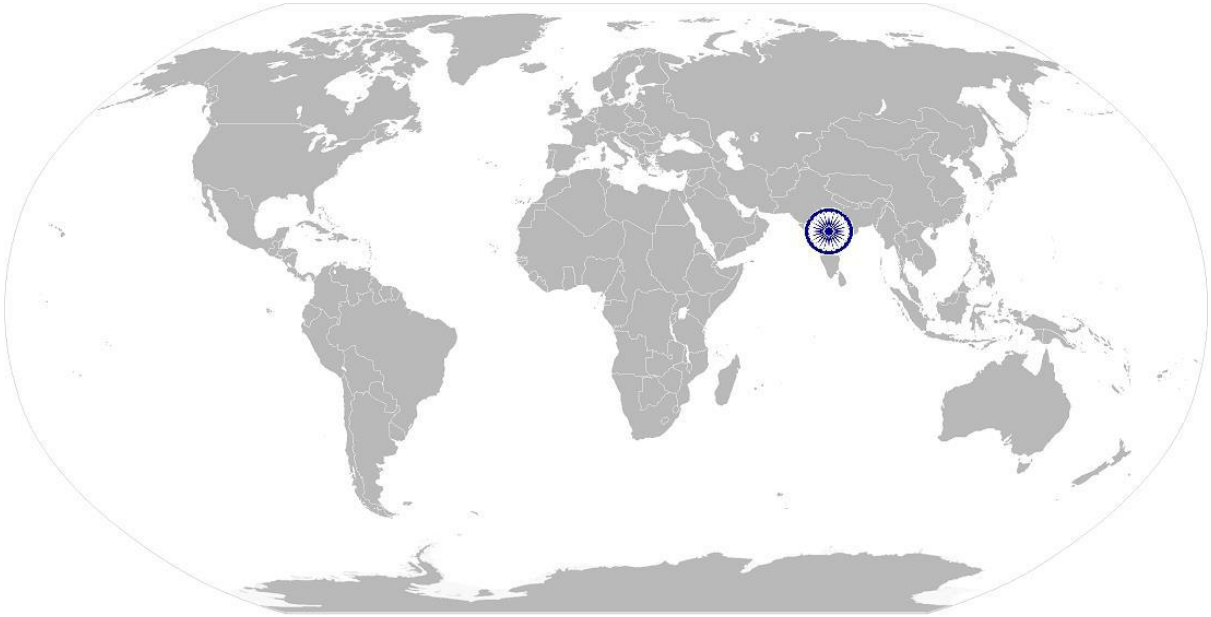
NOS Version Control

NOS Code	CSC/N0208		
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	10/04/2014
Industry Sub-sector	1. Machine Tools 2. Dies, Moulds and Press Tools 3. Plastics Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery 7. Light Engineering Goods	Last reviewed on	24/11/2017
Occupation	Welding and Cutting	Next review date	24/11/2021

CSC/N0207 Manually cut metal materials using plasma arc

National Occupational Standard



Overview

This unit covers manual cutting operations using plasma arc cutting process. The person would be able to independently carry out plasma arc cutting operations for as per welding procedure specification (WPS).

CSC/N0207 Manually cut metal materials using plasma arc

National Occupational Standard

Unit Code	CSC/N0207
Unit Title (Task)	**Manually cut metal materials using plasma arc**
Description	This unit is about competencies required for manual cutting operations using plasma arc. The candidate will be able to cut different materials (mild carbon steel, stainless steel, aluminum, high tensile and special steels, and other materials) in various profiles pertaining to the gas cutting process.
Scope	This unit/task covers the following: • Work safely • Prepare for cutting operations • Carry out cutting operations • Test for quality • Deal with contingencies
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Work safely	To be competent, the user/individual on the job must be able to: PC1. work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines Safety precautions (general): general workshop safety; fire prevention; general hazards; manual lifting; overhead lifting; surface conditions; stability of surrounding structures, furniture, etc. PC2. take necessary safety precautions for plasma cutting operations including equipment, processes and checks
Prepare for cutting operations	To be competent, the user/individual on the job must be able to: PC3. interpret cutting procedure data sheets specifications PC4. check regulators, hoses and check that valves are securely connected and free from leaks and damage PC5. check equipment is calibrated and approved for use PC6. check/fit the correct nozzle to the torch PC7. match correct tips and cups to the torch as per requirement and manufacturer's equipment instructions PC8. set the amperage and gas pressure as per metal thickness, metal type, and type of gas Materials type: mild steel; high alloy steel; stainless steel; aluminium and its alloys; other appropriate metal Types of gases: Primary Plasma Gas – used to create the plasma arc (Nitrogen, Argon, Hydrogen, Compressed air); Secondary Shielding Gas – used

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	to protect the cut metals from oxidation (CO_2, Compressed Air) PC9. use the correct procedure for lighting, adjusting and extinguishing the arc PC10. use appropriate and safe procedures for handling and storing of gas cylinders PC11. prepare the work area for the cutting activities PC12. obtain the appropriate tools and equipment for the plasma arc cutting operations, and check that they are in a safe and usable condition Equipment: plasma power source; pilot arc ignition system; torch; portable straight line cutters; profile cutting machines; air filter with regulator; burner electrode; compressor; nozzle; electrode holder; contact tube; front cap; gas supply system with gauges; cooling system; earthing clamp; connecting leads and cables PC13. check that the plasma arc cutting equipment is correctly set up for the operations to be performed PC14. carry out correct measurements required using appropriate equipment and methods for planning the cut PC15. mark out the components for the required operations, using appropriate tools and techniques where appropriate PC16. perform trial cut to check for cut defect
Carry out cutting operations	To be competent, the user/individual on the job must be able to: PC17. operate the plasma cutting equipment to produce items/cut shapes to the dimensions and profiles as specified PC18. use the correct angles to cut and the right speed PC19. use various types of plasma arc cutting methods/techniques Cutting techniques: stand-off, circle cutting, profile cutting, edge, stenting hole, piercing technique PC20. perform various cutting operations correctly Cutting operations: down-hand straight cuts (freehand), making straight cuts (track guided), cutting regular shapes, cutting irregular shapes, making angled cuts, cutting chamfers, making radial cuts, gouging/flushing, bevelled edge – weld preparations, cutting out holes PC21. produce thermal cuts in various forms of material Forms: plate, rolled section, pipe/tube, solid bars PC22. produce cut profiles for various type of materials Materials type: mild steel; high alloy steel; stainless steel; aluminium and its alloys; other appropriate metal PC23. produce thermally-cut components which meet specified quality criteria Quality criteria: dimensional accuracy is within the tolerances specified on the drawing/specification, or within +/- 1mm; angled/radial cuts are within specification requirements; cuts are clean and smooth and free from flutes; no drags

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	PC24. detect and correct defects in cut PC25. leave the work area in a safe and tidy condition on completion of the cutting activities
Test for quality	To be competent, the user/individual on the job must be able to: PC26. check that the finished components meet the required standard PC27. use appropriate methods and equipment to check the quality, and that all dimensional and geometrical aspects of the cut material are to the specification PC28. identify various cutting defects Defects: grooved, fluted or ragged cuts, poor draglines, rounded edges, tightly adhering slag, dross, burr, distortion
Deal with contingencies	To be competent, the user/individual on the job must be able to: PC29. report any difficulties or problems that may arise with the cutting activities, and carry out any agreed actions PC30. detect equipment malfunctions and deal with them appropriately PC31. 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 PC32. shut down and make safe the cutting equipment on completion of the cutting activities or during an emergency PC33. follow standard emergency procedures in case of emergencies
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. job 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. types of fire extinguishers and their suitable uses in case of gas cutting related fires KB2. specific safety precautions to be taken when working with plasma arc cutting equipment in a fabrication environment Safety precautions: safety from trailing hoses; safety from arc; appropriate fume and gases extraction/control measures; safety from spatter and hot metal (distance, PPE, proper handling and placement); protection from live and other electrical components, including insulation, proper earthing, proper loading, etc.; adequate lighting; appropriate personal protective

