

## QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR CAPITAL GOODS INDUSTRY

### 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- Fitter- Fabrication

**SECTOR/S:** CAPITAL GOODS

**SUB-SECTOR:**

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

**OCCUPATION:** Fitting and Assembly

**REFERENCE ID:** CSC/Q0303

**ALIGNED TO:** NCO-2004/7233.10, 7233.20

**Brief Job Description:** It involves identifying metals, tools; carrying out fitting and fabrication operations like measuring, marking out, sawing, grinding, drilling, chiseling, threading, tapping, scraping, manual lapping and inspecting of components in order to fit a component as per specifications. It also involves basic oxy-fuel gas cutting and basic manual arc welding as per given instructions and under supervision.

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

## Qualifications Pack For Fitter- Fabrication

### Job Details

<b>Qualifications Pack Code</b>	<b>CSC/Q0303</b>		
<b>Job Role</b>	<b>Fitter- Fabrication</b> [Applicable for National Scenarios]		
<b>Credits</b>	TBD	<b>Version number</b>	<b>1.0</b>
<b>Sector</b>	<b>Capital Goods</b>	<b>Drafted on</b>	<b>10/04/2014</b>
<b>Sub-sector</b>	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	<b>Last reviewed on</b>	<b>24/11/2017</b>
<b>Occupation</b>	<b>Fitting and Assembly</b>	<b>Next review date</b>	<b>24/11/2021</b>
<b>NSQC Clearance on</b>	<b>19/12/2018</b>		

Job Role	Fitter - Fabrication
<b>Role Description</b>	Performs fitting operations on metal components using hand tools and manually operated machines, as per specifications.
<b>NSQF level</b>	3
<b>Minimum Educational Qualifications</b>	10 <sup>th</sup> Standard pass, preferably
<b>Maximum Educational Qualifications</b>	Not Applicable
<b>Prerequisite License or Training</b>	No Previous Training Required
<b>Minimum Job Entry Age</b>	18 Years
<b>Experience</b>	No Previous Experience Required
<b>Applicable National Occupational Standards (NOS)</b>	<p><b>Compulsory:</b></p> <ol style="list-style-type: none"> <li>1. <a href="#">CSC/N0303 Perform fitting operations on metal components using hand tools and manually operated machines</a></li> <li>2. <a href="#">CSC/N0201 Perform simple manual cutting operations on carbon steels using oxy-fuel gas</a></li> <li>3. <a href="#">CSC/N0202 Manually weld carbon steels in simple welding positions using Metal Arc Welding / Shielded Metal Arc Welding</a></li> <li>4. <a href="#">CSC/N1335 Use basic health and safety practices at the workplace</a></li> <li>5. <a href="#">CSC/N1336 Work effectively with others</a></li> </ol>
<b>Performance Criteria</b>	As described in the relevant OS units

## Definitions

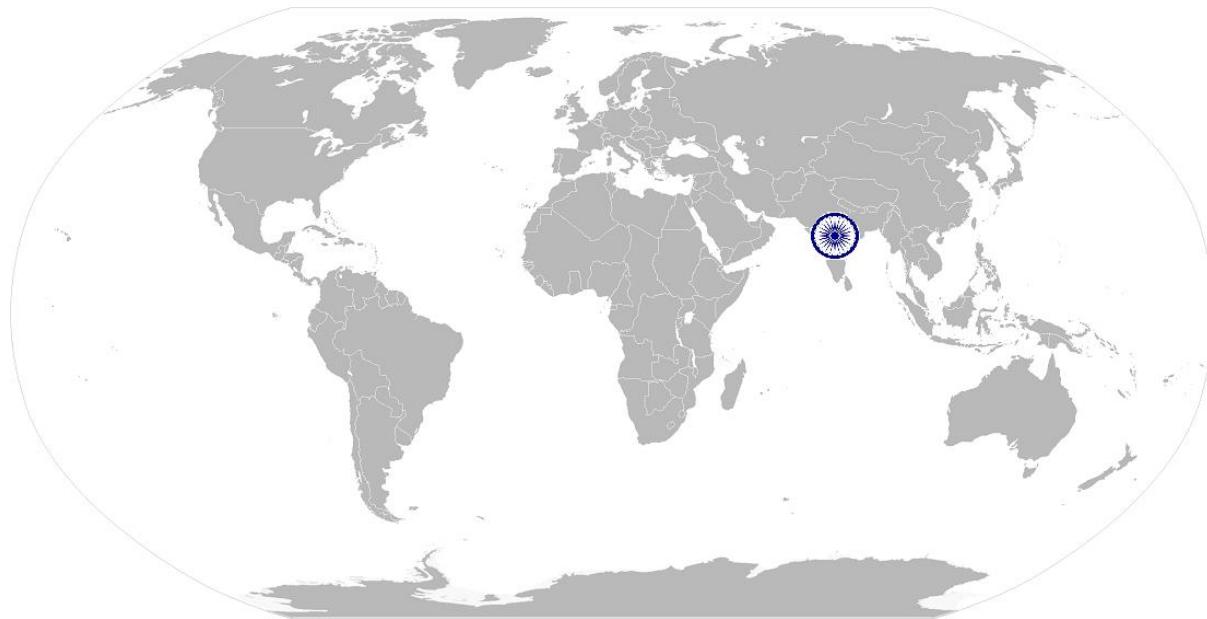
Keywords /Terms	Description
Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further 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.

**Acronyms**

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.
Keywords /Terms	Description
CO <sub>2</sub>	Carbon Dioxide
CPR	Cardiac Pulmonary Resuscitation
PPE	Personal Protective Equipment

**CSC/N0303 Perform fitting operations on metal components using hand tools and manually operated machines**

# National Occupational Standard



## Overview

This unit covers fabrication and fitting of metal products using hand tools and manually operated machines, to modify the shape of a component and/or generate components from raw material, as per given specifications.

## CSC/N0303 Perform fitting operations on metal components using hand tools and manually operated machines

### National Occupational Standard

Unit Code	CSC/N0303
<b>Unit Title (Task)</b>	<b>Perform fitting operations on metal components using hand tools and manually operated machines</b>
<b>Description</b>	This unit covers fabrication and fitting of metal products by using hand tools and/or manually operated machines, to modify the shape of a component or generate a component from raw material, as per given instructions.
<b>Scope</b>	<p>This unit/task covers the following:</p> <ul style="list-style-type: none"> <li>• Work safely</li> <li>• Prepare for fabrication and fitting operations</li> <li>• Mark components</li> <li>• Perform fabrication and fitting operations</li> </ul>
<b>Performance Criteria(PC) w.r.t. the Scope</b>	
Element	Performance Criteria
<b>Work safely</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p class="list-item-l1">PC1. comply with health and safety, environmental and other relevant regulations and guidelines at work</p> <p class="list-item-l1">PC2. adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing fabrication and fitting operations</p> <p class="list-item-l1">PC3. work following laid down procedures and instructions</p> <p class="list-item-l1">PC4. ensure work area is clean and safe from hazards</p> <p class="list-item-l1">PC5. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition</p>
<b>Prepare for fabrication and fitting operations</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p class="list-item-l1">PC6. obtain job specification from a valid and approved source</p> <p style="margin-left: 20px;">Valid sources: job instruction sheet/job card; work drawings and instruction; operation sheets; process specifications; instructions from supervisor</p> <p class="list-item-l1">PC7. read and establish job requirements from the job specification document accurately</p> <p style="margin-left: 20px;">Job specification documents: detailed component drawings; approved sketches/illustrations; fabrication/casting drawings; operational diagrams</p> <p style="margin-left: 20px;">Job requirements: raw materials or components required (type, quality, quantity); dimensions; limits and tolerances; surface texture requirements; operations required (list, sequence and procedures where applicable); shape or profiles to be fabricated; cutting, bending and rolling allowances for fabricated forms; instruments and tools to be used; interdependencies; timelines</p>

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	<p>PC8. report and rectify incorrect and inconsistent information in job specification documents as per organization procedures</p> <p>PC9. prepare the work area for the fabrication and fitting operations as per procedure or operational specification</p> <p>Fabrication and fitting operations: forming, rolling, shearing, sawing (hand, band), manual grinding (eg. Ag4 grinding, wolf grinding, hand air grinding), filing, drilling, chiseling, threading, hand tapping, scraping, manual lapping</p> <p>PC10. ensure that all measuring equipment is calibrated and approved for usage</p> <p>PC11. ensure that the components used are free from foreign objects, dirt or other contamination</p> <p>PC12. obtain correct workpieces/raw materials and consumables as per job requirements</p> <p>PC13. obtain appropriate tools and equipment as per job requirements</p> <p>PC14. set work pieces as per job requirements using appropriate positioning and/or holding devices and support mechanisms</p> <p>Positioning and holding devices: belts; braces; clamps; jigs and fixtures; bolt straps; blocks and tables; manual lifts; ropes; jacks</p>
<b>Mark components</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC15. mark out specified features on the workpieces as per job specification using appropriate measuring and marking out tools and equipment</p> <p>Features: datum/centre lines, lines (perpendicular, parallel), circles, profiles (square/rectangular, radial, angles/angular), hole positions (radial, linear), allowances for bending, simple pattern development</p> <p>Measuring and marking tools: rules/tapes, dividers/trammels, scribes, punches, scribing blocks, squares, protractor, depth/internal/external micrometers, calipers (vernier, inside and outside, depth), gauges (height Vernier, feeler, bore/hole, slip, radius/profile, thread, plug), stick micrometers, dial stand and comparator, vee block with u-clamp, optical instruments</p> <p>PC16. mark out templates for tracing/transferring the specified features on the workpieces as per job specification</p> <p>PC17. trace/transfer the specified features from the templates onto the workpieces as per job specification</p>
<b>Perform fabrication and fitting operations</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC18. identify range of materials by colour, appearance, sparks</p> <p>Range of Materials: Ferrous metals: eg. carbon steels, stainless steels, cast iron, tool steel, hard metals; Non-ferrous metals: eg. bronze, bronze alloys, copper and copper alloys</p> <p>PC19. perform fabrication and fitting operations on various forms of metal</p>

## CSC/N0303 Perform fitting operations on metal components using hand tools and manually operated machines

	<p>components using a range of fabrication hand tools and manually operated machines</p> <p>Forms of metal components: square/rectangular (eg. bar stock, sheet material, machined components), circular/cylindrical (eg. bar stock, tubes, turned components, flat discs), sections (eg. angles, channel, tee section, joists, extrusions), irregular shapes/profile (eg. castings, forgings, odd shaped components)</p> <p>Hand tools: hacksaws; hammers; punches; screwdrivers; sockets; wrenches; spanners; scrapers; chisels; gouges; files; taps; vices and clamps</p> <p>Manually operated machine tools: drills (power drills, pedestal drills), grinders (hand held power grinders, pedestal grinders), saws (jigsaws, cutting saws), shears (hand shear, mechanized shears), nibblers, press V-shape, punching machines, bending machines, threading machines</p> <p>PC20. follow the specified fabrication and fitting sequence and procedure as per job specifications</p> <p>PC21. check the fabricated and fitted products to ensure completeness of work</p> <p>PC22. check the quality of the components as per required standards using visual and dimensional parameters</p> <p>Dimensional parameters: linear dimensions; flatness; squareness; depths; angles; profiles; hole position; hole size/fit; thread size and fit; orientation and elevation</p> <p>Components quality standards: components to be free from damage, false tool cuts, burrs, scratches and non-specified sharp edges; general dimensional tolerance +/- 0.10mm; flatness and squareness 0.05mm; angles within +/- 1 degree; screw threads to fit as per standard; reamed and bored holes within interference: - 0.05mm (hole) + 0.05mm (shaft), transition: - 0.1mm (hole) + 0.1 (shaft), clearance: 50microns; radius: 0.5 r; ovality restriction</p> <p>PC23. produce components with various features as per standards applicable to the process</p> <p>Features of components produced: flat; square; parallel and angular faces; perpendicular plates; radii and curved profiles; drilled holes; internal and external threads; sliding or mating parts; counter bore, countersink or spot face; vessels; simple structures</p> <p>PC24. work to achieve production targets</p> <p>PC25. report conditions and seek appropriate assistance in a timely manner to address risk of failure to comply with necessary targets and specifications</p> <p>PC26. deal with finished components as per organizational guidelines</p> <p>PC27. complete documentation during and post operations as per organizational</p>
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	<p>procedures</p> <p>Documentation: job card, progress records, incident reports</p> <p>PC28. return all tools and equipment to the correct location on completion of the fitting activities</p> <p>PC29. leave the work area in a safe and tidy condition on completion of job activities</p>
<b>Knowledge and Understanding (K)</b>	
<b>A. Organizational Context</b>  (Knowledge of the company / organization and its processes)	<p>The user/individual on the job needs to know and understand:</p> <p>KA1. legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions</p> <p>KA2. relevant health and safety requirements applicable in the work place</p> <p>KA3. importance of working in clean and safe environment</p> <p>KA4. own job role and responsibilities and sources for information pertaining to employment terms, entitlements, job role and responsibilities</p> <p>KA5. reporting structure, inter-dependent functions, lines and procedures in the work area</p> <p>KA6. relevant people and their responsibilities within the work area</p> <p>KA7. escalation matrix and procedures for reporting work and employment related issues</p> <p>KA8. documentation and related procedures applicable in the context of employment and work</p> <p>KA9. importance and purpose of documentation in context of employment and work</p>
<b>B. Technical Knowledge</b>	<p>The user/individual on the job needs to know and understand:</p> <p>KB1. specific safe working practices, fabrication and fitting procedures and environmental regulations that must be observed</p> <p>KB2. hazards associated with carrying out the fabrication and fitting operations and how can they be minimized</p> <p>Fabrication and fitting operations: forming, rolling, shearing, sawing (hand, band), manual grinding (eg. Ag4 grinding, wolf grinding, hand air grinding), filing, drilling, chiseling, threading, hand tapping, scraping, manual lapping</p> <p>KB3. personal protective equipment to be used during the fabrication and fitting activities and where can it be obtained</p> <p>KB4. types and sources of appropriate job specifications</p> <p>KB5. common terminology used in fabrication and fitting</p> <p>KB6. how to read and interpret first and third angle component drawings</p> <p>KB7. how to extract information from engineering drawings or data and related specifications</p> <p>KB8. importance of following specified fabrication and fitting sequences and</p>