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	equipment; protection of self and others from the effects of the arc; cylinder safety; safety measures including nozzles. valves, flowmeter, flashback arrestors, etc.; safety measures for elevated and trench working KB3. personal protective clothing and equipment (PPE) to be worn when working with plasma cutting equipment Personal protective equipment: suitable aprons, gloves, safety boots, correctly fitting overalls, suitable eye shields/goggles, ear plugs or covering KB4. hazards associated with carrying out plasma arc cutting activities and how they can be minimized KB5. safe working practices and procedures for using plasma equipment KB6. principles of plasma arc cutting Principles: plasma an ionized gas that conducts electricity; plasma is created by adding energy to an electrically neutral gas; gas is compressed air, energy is electricity; more electrical energy added, the hotter the plasma; plasma cutting machines constrict the arc and force it through a concentrated area (the nozzle); pilot arc, cutting arc; increasing air pressure and intensifying the arc with higher amperage, the arc becomes hotter and more capable of blasting through thicker metals and blowing away the cuttings and it does not require a pre-heat cycle; using an inert gas for pressure prevents the cut areas from oxidizing; for most ferrous metals, compressed air is used; for nonferrous metals the inert gas is essential to prevent oxidation; different plasma tip diameters are used for different cutting thickness; has smaller heat affected zone (HAZ) preventing the area around the cut from warping and minimizes paint damage; provides gouging and piercing capabilities; minimal cleanup required, small and more precise kerf (width of the cut); cuts any type of electrically conductive metals including aluminum, copper, brass and stainless steel KB7. common terminology used in plasma cutting KB8. procedure for obtaining the required drawings, job instructions and other related specifications KB9. how to use and extract information from engineering drawings and related specifications, workpiece reference points and system of tolerances KB10. various types of plasma arc cutting equipment Types: transferred, non-transferred (welding) KB11. various components of the cutting equipment and types of consumables used Consumables: electrode, gases, tips, cups KB12. construction of the cutting torch KB13. types of plasma arc gases used Types of gases: Primary Plasma Gas – used to create the plasma arc

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	(Nitrogen, Argon, Hydrogen, Compressed air); Secondary Shielding Gas – used to protect the cut metals from oxidation (CO_2, Compressed Air) KB14. accessories that can be used with handheld gas cutting equipment to aid cutting operations (such as cutting guides, templates) KB15. types of regulators such as low- and high-pressure, and single- and two-stage KB16. nozzle type as per type and thickness of base materials KB17. preparations prior to cutting (including checking connections for leaks, setting gas pressures, setting up the material/workpiece, and checking the cleanliness of materials used) KB18. holding methods that are used to aid plasma cutting, and the equipment that can be used KB19. correct procedure for lighting, cutting and extinguishing the arc KB20. importance of following the correct procedure for lighting, cutting and extinguishing an arc KB21. importance of torch to arc distance in relation to thickness of materials, types of torches and gases Torches: air plasma, oxygen injected, duel gas KB22. factors that impact nozzle life KB23. double arcing and its impact KB24. problems that can occur with plasma cutting, and how they can be avoided (including causes of distortion during plasma cutting and methods of controlling distortion) KB25. effects of oil, grease, scale or dirt on the cutting process KB26. quality parameters for plasma cut materials Quality parameters: shape and length of the draglines; squareness; angle deviation; smoothness of the sides; sharpness of the top edges; amount of slag adhering to the metal KB27. causes of cutting defects, how to recognize them, and methods of correction and prevention KB28. gouging and back gouging principles, methods and procedures KB29. importance of leaving the work area in a safe and clean condition on completion of activities KB30. emergency procedures for electrical and other fires KB31. how to close down the cutting equipment safely and correctly KB32. purging tools and their function
Skills (S)	
A. Core Skills/ Generic Skills	**Reading Skills**
	The user/ individual on the job needs to know and understand how to: SA1. read and interpret information correctly from various job specification

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	documents, health and safety instructions, memos, etc. applicable to the job in English and/or local language
	Writing Skills
	The user/individual on the job needs to know and understand how to: SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. undertake numerical operations, geometry and calculations/ formulae (including addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages) SA4. use appropriate measuring techniques SA5. use and convert imperial and metric systems of measurements SA6. apply appropriate degree of accuracy to express numbers SA7. use tolerance in terms of limits of size SA8. check measurements, angles, orientation and slopes SA9. types of reference lines such as tangent lines, datum lines, center lines and work points SA10. check square of material using corner-to-corner dimensions and triangulation (3-4-5) method SA11. select and use tools and equipment such as measuring tapes, levels, squares, protractors and dividers SA12. ability to check dimensions of components SA13. calculate the value of angles in a triangle
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA14. convey and share technical information clearly using appropriate language SA15. check and clarify task-related information SA16. liaise with appropriate authorities using correct protocol SA17. communicate with people in respectful form and manner in line with organizational protocol
B. Professional Skills	**Decision Making**
	NA
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB1. plan, prioritize and sequence work operations as per job requirements SB2. organize and analyze information relevant to work SB3. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	Customer Centricity

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	The user/individual on the job needs to know and understand how to: SB4. exercise restraint while expressing dissent and during conflict situations SB5. avoid and manage distractions to be disciplined at work SB6. manage own time for achieving better results SB7. work in a team in order to achieve better results SB8. identify and clarify work roles within a team SB9. communicate and cooperate with others in the team for better results SB10. seek assistance from fellow team members
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB11. identify problems with work planning, procedures, output and behavior and their implications SB12. prioritize and plan for problem solving SB13. communicate problems appropriately to others SB14. identify sources of information and support for problem solving SB15. seek assistance and support from other sources to solve problems SB16. identify effective resolution techniques SB17. select and apply resolution techniques SB18. seek evidence for problem resolution
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB19. undertake and express new ideas and initiatives to others SB20. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB21. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB22. enhance one's competencies in new and different situations and contexts to achieve more
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB23. participate in on-the-job and other learning, training and development interventions and assessments SB24. clarify task related information with appropriate personnel or technical adviser SB25. seek to improve and modify own work practices SB26. maintain current knowledge of application standards, legislation, codes of practice and product/process developments

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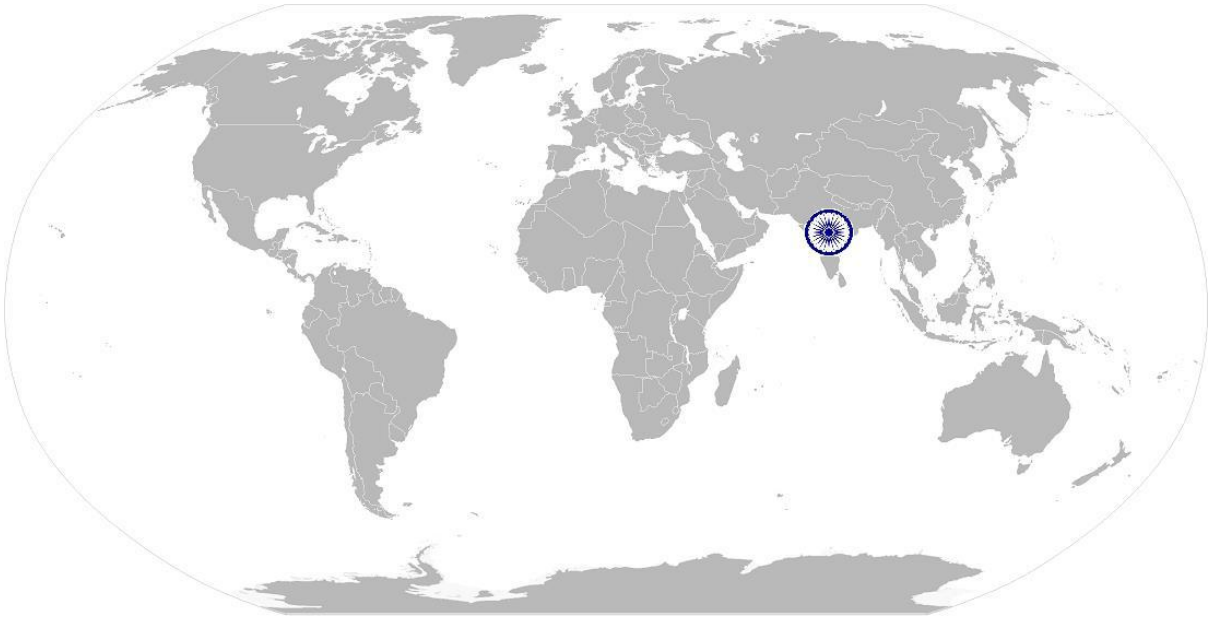
NOS Version Control

NOS Code	CSC/N0207		
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	10/04/2014
Industry Sub-sector	1. Machine Tools 2. Dies, Moulds and Press Tools 3. Plastics Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery 7. Light Engineering Goods	Last reviewed on	24/11/2017
Occupation	Welding and Cutting	Next review date	24/11/2021

CSC/N0203 Manually cut metal and metal alloys using oxyfuel gas

National Occupational Standard



Overview

This unit is about competencies required for manual cutting operations using oxy-fuel gas. The person would be able to independently carry out oxy-fuel gas cutting operations as per welding procedure specification (WPS).

CSC/N0203 Manually cut metal and metal alloys using oxyfuel gas

National Occupational Standard

Unit Code	**CSC/N0203**
Unit Title (Task)	**Manually cut metal and metal alloys using oxyfuel gas**
Description	This unit is about competencies required for manual cutting operations using oxy-fuel gas such as oxy-acetylene. The person would be able to independently carry out oxyfuel cutting operations for as per welding procedure specification (WPS).
Scope	This unit/task covers the following: • Work safely • Prepare for cutting operations • Carry out cutting operations • Test for accuracy • Deal with contingencies
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Work safely	To be competent, the user/individual on the job must be able to: PC1. work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines Safety precautions: general workshop safety, fire prevention, general hazards, manual lifting, overhead lifting, surface conditions, stability of surrounding structures, furniture, etc. PC2. take necessary safety precautions for gas cutting operations including equipment, processes and checks
Prepare for cutting operations	To be competent, the user/individual on the job must be able to: PC3. interpret cutting procedure data sheets specifications PC4. check regulators, hoses and check that valves are securely connected and free from leaks and damage PC5. check equipment is calibrated and approved for use PC6. check/fit the correct size gas nozzle to the torch PC7. ensure preheat and oxygen holes on the tips are clean PC8. check that a flashback arrestor is fitted PC9. set appropriate gas pressures PC10. use the correct procedure for lighting, adjusting and extinguishing the flame Lighting and cutting procedures: lighting the cutting torch; adjusting gas controls to produce a neutral flame; methods of starting the cut and controlling the cutting speed; direction and angle of cut; procedure for extinguishing the flame PC11. adjust torch valve for type of flame such as neutral, carburizing and oxidizing

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	PC12. follow sequence of operations such as pre-heating material and initiating cut PC13. mark out the locations for cutting accurately and as per requirement PC14. use appropriate and safe procedures for handling and storing of gas cylinders PC15. prepare the work area for the cutting activities PC16. obtain the appropriate tools and equipment for the oxy-fuel gas cutting operations, and check that they are in a safe and usable condition Equipment: hand-held oxy-fuel gas cutting equipment, simple, portable, track-driven cutting equipment (electrical or mechanical), fixed bench gas cutting equipment PC17. check that the oxy-fuel gas cutting equipment is set up for the operations to be performed PC18. adjust cylinder valves and adjust regulator for operating pressure to achieve specifications for required operations PC19. mark out the components for the required operations, using appropriate tools and techniques where appropriate PC20. perform trial cut to check for cut defects
Carry out cutting operations	To be competent, the user/individual on the job must be able to: PC21. operate the oxy-fuel gas cutting equipment to produce items/cut shapes to the dimensions and profiles specified PC22. use various types of oxy-fuel gas cutting methods PC23. perform various cutting operations correctly Cutting operations: down-hand straight cuts (freehand), making straight cuts (track guided), cutting regular shapes, cutting irregular shapes, making angled cuts, cutting chamfers, making radial cuts, gouging/flushing, beveled edge – weld preparations, cutting out holes PC24. produce thermal cuts in various forms of material (metal of 3mm and above) PC25. produce cut profiles for various type of materials and forms Materials: mild carbon steel, high tensile and special steels, other materials Forms: plate, rolled section, pipe/tube, solid bars PC26. produce thermally-cut components which meet specified quality criteria Quality criteria: dimensional accuracy is within the tolerances specified on the drawing/specification, or within +/- 2mm; angled/radial cuts are within specification requirements; cuts are clean and smooth and free from flutes; no drags PC27. recognize and correct burnback and flashback PC28. detect and correct defects in cut PC29. ensure the work area is left in a safe and tidy condition on completion of the cutting activities
Test for accuracy	To be competent, the user/individual on the job must be able to: PC30. check that the finished components meet the standard required

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	PC31. use appropriate methods and equipment to check the quality, and that all dimensional and geometrical aspects of the cut material are to the specification PC32. identify various cutting defects and follow organisation recommended procedures to address them Defects: distortion; grooved, fluted or ragged cuts; poor draglines; rounded edges; tightly adhering slag
Deal with contingencies	To be competent, the user/individual on the job must be able to: PC33. report any difficulties or problems that may arise with the cutting activities, and carry out any agreed actions PC34. detect equipment malfunctions and deal with them appropriately PC35. 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 PC36. shut down and make safe the cutting equipment on completion of the cutting activities PC37. follow standard emergency procedures in case of emergencies Emergencies (safety procedures): sustained backfire in a blowpipe; close the oxygen valve of the blowpipe; followed by the fuel valve and then close both cylinder valves; investigate the cause and rectify the fault; re-light the blowpipe only after it is completely cooled down; flashback into the hose and equipment, or a hose fire or explosion, or a fire at the gas regulator connections; isolate the fuel gas and oxygen supplies by closing the cylinder valves only when this can be done safely; may attempt to control the fire by fire-fighting equipment only when there is no undue risk of personal injury; activate the fire alarm and call for the Fire Services Department as per organizational procedures; fires involving acetylene cylinders; always best dealt with by firemen from the Fire Services Department. However, the following initial response may be appropriate: cool the cylinder by spraying with water only if it is safe to do so; close the cylinder valve to control the fire only if it is safe to do so; evacuate the building by activating the fire alarm or by any other means; to avoid explosion never move an acetylene cylinder involved in a fire or which has been affected by heat from a nearby fire even if it seems cooled down
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and	The user/individual on the job needs to know and understand: KA1. job relevant legislation, standards, policies, and procedures followed in the company KA2. key purpose of the organization KA3. department structure and hierarchy protocols