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	<p>procedures</p> <p>KB9. importance and procedures of ensuring suitability of workpieces/materials and consumables for the specified job</p> <p>KB10. suitability of workpieces/materials and consumables: e.g. correct type and code, correct form, correct dimensions, damage free, correctly issued, etc.</p> <p>KB11. tools and equipment used for the fabrication and fitting operations</p> <p>KB12. importance and procedures to ensure that tools and equipment are in a safe and usable condition</p> <p>KB13. correct techniques and procedures to carry out specific fabrication and fitting operations by hand tools and manually operated machines</p> <p>Hand tools: hacksaws; hammers; punches; screwdrivers; sockets; wrenches; spanners; scrapers; chisels; gouges; files; taps; vices and clamps</p> <p>Manually operated machine tools: drills (power drills, pedestal drills), grinders (hand held power grinders, pedestal grinders), saws (jigsaws, cutting saws), shears (hand shear, mechanized shears), nibblers, press V-shape, punching machines, bending machines, threading machines</p> <p>KB14. importance of securing the workpiece/raw material correctly using appropriate holding devices and mechanisms</p> <p>Positioning and holding devices: belts; braces; clamps; jigs and fixtures; bolt straps; blocks and tables; manual lifts; ropes; jacks</p> <p>KB15. common problems that can occur in the fabrication and fitting operations and their implications</p> <p>KB16. correct procedures to address problems commonly encountered during fitting and fabrication operations</p> <p>KB17. importance of reporting problems immediately and accurately</p> <p>KB18. meaning and importance of quality in relation to final and intermediate job output</p> <p>KB19. how to check the quality of the shaped components against the specified quality standards</p> <p>Components quality standards: components to be free from damage, false tool cuts, burrs, scratches and non-specified sharp edges; general dimensional tolerance <math>+/- 0.10\text{mm}</math>; flatness and squareness <math>0.05\text{mm}</math>; angles within <math>+/- 1</math> degree; screw threads to fit as per standard; reamed and bored holes within interference: <math>-0.05\text{mm}</math> (hole) <math>+0.05\text{mm}</math> (shaft), transition: <math>-0.1\text{mm}</math> (hole) <math>+0.1</math> (shaft), clearance: 50 microns; radius: 0.5 r; ovality restriction</p> <p>KB20. range of materials used in relevant fitting and fabrication applications</p> <p>Range of Materials: Ferrous metals: eg. carbon steels, stainless steels, cast iron, tool steel, hard metals; Non-ferrous metals: eg. bronze, bronze alloys,</p>
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## CSC/N0303 Perform fitting operations on metal components using hand tools and manually operated machines

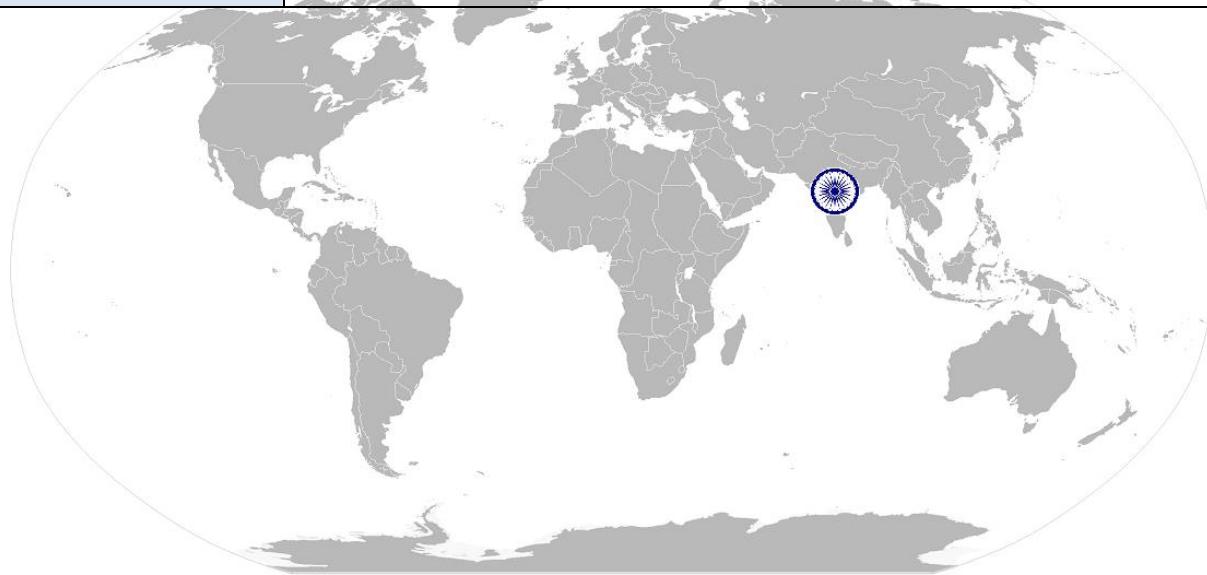
	<p>copper and copper alloys</p> <p>KB21. the relevant mechanical properties of materials and implications for job Mechanical properties: tensile strength, toughness, hardness, elasticity, ductility, malleability</p> <p>KB22. importance of using correct procedures as per type and form of materials and metal components Forms of metal components: square/rectangular (eg. bar stock, sheet material, machined components), circular/cylindrical (eg. bar stock, tubes, turned components, flat discs), sections (eg. angles, channel, tee section, joists, extrusions), irregular shapes/profile (eg. castings, forgings, odd shaped components)</p>
<b>Skills (S)</b>	
<b>A. Core Skills/ Generic Skills</b>	<p><b>Reading Skills</b></p> <p>The user/ individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>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</li> </ul> <p><b>Writing Skills</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language</li> <li>SA3. undertake numerical operations, geometry and calculations/ formulae Numerical computations: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages</li> <li>SA4. identify various basic, compound and solid shapes as per dimensions given Basic shapes: square, rectangle, triangle, circle Compound shapes: involving squares, rectangles, triangles, circles, semi-circles, quadrants of a circle Solid shapes: cube, rectangular prism, cylinder</li> <li>SA5. use appropriate measuring techniques and units of measurement</li> <li>SA6. use appropriate units and number systems to express degree of accuracy Units and number systems representing degree of accuracy: decimals places, significant figures, fractions as a decimal quantity</li> <li>SA7. use metric systems of measurement</li> </ul> <p><b>Oral Communication (Listening and Speaking skills)</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SA8. convey and share technical information clearly using appropriate language</li> </ul>