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its processes)	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. types of fire extinguishers and their suitable uses in case of gas cutting related fires KB2. specific safety precautions to be taken when working with oxy-fuel gas cutting equipment in a fabrication environment Safety precautions: safety from trailing hoses; safety from naked flames; appropriate fume and gases extraction/control measures; safety from explosive gas mixtures and oxygen enrichment; safety from spatter and hot metal (distance, PPE, proper handling and placement); protection from live and other electrical components, including insulation, proper earthing, proper loading, etc.; adequate lighting; appropriate personal protective equipment; protection of self and others from the effects of the flame; safety measures for elevated and trench working; gas cylinder safety: right color code; correctly labelled; no leakage; away from heat or ignition source; never use hose other than that designed for the specified gas; use ferrules or clamps designed for the hose (not ordinary wire or other substitute) to connect hoses to fittings; upright position (fuel gas); physical care to avoid damage and falls, throws and bumps; move on trolleys, cap closed and without regulators; valves closed on empty cylinders KB3. personal protective clothing and equipment (PPE) to be worn when working with gas cutting equipment Personal protective equipment: suitable aprons, gloves, safety boots, correctly fitting overalls, suitable eye shields/goggles, respirators KB4. hazards associated with carrying out gas cutting activities and how they can be minimized KB5. safe working practices and procedures for using thermal equipment KB6. principles of oxy-fuel gas cutting Principles: oxygen cutting for materials which readily get oxidized; oxides have lower melting points than the metals; widely used for ferrous materials; oxygen cutting is not used for materials like aluminum, bronze, mild steels which resist oxidation; cutting of high carbon steels and cast irons require special attention due to formation of heat affected zone (HAZ) where structural transformation occurs; substitute hydrocarbon gases (propane, butane and natural gas) not suitable for cutting ferrous materials due to their oxidizing characteristics KB7. procedure for obtaining the required drawings, job instructions and other related specifications

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	KB8. how to use and extract information from engineering drawings and related specifications, workpiece reference points and system of tolerances KB9. various types of gas cutting equipment available Equipment: hand-held oxy-fuel gas cutting equipment, simple, portable, track-driven cutting equipment (electrical or mechanical), fixed bench gas cutting equipment KB10. various components of the gas cutting equipment Components: color coded cylinder oxygen; color coded cylinder acetylene; cylinder valve; flashback arrestor; set of nozzles; gas lighter nozzle; cutting tips; pressure regulator; pressure gauge; non-return valves; color coded flexible hose; trolleys; torches (rose-bud heating, cutting, others) KB11. construction of the heating and cutting torch KB12. types of oxy-fuel gases such as acetylene, natural gas and propane KB13. accessories that can be used with handheld gas cutting equipment to aid cutting operations (such as cutting guides, trammels, templates) KB14. importance of correct marking procedure before a cut (eg. allowances for post-cut operations, punch marks, etc.) KB15. types of regulators such as low- and high-pressure, and single- and two-stage KB16. how to identify the gases used in the cutting process, and the color coding of gas cylinders KB17. type and thickness of base metals related to nozzle type KB18. preparations prior to cutting (including checking connections for leaks, setting gas pressures, setting up the material/workpiece, and checking the cleanliness of materials used) KB19. holding methods that are used to aid thermal cutting, and the equipment that can be used KB20. correct procedure for lighting, cutting and extinguishing the flame Lighting and cutting procedures: lighting the cutting torch; adjusting gas controls to produce a neutral flame; methods of starting the cut and controlling the cutting speed; direction and angle of cut; procedure for extinguishing the flame KB21. types of flames and their implication for cutting KB22. importance of following the correct procedure for lighting, cutting and extinguishing a flame KB23. problems that can occur with thermal cutting, and how they can be avoided (including causes of distortion during thermal cutting and methods of controlling distortion) KB24. effects of oil, grease, scale or dirt on the cutting process KB25. gas mixture ratio required to get various flames KB26. quality parameters for gas cut materials

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	Quality parameters: shape and length of the draglines; smoothness of the sides; sharpness of the top edges; amount of slag adhering to the metal KB27. special grade materials used in industry and their behavior with oxy fuel gas KB28. causes of cutting defects, how to recognize them, and methods of correction and prevention Defects: distortion; grooved, fluted or ragged cuts; poor draglines; rounded edges; tightly adhering slag KB29. importance of leaving the work area in a safe and clean condition on completion of activities KB30. correct handling and storage of gas cylinders KB31. emergency procedures for backfires, flashback and other fires Emergencies (safety procedures): sustained backfire in a blowpipe; close the oxygen valve of the blowpipe; followed by the fuel valve and then close both cylinder valves; investigate the cause and rectify the fault; re-light the blowpipe only after it is completely cooled down; flashback into the hose and equipment, or a hose fire or explosion, or a fire at the gas regulator connections; isolate the fuel gas and oxygen supplies by closing the cylinder valves only when this can be done safely; may attempt to control the fire by fire-fighting equipment only when there is no undue risk of personal injury; activate the fire alarm and call for the Fire Services Department as per organizational procedures; fires involving acetylene cylinders; always best dealt with by firemen from the Fire Services Department. However, the following initial response may be appropriate: cool the cylinder by spraying with water only if it is safe to do so; close the cylinder valve to control the fire only if it is safe to do so; evacuate the building by activating the fire alarm or by any other means; to avoid explosion never move an acetylene cylinder involved in a fire or which has been affected by heat from a nearby fire even if it seems cooled down KB32. how to close down the cutting equipment safely and correctly KB33. purging tools and their function
Skills (S)	
A. Core Skills/ Generic Skills	**Reading Skills**
	The user/ individual on the job needs to know and understand how to: SA1. read and interpret information correctly from various job specification documents, health and safety instructions, memos, etc. applicable to the job in English and/or local language
	Writing Skills
	The user/individual on the job needs to know and understand how to:

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	SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language SA3. undertake numerical operations, geometry and calculations/ formulae (including addition, subtraction, multiplication, division, fractions and decimals) SA4. use appropriate measuring techniques SA5. use and convert imperial and metric systems of measurements SA6. apply appropriate degree of accuracy to express numbers Units and number systems representing degree of accuracy: decimals places, significant figures, fractions as a decimal quantity SA7. calculate the value of angles in a triangle Angles in a triangle: right-angled, isosceles, equilateral
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA8. convey and share technical information clearly using appropriate language SA9. check and clarify task-related information SA10. liaise with appropriate authorities using correct protocol SA11. communicate with people in respectful form and manner in line with organizational protocol
B. Professional Skills	**Decision Making**
	NA
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB1. plan, prioritize and sequence work operations as per job requirements SB2. organize and analyze information relevant to work SB3. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB4. exercise restraint while expressing dissent and during conflict situations SB5. avoid and manage distractions to be disciplined at work SB6. manage own time for achieving better results SB7. work in a team in order to achieve better results SB8. identify and clarify work roles within a team SB9. communicate and cooperate with others in the team for better results SB10. seek assistance from fellow team members
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB11. identify problems with work planning, procedures, output and behavior and their implications

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	SB12. prioritize and plan for problem solving SB13. communicate problems appropriately to others SB14. identify sources of information and support for problem solving SB15. seek assistance and support from other sources to solve problems SB16. identify effective resolution techniques SB17. select and apply resolution techniques SB18. seek evidence for problem resolution
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB19. undertake and express new ideas and initiatives to others SB20. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB21. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB22. enhance one's competencies in new and different situations and contexts to achieve more
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB23. participate in on-the-job and other learning, training and development interventions and assessments SB24. clarify task related information with appropriate personnel or technical adviser SB25. seek to improve and modify own work practices SB26. maintain current knowledge of application standards, legislation, codes of practice and product/process developments

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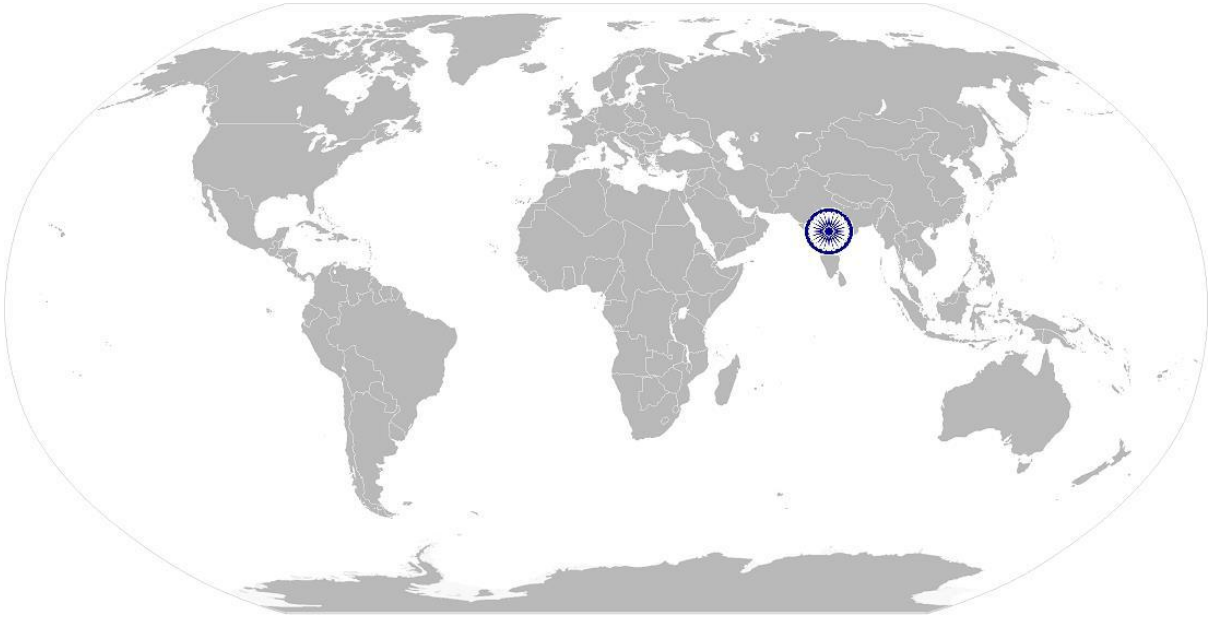
NOS Version Control

NOS Code	CSC/N0203		
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	10/04/2014
Industry Sub-sector	1. Machine Tools 2. Dies, Moulds and Press Tools 3. Plastics Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery 7. Light Engineering Goods	Last reviewed on	24/11/2017
Occupation	Welding and Cutting	Next review date	24/11/2021

CSC/N1335 Use basic health and safety practices at the workplace

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/N1335 Use basic health and safety practices at the workplace

National Occupational Standard

Unit Code	**CSC/N1335**
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.
Scope	This unit/task covers the following: • Health and safety • Fire safety • Emergencies, rescue and first-aid procedure
Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Health and safety	To be competent, the user/individual on the job must be able to: PC1. use protective clothing/equipment for specific tasks and work conditions Protective clothing: leather or asbestos gloves, flame proof aprons, flame proof overalls buttoned to neck, cuffless (without folds), trousers, reinforced footwear, helmets/hard hats, cap and shoulder covers, ear defenders/plugs, safety boots, knee pads, particle masks, glasses/goggles/visors Equipment: hand shields, machine guards, residual current devices, shields, dust sheets, respirator PC2. state the name and location of people responsible for health and safety in the workplace PC3. state the names and location of documents that refer to health and safety in the workplace PC4. identify job-site hazardous work and state possible causes of risk or accident in the workplace Hazards: sharp edged and heavy tools; heated metals; oxy fuel and gas cylinders; welding radiation; hazardous surfaces (sharp, slippery, uneven, chipped, broken, etc.); hazardous substances (chemicals, gas, oxy-fuel, fumes, dust, etc.); physical hazards (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 hazards (power supply and points, loose and naked cables and wires, electrical machines and appliances, etc.) Possible causes of risk and accident: physical actions; reading; listening to and giving instructions; inattention; sickness and incapacity (such as drunkenness); health hazards (such as untreated injuries and contagious

CSC/N1335 Use basic health and safety practices at the workplace

	illness) PC5. carry out safe working practices while dealing with hazards to ensure the safety of self and others Safe working practices: using protective clothing and equipment; putting up and reading safety signs; handle tools in the correct manner and store and maintain them properly; keep work area clear of clutter, spillage and unsafe object lying casually; while working with electricity take all electrical precautions like insulated clothing, adequate equipment insulation, use of control equipment, dry work area, switch off the power supply when not required, etc.; safe lifting and carrying practices; use equipment that is working properly and is well maintained; take due measures for safety while working in confined places, trenches or at heights, etc. including safety harness, fall arrestors, etc. PC6. state methods of accident prevention in the work environment of the job role Methods of accident prevention: training in health and safety procedures; using health and safety procedures; use of equipment and working practices (such as safe carrying procedures); safety notices, advice; instruction from colleagues and supervisors PC7. state location of general health and safety equipment in the workplace General health and safety equipment: fire extinguishers; first aid equipment; safety instruments and clothing; safety installations (eg fire exits, exhaust fans) PC8. inspect for faults, set up and safely use steps and ladders in general use Ladder faults: corrosion of metal components, deterioration, splits and cracks timber components, imbalance, loose rungs, missing/ unfixed nuts or bolts, etc. Ladders set up: firm/level base, clip/lash down, leaning at the correct angle, etc. PC9. work safely in and around trenches, elevated places and confined areas PC10. lift heavy objects safely using correct procedures PC11. apply good housekeeping practices at all times Good housekeeping practices: clean/tidy work areas, removal/disposal of waste products, protect surfaces PC12. identify common hazard signs displayed in various areas Various areas: on chemical containers; equipment; packages; inside buildings; in open areas and public spaces, etc. PC13. retrieve and/or point out documents that refer to health and safety in the workplace Documents: fire notices, accident reports, safety instructions for equipment and procedures, company notices and documents, legal documents (eg

CSC/N1335 Use basic health and safety practices at the workplace

	government notices)
Fire safety	To be competent, the user/individual on the job must be able to: PC14. use the various appropriate fire extinguishers on different types of fires correctly Types of fires: 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) PC15. demonstrate rescue techniques applied during fire hazard PC16. demonstrate good housekeeping in order to prevent fire hazards PC17. demonstrate the correct use of a fire extinguisher
Emergencies, rescue and first-aid procedures	To be competent, the user/individual on the job must be able to: PC18. demonstrate how to free a person from electrocution PC19. administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc. PC20. demonstrate basic techniques of bandaging PC21. respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments PC22. perform and organize loss minimization or rescue activity during an accident in real or simulated environments PC23. 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 PC24. demonstrate the artificial respiration and the CPR Process PC25. participate in emergency procedures Emergency procedures: raising alarm, safe/efficient, evacuation, correct means of escape, correct assembly point, roll call, correct return to work PC26. complete a written accident/incident report or dictate a report to another person, and send report to person responsible Incident Report includes details of: name, date/time of incident, date/time of report, location, environment conditions, persons involved, sequence of events, injuries sustained, damage sustained, actions taken, witnesses, supervisor/manager notified PC27. demonstrate correct method to move injured people and others during an emergency
Knowledge and Understanding (K)	