## CSC/N0303 Perform fitting operations on metal components using hand tools and manually operated machines

	<ul style="list-style-type: none"> <li>SA9. check and clarify task-related information</li> <li>SA10. liaise with appropriate authorities using correct protocol</li> <li>SA11. communicate with people in respectful form and manner in line with organizational protocol</li> </ul>
<b>B. Professional Skills</b>	<b>Decision Making</b>
	NA
	<b>Plan and Organize</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB1. plan, prioritize and sequence work operations as per job requirements</li> <li>SB2. organize and analyze information relevant to work</li> <li>SB3. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time</li> </ul>
	<b>CustomerCentricity</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB4. exercise restraint while expressing dissent and during conflict situations</li> <li>SB5. avoid and manage distractions to be disciplined at work</li> <li>SB6. manage own time for achieving better results</li> <li>SB7. work in a team in order to achieve better results</li> <li>SB8. identify and clarify work roles within a team</li> <li>SB9. communicate and cooperate with others in the team for better results</li> <li>SB10. seek assistance from fellow team members</li> </ul>
	<b>Problem Solving</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB11. identify problems with work planning, procedures, output and behavior and their implications</li> <li>SB12. prioritize and plan for problem solving</li> <li>SB13. communicate problems appropriately to others</li> <li>SB14. identify sources of information and support for problem solving</li> <li>SB15. seek assistance and support from other sources to solve problems</li> <li>SB16. identify effective resolution techniques</li> <li>SB17. select and apply resolution techniques</li> <li>SB18. seek evidence for problem resolution</li> </ul>
	<b>Analytical Thinking</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB19. undertake and express new ideas and initiatives to others</li> <li>SB20. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses</li> </ul>

### **CSC/N0303 Perform fitting operations on metal components using hand tools and manually operated machines**

	<ul style="list-style-type: none"> <li>SB21. participate in improvement procedures including process, quality and internal/external customer/supplier relationships</li> <li>SB22. enhance one's competencies in new and different situations and contexts to achieve more</li> </ul>
<b>Critical Thinking</b>	
<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB23. participate in on-the-job and other learning, training and development interventions and assessments</li> <li>SB24. clarify task related information with appropriate personnel or technical adviser</li> <li>SB25. seek to improve and modify own work practices</li> <li>SB26. maintain current knowledge of application standards, legislation, codes of practice and product/process developments</li> </ul>	



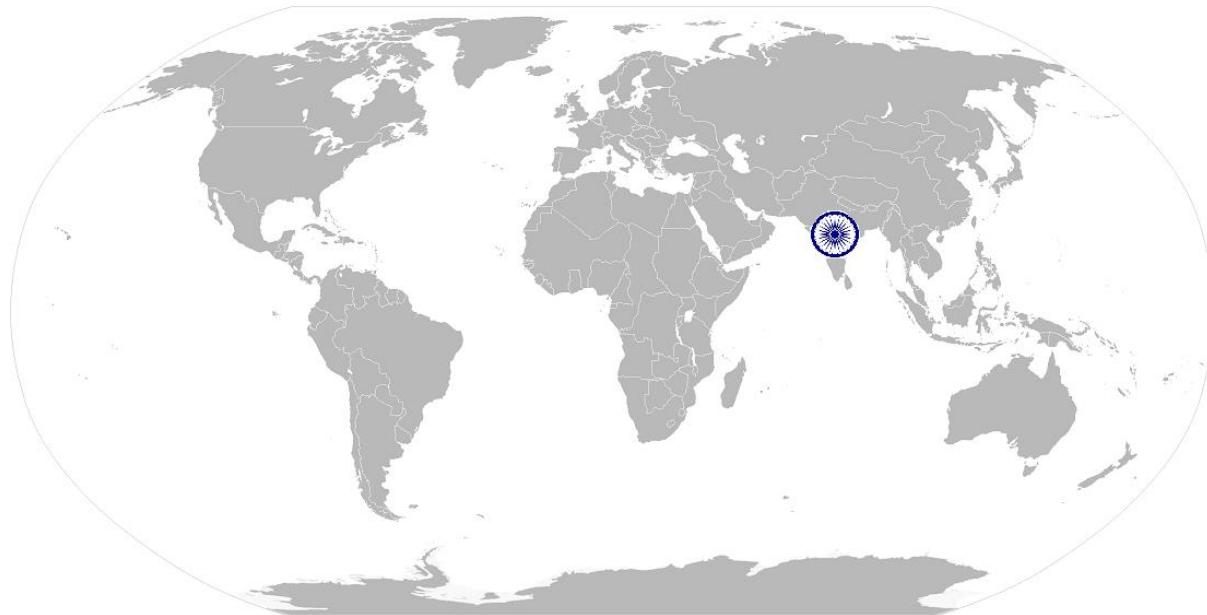
**CSC/N0303 Perform fitting operations on metal components using hand tools and manually operated machines**

**NOS Version Control**

NOS Code		CSC/N0303	
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	Fitting and Assembly	Next review date	24/11/2021

**CSC/N0201 Perform simple manual cutting operations on carbon steels using oxy-fuel gas**

# National Occupational Standard



## Overview

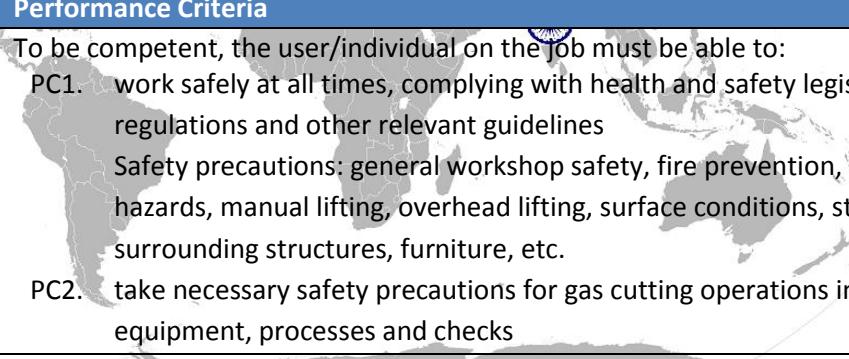
This unit is about competencies required for manual cutting operations using oxy-fuel gas. The person would be able to carry out basic oxy-fuel gas cutting operations under constant supervision as per instructions received.