CSC/N1335 Use basic health and safety practices at the workplace

A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. names (and job titles if applicable), and where to find, all the people responsible for health and safety in a workplace KA2. names and location of documents that refer to health and safety in the workplace
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. meaning of "hazards" and "risks" KB2. health and safety hazards commonly present in the work environment and related precautions KB3. possible causes of risk, hazard or accident in the workplace and why risk and/ or accidents are possible KB4. possible causes of risk and accident Possible causes of risk and accident: physical actions; reading; listening to and giving instructions; inattention; sickness and incapacity (such as drunkenness); health hazards (such as untreated injuries and contagious illness) KB5. methods of accident prevention Methods of accident prevention: training in health and safety procedures; using health and safety procedures; use of equipment and working practices (such as safe carrying procedures); safety notices, advice; instruction from colleagues and supervisors KB6. safe working practices when working with tools and machines KB7. safe working practices while working at various hazardous sites KB8. where to find all the general health and safety equipment in the workplace KB9. various dangers associated with the use of electrical equipment KB10. preventative and remedial actions to be taken in the case of exposure to toxic materials Exposure: ingested, contact with skin, inhaled Preventative action: ventilation, masks, protective clothing/ equipment); Remedial action: immediate first aid, report to supervisor Toxic materials: solvents, flux, lead KB11. importance of using protective clothing/equipment while working KB12. precautionary activities to prevent the fire accident KB13. various causes of fire Causes of fires: heating of metal; spontaneous ignition; sparking; electrical heating; loose fires (smoking, welding, etc.); chemical fires; etc. KB14. techniques of using the different fire extinguishers KB15. different methods of extinguishing fire KB16. different materials used for extinguishing fire

CSC/N1335 Use basic health and safety practices at the workplace

	Materials: sand, water, foam, CO_2, dry powder KB17. rescue techniques applied during a fire hazard KB18. various types of safety signs and what they mean KB19. appropriate basic first aid treatment relevant to the condition eg. shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries KB20. content of written accident report KB21. potential injuries and ill health associated with incorrect manual handing KB22. safe lifting and carrying practices KB23. personal safety, health and dignity issues relating to the movement of a person by others KB24. potential impact to a person who is moved incorrectly
Skills (S)	
A. Core Skills/ Generic Skills	**Reading 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 an accident/incident report in local language or English
	Writing Skills
	The user/individual on the job needs to know and understand how to: SA4. 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: SA5. question coworkers appropriately in order to clarify instructions and other issues SA6. give clear instructions to coworkers, subordinates others
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. 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
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB2. plan and organize their own work schedule, work area, tools, equipment and materials to maintain decorum and for improved productivity
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB3. remain congenial while discussing and debating issues with co-workers

CSC/N1335 Use basic health and safety practices at the workplace

	SB4. follow appropriate protocols for communication based on situation, hierarchy, organizational culture and practice SB5. ask for, provide and receive required assistance where possible to ensure achievement of work related objectives SB6. thank coworkers for any assistance received SB7. 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: SB8. think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s) SB9. identify immediate or temporary solutions to resolve delays SB10. identify sources of support that can be availed of for problem solving for various kind of problems SB11. seek appropriate assistance from other sources to resolve problems SB12. report problems that you cannot resolve to appropriate authority
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB13. identify cause and effect relations in their area of work SB14. use cause and effect relations to anticipate potential problems and their solution
	Critical Thinking
	NA

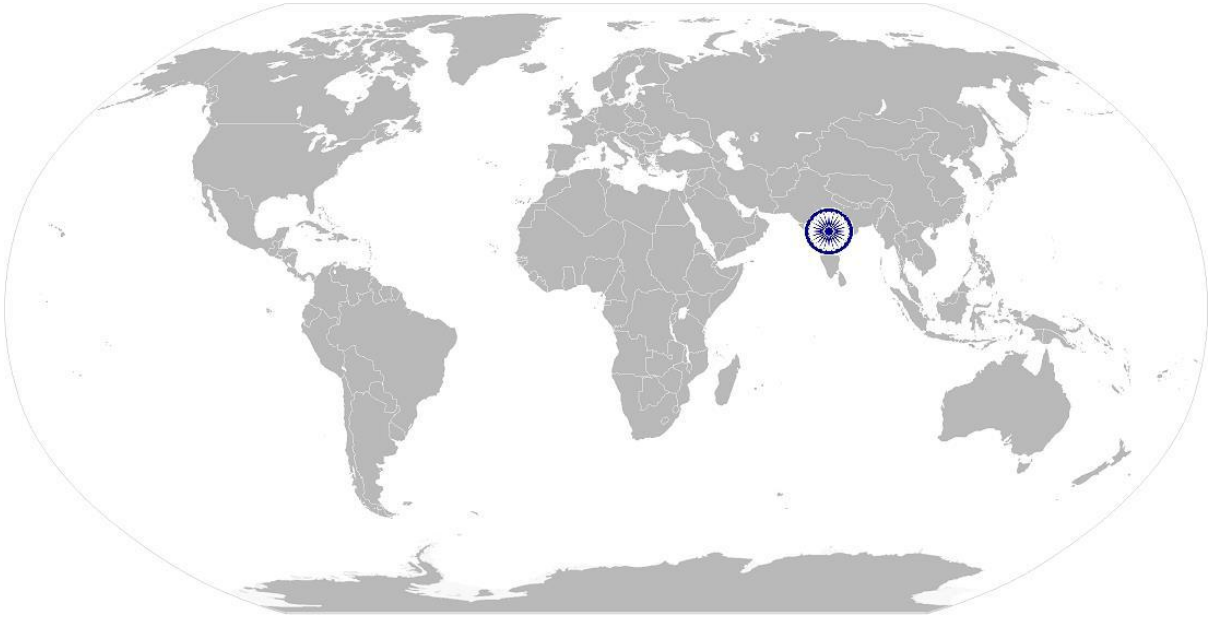
CSC/N1335 Use basic health and safety practices at the workplace

NOS Version Control

NOS Code	**CSC/N1335**		
Credits	**TBD**	**Version number**	**1.0**
Industry	**Capital Goods**	**Drafted on**	**10/04/2014**
Industry Sub-sector	**1. Machine Tools** **2. Dies, Moulds and Press Tools** **3. Plastics Manufacturing Machinery** **4. Textile Manufacturing Machinery** **5. Process Plant Machinery** **6. Electrical and Power Machinery** **7. Light Engineering Goods**	**Last reviewed on**	**24/11/2017**
Occupation	**Welding and Cutting**	**Next review date**	**24/11/2021**

CSC/N1336 **Work effectively with others**

National Occupational Standard



Overview

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

CSC/N1336 **Work effectively with others**

National Occupational Standard

Unit Code	**CSC/N1336**
Unit Title (Task)	**Work effectively with others**
Description	This unit covers basic etiquette and competencies that a candidate is required to possess and demonstrate in their behavior and interactions with others at the workplace. These cover areas such as communication etiquette, discipline, listening etc.
Scope	This unit/task covers the following: • Work effectively with others

Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Work effectively with others	To be competent, the user/individual on the job must be able to: PC1. accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required PC2. accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt PC3. give information to others clearly, at a pace and in a manner that helps them to understand PC4. display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible PC5. consult with and assist others to maximize effectiveness and efficiency in carrying out tasks PC6. display appropriate communication etiquette while working Communication etiquette: do not use abusive language; use appropriate titles and terms of respect; do not eat or chew while talking (vice versa) etc. PC7. display active listening skills while interacting with others at work PC8. use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism PC9. demonstrate responsible and disciplined behaviors at the workplace Disciplined behaviors: e.g. punctuality; completing tasks as per given time and standards; not gossiping and idling time; eliminating waste, honesty, etc. PC10. escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict

Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company /	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

CSC/N1336 **Work effectively with others**

organization and its processes)	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)	
A. Core Skills/ Generic Skills	**Reading Skills**
	The user/ individual on the job needs to know and understand how to: SA1. read basic terms and terminologies to accurately interpret work related documents, labels, supervisor instructions in the local language SA2. read and interpret accurate information from various relevant work instructions and records
	Writing Skills
	The user/ individual on the job needs to know and understand how to: SA3. write clear and legible notes to self, colleagues and seniors to pass messages, keep records, prepare to-do lists, take down instructions SA4. write basic numbers, quantities and work related terminology for operational requirements in the local language

CSC/N1336 **Work effectively with others**

	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA5. interact with the supervisor appropriately (correct protocol and manner of speaking) in order to understand the basic requirements of the product, production plans and other associated requirements SA6. give clear instructions to co-workers about the type of output required and answer queries SA7. display active listening skills while interacting with co-workers and other in the workplace
B. Professional Skills	**Decision Making**
	NA
	Plan and organize
	The user/individual on the job needs to know and understand how to: SB1. use appropriate planning to maintain a smooth relationship with fellow team members SB2. take steps within one's limits of authority to initiate modification in plan if the circumstances require it
	Customer centricity
	The user/individual on the job needs to know and understand how to: SB3. check that work meets customer requirements SB4. deliver consistent and reliable service to internal and external customers
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB5. work with co-workers and supervisor to resolve any issues that threaten disruption, increase risk, cause delays or under-achievement of quality and targets as per the planned schedule
	Analytical Thinking
	NA
	Critical Thinking
	NA

CSC/N1336 **Work effectively with others**

NOS Version Control

NOS Code	CSC/N1336		
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	10/04/2014
Industry Sub-sector	1. Machine Tools 2. Dies, Moulds and Press Tools 3. Plastics Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery 7. Light Engineering Goods	Last reviewed on	24/11/2017
Occupation	Welding and Cutting	Next review date	24/11/2021

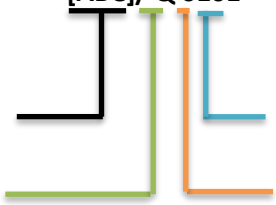
Annexure

Nomenclature for QP and NOS

Qualifications Pack

9 characters

[ABC]/ Q 0101



[Insert 3 letter codes for SSC]

Q denoting Qualifications Pack

QP number (2 numbers)

Occupation (2 numbers)

Occupational Standard

An example of NOS with 'N'

9 characters

[ABC] / N 0101

[Insert 3 letter codes for SSC]

N denoting National Occupational Standard

OS number (2 numbers)

Occupation (2 numbers)

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

Sub-sector	Range of Occupation numbers
Machine Tools	01-13
Dies, Moulds and Press Tools	01-13
Plastic Manufacturing Machinery	01-13
Textile Manufacturing Machinery	01-13
Process Plant Machinery	01-13
Electrical and Power Machinery	01-13
Light Engineering Goods	01-13

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

Criteria For Assessment Of Trainees

Job Role: Senior Manual Metal Arc Welder/ Shielded Metal Arc Welder
Qualification Pack: CSC/Q0208
Sector Skill Council: Capital Goods 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. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
6. To pass the Qualification Pack , every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Total Marks: 500	**Compulsory NOS**			**Marks Allocation**	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out of**	**Theory**	**Skills Practical**
CSC/N0208 Manually weld carbon steel/ low alloy steel and austenitic stainless steel using Metal Arc Welding / Shielded Metal Arc Welding	PC1.work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	100	3	1	2
	PC2.adhere to procedures or systems in place for health and safety, personal protective equipment (PPE) and other relevant safety regulations		4	1	3
	PC3.check the condition of, and correctly connect, welding leads, earthing arrangements and electrode holder		2	0	2
	PC4.deal with any faults or differential as per laid procedures		2	0	2
	PC5.follow fume extraction safety procedures		3	1	2
	PC6.read and interpret routine information on written job instructions, welding procedure specifications (WPS) and standard operating procedures		3	1	2

	PC7.select welding machines (e.g. transformers, rectifiers, inverters and generators, etc.) according to the task		2	0	2
	PC8.select type and size of electrodes according to classification and specifications		3	1	2
	PC9.re-dry electrodes as per electrode classification requirement		3	1	2
	PC10.prepare the work area for the welding activities		2	0	2
	PC11.perform measurements for joint preparation and routine MMAW		3	0	3
	PC12.prepare the various forms of materials and the joint in readiness for welding		2	0	2
	PC13.tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding		3	0	3
	PC14.use manual metal-arc welding and related equipment to include a. alternating current (AC) equipment b. direct current (DC) equipment		3	0	3
	PC15.connect equipment to power source		2	0	2
	PC16.connect cables, electrode holders, return leads and ground clamps to appropriate terminal		3	1	2
	PC17.set, read and adjust amperage controls		3	1	2
	PC18.verify setup by running test and appropriately handle weld specimen/scrap plate		3	0	3
	PC19.tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding		2	0	2
	PC20.strike and maintain a stable arc		2	0	2
	PC21.stop and properly re-start arc to avoid welding defects (scratch start, tapping techniques)		3	1	2
	PC22.manipulate electrode angle using various methods as per WPS		2	0	2
	PC23.maintain constant puddle by using appropriate travel speed		2	0	2
	PC24.remove slag in an appropriate manner (eg. wire brush, hammer, etc.)		3	1	2
	PC25.weld the joint to the specified quality, dimensions and profile applicable to range of material		4	1	3

	PC26.produce range of welded joints to within the mentioned standard using single or multi-run welds (as appropriate)		4	1	3
	PC27.produce joints of the required quality and of specified dimensional accuracy which achieve a weld quality equivalent to Level C of ISO 5817		3	0	3
	PC28.produce range of welded joints in various positions as per the WPS specified		2	0	2
	PC29.shut down and make safe the welding equipment on completion of the welding activities		4	1	3
	PC30.identify various weld defects, use appropriate methods and equipment to check the quality, and that all dimensional and geometrical aspects of the weld are to the specification		4	1	3
	PC31.check that the welded joint conforms to the specification, by checking various		2	0	2
	PC32.detect surface imperfections and deal with them appropriately		3	1	2
	PC33.carry out DPT tests to assess fine defect open to the surface not detected by visual inspection (VT)		3	1	2
	PC34.assist in preparation for non-destructive testing of the welds, for a range of tests		2	0	2
	PC35.prepare for destructive tests on weld specimens for fillet, butt and corner		3	0	3
	PC36.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		3	1	2
		Total	**100**	**17**	**83**
CSC/N0207 Manually cut metal materials using plasma arc	PC1.work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	**100**	3	1	2
	PC2.take necessary safety precautions for plasma cutting operations including equipment, processes and checks		2	0	2
	PC3.interpret cutting procedure data sheets specifications		3	1	2
	PC4.check regulators, hoses and check that valves are securely connected and free from leaks and damage		2	0	2
	PC5.check equipment is calibrated and approved for use		2	0	2
	PC6.check/fit the correct nozzle to the torch		2	0	2