## CSC/N0201 Perform simple manual cutting operations on carbon steels using oxy-fuel gas

### National Occupational Standard

<b>Unit Code</b>	CSC/N0201
<b>Unit Title (Task)</b>	<b>Perform simple manual cutting operations on carbon steels using oxy-fuel gas</b>
<b>Description</b>	This unit is about competencies required for simple manual cutting operations on carbon steels using oxy-fuel gas such as oxy-acetylene. The person would be able to carry out simple oxy-fuel cutting operations on carbon steels as per specific instructions given.
<b>Scope</b>	<p>This unit/task covers the following:</p> <ul style="list-style-type: none"> <li>• Work safely</li> <li>• Prepare for cutting operations</li> <li>• Carry out cutting operations</li> <li>• Test for accuracy</li> <li>• Deal with contingencies</li> </ul> 

### Performance Criteria(PC) w.r.t. the Scope

Element	Performance Criteria
<b>Work safely</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p>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.</p> <p>PC2. take necessary safety precautions for gas cutting operations including equipment, processes and checks</p> 
<b>Prepare for cutting operations</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC3. interpret cutting procedure data sheets specifications</p> <p>PC4. check regulators, hoses and check that valves are securely connected and free from leaks and damage</p> <p>PC5. check equipment is calibrated and approved for use</p> <p>PC6. check the correct size gas nozzle to the torch</p> <p>PC7. ensure preheat and oxygen holes on the tips are clean</p> <p>PC8. check that a flashback arrestor is fitted</p> <p>PC9. set appropriate gas pressures</p> <p>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</p>

### CSC/N0201 Perform simple manual cutting operations on carbon steels using oxy-fuel gas

	<p>PC11. adjust torch valve for type of flame such as neutral, carburizing and oxidizing</p> <p>PC12. follow sequence of operations such as pre-heating material and initiating cut</p> <p>PC13. check if the locations for cutting have been marked out by authorised persons</p> <p>PC14. use appropriate and safe procedures for handling and storing of gas cylinders</p> <p>PC15. prepare the work area for the cutting activities</p> <p>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</p> <p>Equipment: hand-held oxy-fuel gas cutting equipment, simple, portable, track-driven cutting equipment (electrical or mechanical), fixed bench gas cutting equipment</p> <p>PC17. check that the oxy-fuel gas cutting equipment is set up for the operations to be performed</p> <p>PC18. adjust cylinder valves and adjust regulator for operating pressure to achieve specifications for required operations</p> <p>PC19. seek clarification where marking out is not done or is not clear from authorised person</p> <p>PC20. perform trial cut to check for cut defects</p>
<b>Carry out cutting Operations</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC21. operate the oxy-fuel gas cutting equipment to produce items/cut shapes to the dimensions and profiles as per instructions given</p> <p>PC22. use various oxy-fuel gas lighting and cutting procedures</p> <p>PC23. perform various cutting operations correctly</p> <p>Cutting operations: down-hand straight cuts (freehand), making straight cuts (track guided), cutting regular shapes, making angled cuts, bevelled edge – weld preparations</p> <p>PC24. produce thermal cuts in low carbon steel (1.5mm to 10mm thickness)</p> <p>PC25. produce cut profiles for various type of materials and forms</p> <p>Materials: carbon steels</p> <p>Forms: plate; sheet; pipe/tube; bars and rods</p> <p>PC26. produce thermally-cut components which meet specified quality criteria</p> <p>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</p> <p>PC27. recognize and correct burnback and flashback</p> <p>PC28. detect and correct defects in cut</p> <p>PC29. ensure the work area is left in a safe and tidy condition on completion of the cutting activities</p>
<b>Test for accuracy</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC30. check that the finished components meet the standard required</p>

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	<p>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</p> <p>PC32. identify various cutting defects and follow organisation recommended procedures to address them</p> <p>Defects: distortion; grooved, fluted or ragged cuts; poor draglines; rounded edges; tightly adhering slag</p>
<b>Deal with contingencies</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC33. report any difficulties or problems that may arise with the cutting activities, and carry out any agreed actions</p> <p>PC34. detect equipment malfunctions and deal with them appropriately</p> <p>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</p> <p>PC36. shut down and make safe the cutting equipment on completion of the cutting activities</p> <p>PC37. follow standard emergency procedures in case of emergencies</p> <p>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</p>
Knowledge and Understanding (K)	
<b>A. Organizational Context</b>  (Knowledge of the company /	The user/individual on the job needs to know and understand: <p>KA1. job relevant legislation, standards, policies, and procedures followed in the company</p> <p>KA2. key purpose of the organization</p> <p>KA3. department structure and hierarchy protocols</p>

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organization and its processes)	<ul style="list-style-type: none"> <li>KA4. work flow and own role in the workflow</li> <li>KA5. dependencies and interdependencies in the workflow</li> <li>KA6. support functions and types of support available for incumbents in this role</li> </ul>
<b>B. Technical Knowledge</b>	<p>The user/individual on the job needs to know and understand:</p> <ul style="list-style-type: none"> <li>KB1. types of fire extinguishers and their suitable uses in case of gas cutting related fires</li> <li>KB2. specific safety precautions to be taken when working with oxy-fuel gas cutting equipment in a fabrication environment</li> </ul> <p>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 protection of self and others from the effects of the flame; safety measures for elevated and trench working; gas cylinder safety: right color coded; 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</p> <ul style="list-style-type: none"> <li>KB3. personal protective clothing and equipment (PPE) to be worn when working with gas cutting equipment</li> </ul> <p>Personal protective equipment: suitable aprons; gloves; safety boots; correctly fitting overalls; suitable eye shields/goggles; respirators</p> <ul style="list-style-type: none"> <li>KB4. hazards associated with carrying out gas cutting activities and how they can be minimized</li> <li>KB5. safe working practices and procedures for using thermal equipment</li> <li>KB6. principles of oxy-fuel gas cutting</li> <li>KB7. procedure for obtaining the required drawings, job instructions and other related specifications</li> <li>KB8. how to use and extract information from engineering drawings and related specifications, workpiece reference points and system of tolerances</li> <li>KB9. various types of gas cutting equipment available</li> </ul> <p>Equipment: hand-held oxy-fuel gas cutting equipment, simple, portable, track-driven cutting equipment (electrical or mechanical), fixed bench gas cutting equipment</p> <ul style="list-style-type: none"> <li>KB10. various components of the gas cutting equipment</li> </ul> <p>Components: color coded cylinder oxygen, color coded cylinder acetylene, cylinder valve, flashback arrestor, set of nozzles, gas lighter nozzle, cutting</p>

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	<p>tips, pressure regulator, pressure gauge, non-return valves, color coded flexible hose, trolleys, torches (rose-bud heating, cutting, others)</p> <p>KB11. construction of the heating and cutting torch</p> <p>KB12. types of oxy-fuel gases such as acetylene, natural gas and propane</p> <p>KB13. accessories that can be used with handheld gas cutting equipment to aid cutting operations (such as cutting guides, trammels, templates)          Cutting operations: down-hand straight cuts (freehand), making straight cuts (track guided), cutting regular shapes, making angled cuts, beveled edge – weld preparations</p> <p>KB14. importance of correct marking procedure before a cut (eg. allowances for post-cut operations, punch marks, etc.)</p> <p>KB15. types of regulators such as low- and high-pressure, and single- and two-stage</p> <p>KB16. how to identify the gases used in the cutting process, and the color coding of gas cylinders</p> <p>KB17. type and thickness of base metals related to nozzle type</p> <p>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)</p> <p>KB19. holding methods that are used to aid thermal cutting, and the equipment that can be used</p> <p>KB20. correct procedure for lighting, cutting and extinguishing the flame</p> <p>KB21. types of flames and their implication for cutting</p> <p>KB22. importance of following the correct procedure for lighting, cutting and extinguishing a 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</p> <p>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)</p> <p>KB24. effects of oil, grease, scale or dirt on the cutting process</p> <p>KB25. gas mixture ratio required to get various flames</p> <p>KB26. quality parameters for gas cut materials          Quality parameters: shape and length of the dragline, smoothness of the sides, sharpness of the top edges, amount of slag adhering to the metal</p> <p>KB27. special grade materials used in industry and their behavior with oxy fuel gas</p> <p>KB28. causes of cutting defects, how to recognize them, and methods of correction and prevention</p> <p>KB29. importance of leaving the work area in a safe and clean condition on</p>
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	<p>completion of activities</p> <p>KB30. correct handling and storage of gas cylinders</p> <p>KB31. emergency procedures for backfires, flashback and other fires</p> <p>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</p> <p>KB32. how to close down the cutting equipment safely and correctly</p> <p>KB33. purging tools and their function</p>
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### Skills (S)