	PC7.match correct tips and cups to the torch as per requirement and manufacturer's equipment instructions		3	1	2
	PC8.set the amperage and gas pressure as per metal thickness, metal type, and type of gas		2	0	2
	PC9.use the correct procedure for lighting, adjusting and extinguishing the arc		4	1	3
	PC10.use appropriate and safe procedures for handling and storing of gas cylinders		3	1	2
	PC11.prepare the work area for the cutting activities		2	0	2
	PC12.obtain the appropriate tools and equipment for the plasma arc cutting operations, and check that they are in a safe and usable condition		2	0	2
	PC13.check that the plasma arc cutting equipment is correctly set up for the operations to be performed		2	0	2
	PC14.carry out correct measurements required using appropriate equipment and methods for planning the cut		3	1	2
	PC15.mark out the components for the required operations, using appropriate tools and techniques where appropriate		4	1	3
	PC16.perform trial cut to check for cut defect		2	0	2
	PC17.operate the plasma cutting equipment to produce items/cut shapes to the dimensions and profiles as specified		5	1	4
	PC18.use the correct angles to cut and the right speed		3	0	3
	PC19.use various types of plasma arc cutting methods/techniques		4	0	4
	PC20.perform various cutting operations correctly		4	0	4
	PC21.produce thermal cuts in various forms of material		4	0	4
	PC22.produce cut profiles for various type of materials		4	0	4
	PC23.produce thermally-cut components which meet specified quality criteria		5	1	4
	PC24.detect and correct defects in cut		3	0	3
	PC25.leave the work area in a safe and tidy condition on completion of the cutting activities		2	0	2
	PC26.check that the finished components meet the required standard		4	1	3

	PC27.use appropriate methods and equipment to check the quality, and that all dimensional and geometrical aspects of the cut material are to the specification		6	2	4
	PC28.identify various cutting defects		3	0	3
	PC29.report any difficulties or problems that may arise with the cutting activities and carry out any agreed actions		2	0	2
	PC30.detect equipment malfunctions and deal with them appropriately		2	0	2
	PC31.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		3	0	3
	PC32.shut down and make safe the cutting equipment on completion of the cutting activities or during an emergency		2	0	2
	PC33.follow standard emergency procedures in case of emergencies		3	1	2
		Total	**100**	**13**	**87**
CSC/N0203 Manually cut metal and metal alloys using oxyfuel gas	PC1.work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines	100	3	1	2
	PC2.take necessary safety precautions for gas cutting operations including equipment, processes and checks		2	0	2
	PC3.interpret cutting procedure data sheets specifications		3	1	2
	PC4.check regulators, hoses and check that valves are securely connected and free from leaks and damage		2	0	2
	PC5.check equipment is calibrated and approved for use		2	0	2
	PC6.check/fit the correct size gas nozzle to the torch		2	0	2
	PC7.ensure preheat and oxygen holes on the tips are clean		2	0	2
	PC8.check that a flashback arrestor is fitted		2	0	2
	PC9.set appropriate gas pressures		2	0	2
	PC10.use the correct procedure for lighting, adjusting and extinguishing the flame		3	1	2
	PC11.adjust torch valve for type of flame such as neutral, carburizing and oxidizing		2	0	2
	PC12.follow sequence of operations such as pre-heating material and initiating cut		3	1	2
	PC13.mark out the locations for cutting accurately and as per requirement		3	1	2

	PC14.use appropriate and safe procedures for handling and storing of gas cylinders		3	1	2
	PC15.prepare the work area for the cutting activities		2	0	2
	PC16.obtain the appropriate tools and equipment for the oxy-fuel gas cutting operations, and check that they are in a safe and usable condition		2	0	2
	PC17.check that the oxy-fuel gas cutting equipment is set up for the operations to be performed		2	0	2
	PC18.adjust cylinder valves and adjust regulator for operating pressure to achieve specifications for required operations		3	1	2
	PC19.mark out the components for the required operations, using appropriate tools and techniques where appropriate		2	0	2
	PC20.perform trial cut to check for cut defects		3	0	3
	PC21.operate the oxy-fuel gas cutting equipment to produce items/cut shapes to the dimensions and profiles specified		5	1	4
	PC22.use various types of oxy-fuel gas cutting methods		4	0	4
	PC23.perform various cutting operations correctly		4	0	4
	PC24.produce thermal cuts in various forms of material (metal of 3mm and above)		4	0	4
	PC25.produce cut profiles for various type of materials and forms		3	0	3
	PC26.produce thermally-cut components which meet specified quality criterias		4	1	3
	PC27.recognize and correct burnback and flashback		3	1	2
	PC28.detect and correct defects in cut		2	0	2
	PC29.ensure the work area is left in a safe and tidy condition on completion of the cutting activities		2	0	2
	PC30.check that the finished components meet the standard required		3	1	2
	PC31.use appropriate methods and equipment to check the quality, and that all dimensional and geometrical aspects of the cut material are to the specification		4	1	3
	PC32.identify various cutting defects and follow organisation recommended procedures to address them		3	1	2

	PC33.report any difficulties or problems that may arise with the cutting activities and carry out any agreed actions		2	0	2
	PC34.detect equipment malfunctions and deal with them appropriately		2	0	2
	PC35.deal promptly and effectively with problems within their control, and seek help and guidance from the relevant people if they have problems that they cannot resolve		2	0	2
	PC36.shut down and make safe the cutting equipment on completion of the cutting activities		2	0	2
	PC37.follow standard emergency procedures in case of emergencies		3	1	2
		Total	**100**	**14**	**86**
CSC/N1335 Use basic health and safety practices at the workplace	PC1.use protective clothing/equipment for specific tasks and work conditions	100	5	2	3
	PC2.state the name and location of people responsible for health and safety in the workplace		3	1	2
	PC3.state the names and location of documents that refer to health and safety in the workplace		3	1	2
	PC4.identify job-site hazardous work and state possible causes of risk or accident in the workplace		5	2	3
	PC5.carry out safe working practices while dealing with hazards to ensure the safety of self and others		4	2	2
	PC6.state methods of accident prevention in the work environment of the job role		3	2	1
	PC7.state location of general health and safety equipment in the workplace		5	2	3
	PC8.inspect for faults, set up and safely use steps and ladders in general use		5	2	3
	PC9.work safely in and around trenches, elevated places and confined areas		5	2	3
	PC10.lift heavy objects safely using correct procedures		4	2	2
	PC11.apply good housekeeping practices at all times		5	2	3
	PC12.identify common hazard signs displayed in various areas		3	1	2
	PC13.retrieve and/or point out documents that refer to health and safety in the workplace		4	1	3

	PC14.use the various appropriate fire extinguishers on different types of fires correctly		4	1	3
	PC15.demonstrate rescue techniques applied during fire hazard		3	1	2
	PC16.demonstrate good housekeeping in order to prevent fire hazards		4	1	3
	PC17.demonstrate the correct use of a fire extinguisher		4	1	3
	PC18.demonstrate how to free a person from electrocution		4	1	3
	PC19.administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.		3	1	2
	PC20.demonstrate basic techniques of bandaging		4	1	3
	PC21.respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		3	1	2
	PC22.perform and organize loss minimization or rescue activity during an accident in real or simulated environments		3	1	2
	PC23.administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases		3	1	2
	PC24.demonstrate the artificial respiration and the CPR Process		3	2	1
	PC25.participate in emergency procedures		2	1	1
	PC26.complete a written accident/incident report or dictate a report to another person, and send report to person responsible		3	1	2
	PC27.demonstrate correct method to move injured people and others during an emergency		3	1	2
		Total	**100**	**37**	**63**
CSC/N1336 Work effectively with others	PC1.accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required	100	10	3	7
	PC2.accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt		10	3	7
	PC3.give information to others clearly, at a pace and in a manner that helps them to understand		10	3	7

	PC4.display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible		10	3	7
	PC5.consult with and assist others to maximize effectiveness and efficiency in carrying out tasks		10	3	7
	PC6.display appropriate communication etiquette while working		10	3	7
	PC7.display active listening skills while interacting with others at work		10	3	7
	PC8.use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	3	7
	PC9.demonstrate responsible and disciplined behaviors at the workplace		10	3	7
	PC10.escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict		10	3	7
		Total	**100**	**30**	**70**