<b>A. Core Skills/ Generic Skills</b>	<b>Reading Skills</b> <p>The user/ individual on the job needs to know and understand how to:</p> <p>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</p>
	<b>Writing Skills</b> <p>The user/individual on the job needs to know and understand how to:</p> <p>SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language</p> <p>SA3. undertake numerical operations, geometry and calculations/ formulae</p> <p>Numerical computations: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages</p> <p>SA4. identify various basic, compound and solid shapes as per dimensions given</p> <p>Basic shapes: square, rectangle, triangle, circle</p> <p>Compound shapes: involving squares, rectangles, triangles, circles, semi-</p>

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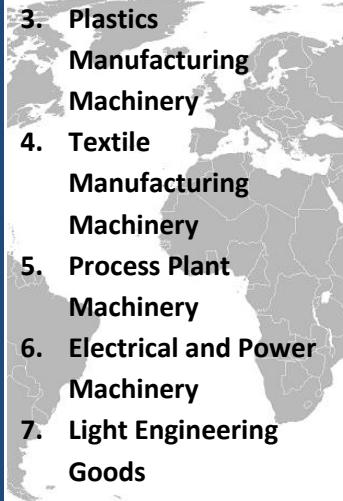
	circles, quadrants of a circle Solid shapes: cube, rectangular prism, cylinder SA5. use appropriate measuring techniques and units of measurement SA6. use appropriate units and number systems to express degree of accuracy Units and number systems representing degree of accuracy: decimals places, significant figures, fractions as a decimal quantity SA7. use metric systems of measurement
	<b>Oral Communication (Listening and Speaking skills)</b>  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>B. Professional Skills</b>	<b>Decision Making</b>  
	<b>Plan and Organize</b>  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
	<b>CustomerCentricity</b>  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
	<b>Problem Solving</b>  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

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	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
	<b>Analytical Thinking</b>  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
	<b>Critical Thinking</b>  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

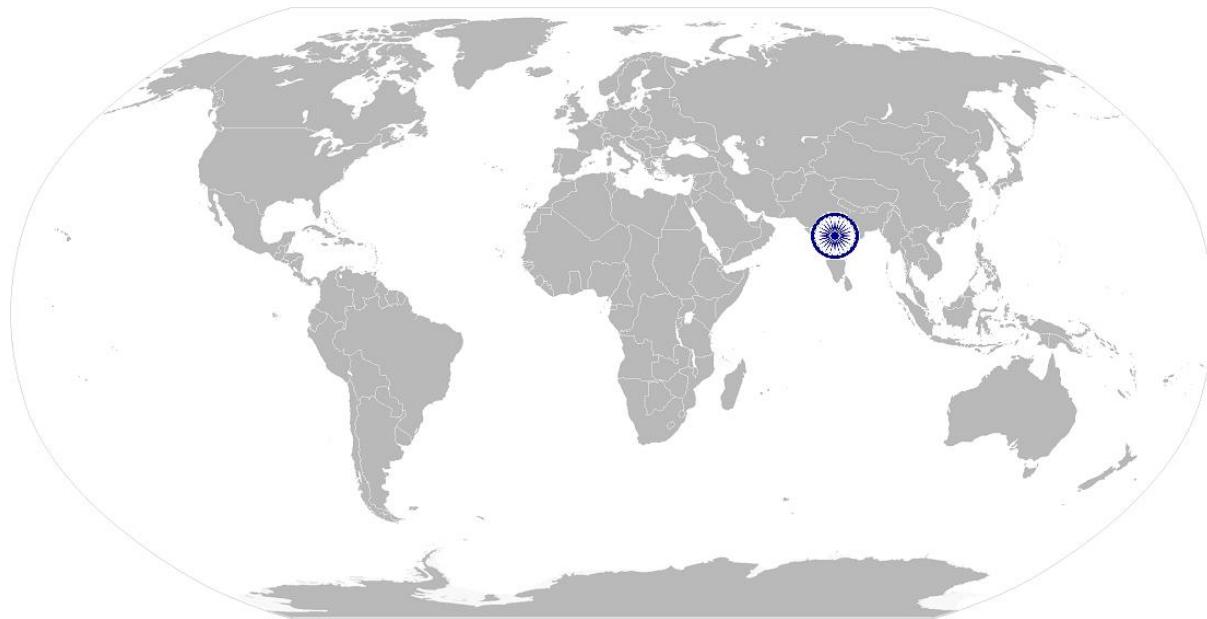
## CSC/N0201 Perform simple manual cutting operations on carbon steels using oxy-fuel gas

### NOS Version Control

NOS Code		CSC/N0201	
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	10/04/2014
Industry Sub-sector	 <ul style="list-style-type: none"> <li>1. Machine Tools</li> <li>2. Dies, Moulds and Press Tools</li> <li>3. Plastics Manufacturing Machinery</li> <li>4. Textile Manufacturing Machinery</li> <li>5. Process Plant Machinery</li> <li>6. Electrical and Power Machinery</li> <li>7. Light Engineering Goods</li> </ul>	Last reviewed on	 24/11/2017
Occupation	Fitting and Assembly	Next review date	24/11/2021

**CSC/N0202 Manually weld carbon steels in simple welding positions using Metal Arc Welding/ Shielded Metal Arc Welding**

# 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 fillet and groove welds on low carbon and low alloy steels in simple welding positions as per specific instructions given.

## CSC/N0202 Manually weld carbon steels in simple welding positions using Metal Arc Welding/ Shielded Metal Arc Welding

National Occupational Standard	
Unit Code	<b>CSC/N0202</b>
Unit Title (Task)	<b>Manually weld carbon steels in simple welding positions using Metal Arc Welding/ Shielded Metal Arc Welding</b>
Description	This OS unit is about performing manual metal arc welding (MMAW) welding also known as Shielded Metal Arc Welding (SMAW) for producing various types of joints on low carbon and low alloy steels in 1G/1F and 2G/2F welding positions as per specific instructions given and under close supervision.
Scope	<p>This unit/task covers the following:</p> <ul style="list-style-type: none"> <li>• Work Safely</li> <li>• Prepare for welding operations</li> <li>• Carry out welding operations</li> <li>• Test for quality</li> </ul>
Performance Criteria(PC) w.r.t. the Scope	
Element	Performance Criteria
Work safely	<p>To be competent, the user/individual on the job must be able to:</p> <p class="list-item-l1">PC1. work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines</p> <p class="list-item-l1">PC2. adhere to procedures or systems in place for health and safety, personal protective equipment (PPE) and other relevant safety regulations</p> <p>Safety precautions: general workshop safety; fire prevention; general hazards; manual lifting; overhead lifting; shopfloor housekeeping including surface conditions; waste disposal; stability of surrounding structures, furniture etc.</p> <p class="list-item-l1">PC3. check the condition of, welding leads, earthing arrangements and electrode holder</p> <p class="list-item-l1">PC4. report any faults or potential hazards to appropriate authority</p> <p class="list-item-l1">PC5. follow fume extraction safety procedures</p>
Prepare for welding operations	<p>To be competent, the user/individual on the job must be able to:</p> <p class="list-item-l1">PC6. read and interpret routine information on written job instructions and drawings</p> <p class="list-item-l1">PC7. identify welding machines eg. transformers, rectifiers, inverters and generators, according to the task</p> <p class="list-item-l1">PC8. prepare the work area for the welding activities</p> <p class="list-item-l1">PC9. prepare the raw materials and joint in readiness for welding</p> <p class="list-item-l1">PC10. perform measurements for joint preparation and routine MMAW</p> <p>Raw materials: low carbon steels, low alloy steels</p> <p>Form: plate(&gt;1.5 mm, &lt;24 mm), sheet (1.5mm)</p>

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	<p>PC11. prepare workpiece prior to welding          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; setting up the joint in the correct position and alignment</p> <p>PC12. tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding</p> <p>PC13. receive the set up equipment and connect to power source</p> <p>PC14. use manual metal-arc welding and related equipment to include a. alternating current (AC) equipment b. direct current (DC) equipment          MMAW equipment: 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.)</p> <p>PC15. verify set up by running test weld specimen (scrap plate)</p> <p>PC16. report any faults or problem to appropriate authority</p>
<b>Carry out welding operations</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC17. strike and maintain a stable arc</p> <p>PC18. stop and properly re-start arc to avoid welding defects (scratch start, tapping techniques)</p> <p>PC19. maintain constant puddle by using appropriate travel speed</p> <p>PC20. maintain proper bead sequence with respect to groove/fillet configurations and positions</p> <p>PC21. remove slag in an appropriate manner (eg. wire brush, hammer, etc.)</p> <p>PC22. produce fillet and groove joints in simple welding positions as per specific instructions given using single or multi-run welds(as instructed)          Positions: flat (PA) IG/1F, horizontal vertical (PB) 2F, horizontal (PC) 2G</p> <p>PC23. produce joints on low carbon and low alloy steel materials using various methods          Methods: drag, weave, whip</p> <p>PC24. weld the joint to the specified quality standards, dimensions and profile for sheets and plates from 1.5 mm – 24 mm          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</p>

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	<p>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</p> <p>PC25. ensure full penetration groove welds are back clipped prior to back welding</p> <p>PC26. 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</p> <p>PC27. ensure welding is done according to welding parameter specified in WPS</p> <p>PC28. shut down and make safe the welding equipment on completion of the welding activities</p>
<b>Test for quality</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC29. measure and check that all dimensional and geometrical aspects of the weld are as per instructions</p> <p>PC30. identify various weld defects using visual inspection</p> <p>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</p> <p>Visual inspections: e.g. use of visual techniques, distance from workpiece, angle of observation, adequate lighting, low powered magnification, fillet Weld gauges, etc.</p> <p>PC31. detect and report surface imperfections to appropriate authority</p> <p>PC32. deal with defects in welding as per instructions given</p>
<b>Knowledge and Understanding (K)</b>	
<b>A. Organizational Context</b> (Knowledge of the company / organization and its processes)	<p>The user/individual on the job needs to know and understand:</p> <p>KA1. relevant legislation, standards, policies, and procedures followed in the company</p> <p>KA2. department structure and hierarchy protocols</p> <p>KA3. work flow and own role in the workflow</p> <p>KA4. dependencies and interdependencies in the workflow</p> <p>KA5. support functions and types of support available for incumbents in this role</p>

## CSC/N0202 Manually weld carbon steels in simple welding positions using Metal Arc Welding/ Shielded Metal Arc Welding

<b>B. Technical Knowledge</b>	<p>The user/individual on the job needs to know and understand:</p> <ul style="list-style-type: none"> <li>KB1. health and safety hazards associated with MMAW/SMAW welding Safety precautions: protection from live and other 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.)</li> <li>KB2. effects of exposure to the electric arc</li> <li>KB3. types of fire extinguishers and their suitable uses</li> <li>KB4. effects of exposure to welding fume</li> <li>KB5. methods of managing welding fume hazards</li> <li>KB6. personal protective equipment (PPE) and clothing to be worn during MMAW/SMAW welding</li> <li>KB7. various welding methods and specific equipment requirements for MMAW/SMAW welding MMAW equipment: 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.) Methods: drag, weave, whip</li> <li>KB8. main components and controls of welding equipment</li> <li>KB9. type of current used and implication</li> <li>KB10. types of consumables used for MMAW/SMAW welding</li> <li>KB11. 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</li> <li>KB12. magnetic arc blow or arc deflection, causes and methods to avoid or compensate</li> <li>KB13. types of joint configurations Joints: groove and fillet</li> <li>KB14. 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)</li> </ul>
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## CSC/N0202 Manually weld carbon steels in simple welding positions using Metal Arc Welding/ Shielded Metal Arc Welding

	<p>KB15. types of beads, their characteristics and uses (stringer, weave, weave patterns)          Bead characteristics: spatter deposits, roughness, evenness, fill, crater, overlap</p> <p>KB16. factors that affect weld quality</p> <p>KB17. weld positions such as flat, horizontal, vertical and overhead          Positions: flat (PA) IG/1F, horizontal vertical (PB) 2F, horizontal (PC) 2G</p> <p>KB18. types of equipment components such as electrode holders, work leads cables and ground clamps</p> <p>KB19. storage requirements for consumable electrodes</p> <p>KB20. welding process specification sheet, process qualification record (PQR) and related essential variables</p> <p>KB21. travel speed and heat inputs</p> <p>KB22. importance and implications of various diameters of electrodes</p> <p>KB23. purpose and importance of pre-heating requirements for base metals</p> <p>KB24. purpose and importance of post-heating in welding</p> <p>KB25. 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.</p>
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### Skills (S)

<b>A. Core Skills/ Generic Skills</b>	<b>Reading Skills</b> <p>The user/ individual on the job needs to know and understand how to:</p> <p>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</p>
	<b>Writing Skills</b> <p>The user/individual on the job needs to know and understand how to:</p> <p>SA2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language</p> <p>SA3. undertake numerical operations, geometry and calculations/ formulae          Numerical computations: addition, subtraction, multiplication, division, fractions and decimals, percentages and proportions, simple ratios and averages</p> <p>SA4. identify various basic, compound and solid shapes as per dimensions given          Basic shapes: square, rectangle, triangle, circle          Compound shapes: involving squares, rectangles, triangles, circles, semi-circles, quadrants of a circle</p>

## CSC/N0202 Manually weld carbon steels in simple welding positions using Metal Arc Welding/ Shielded Metal Arc Welding

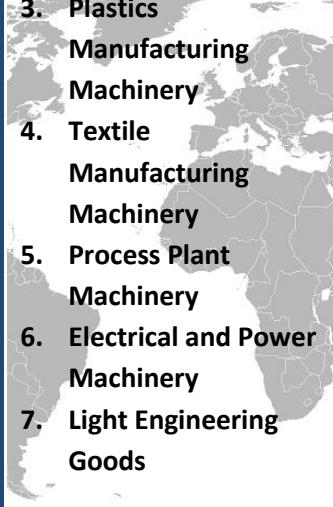
<b>B. Professional Skills</b>	<ul style="list-style-type: none"> <li>Solid shapes: cube, rectangular prism, cylinder</li> <li>SA5. use appropriate measuring techniques and units of measurement</li> <li>SA6. use appropriate units and number systems to express degree of accuracy Units and number systems representing degree of accuracy: decimals places, significant figures, fractions as a decimal quantity</li> <li>SA7. use metric systems of measurement</li> </ul>
	<b>Oral Communication (Listening and Speaking skills)</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SA8. convey and share technical information clearly using appropriate language</li> <li>SA9. check and clarify task-related information</li> <li>SA10. liaise with appropriate authorities using correct protocol</li> <li>SA11. communicate with people in respectful form and manner in line with organizational protocol</li> </ul>
	<b>Decision Making</b>
	NA
	<b>Plan and Organize</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB1. plan, prioritize and sequence work operations as per job requirements</li> <li>SB2. organize and analyze information relevant to work</li> <li>SB3. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time</li> </ul>
	<b>CustomerCentricity</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB4. exercise restraint while expressing dissent and during conflict situations</li> <li>SB5. avoid and manage distractions to be disciplined at work</li> <li>SB6. manage own time for achieving better results</li> <li>SB7. work in a team in order to achieve better results</li> <li>SB8. identify and clarify work roles within a team</li> <li>SB9. communicate and cooperate with others in the team for better results</li> <li>SB10. seek assistance from fellow team members</li> </ul>
	<b>Problem Solving</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB11. identify problems with work planning, procedures, output and behavior and their implications</li> <li>SB12. prioritize and plan for problem solving</li> <li>SB13. communicate problems appropriately to others</li> <li>SB14. identify sources of information and support for problem solving</li> </ul>

## CSC/N0202 Manually weld carbon steels in simple welding positions using Metal Arc Welding/ Shielded Metal Arc Welding

	<ul style="list-style-type: none"> <li>SB15. seek assistance and support from other sources to solve problems</li> <li>SB16. identify effective resolution techniques</li> <li>SB17. select and apply resolution techniques</li> <li>SB18. seek evidence for problem resolution</li> </ul>
<b>Analytical Thinking</b>	
<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB19. undertake and express new ideas and initiatives to others</li> <li>SB20. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses</li> <li>SB21. participate in improvement procedures including process, quality and internal/external customer/supplier relationships</li> <li>SB22. enhance one's competencies in new and different situations and contexts to achieve more</li> </ul>	
<b>Critical Thinking</b>	
<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB23. participate in on-the-job and other learning, training and development interventions and assessments</li> <li>SB24. clarify task related information with appropriate personnel or technical adviser</li> <li>SB25. seek to improve and modify own work practices</li> <li>SB26. maintain current knowledge of application standards, legislation, codes of practice and product/process developments</li> </ul>	

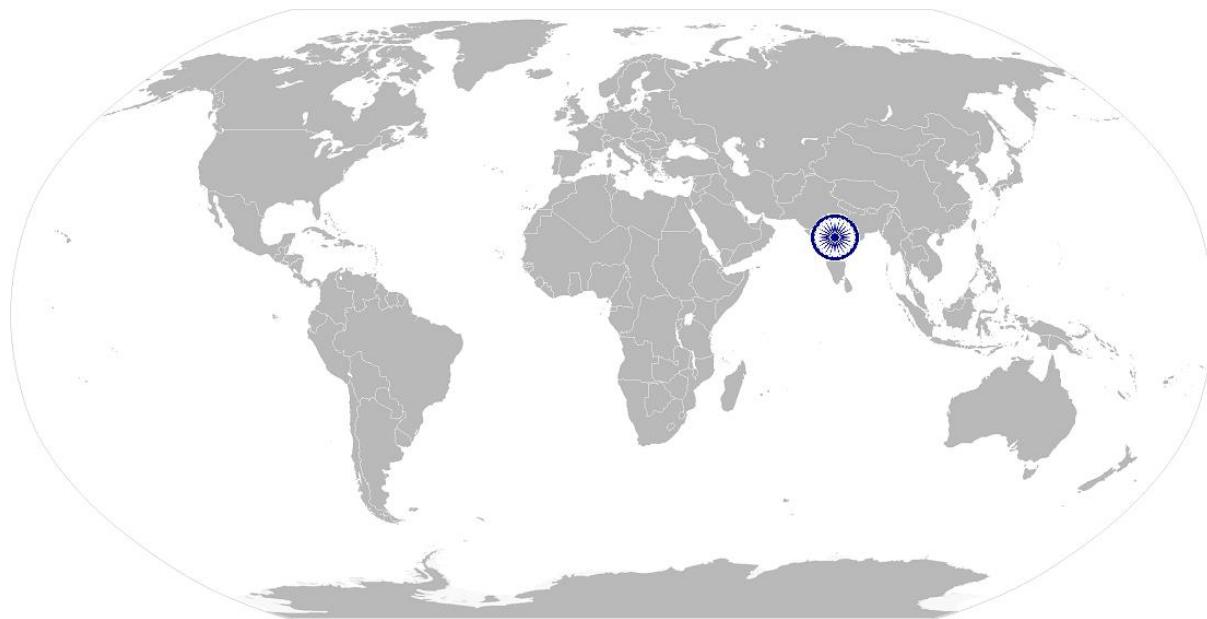
**CSC/N0202 Manually weld carbon steels in simple welding positions using Metal Arc Welding/ Shielded Metal Arc Welding**

**NOS Version Control**

NOS Code		CSC/N0202	
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	10/04/2014
Industry Sub-sector	<ul style="list-style-type: none"> <li>1. Machine Tools</li> <li>2. Dies, Moulds and Press Tools</li> <li>3. Plastics Manufacturing Machinery</li> <li>4. Textile Manufacturing Machinery</li> <li>5. Process Plant Machinery</li> <li>6. Electrical and Power Machinery</li> <li>7. Light Engineering Goods</li> </ul> 	Last reviewed on	24/11/2017
Occupation	Fitting and Assembly	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

<b>Unit Code</b>	<b>CSC/N1335</b>
<b>Unit Title (Task)</b>	<b>Use basic health and safety practices at the workplace</b>
<b>Description</b>	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.
<b>Scope</b>	<p>This unit/task covers the following:</p> <ul style="list-style-type: none"> <li>• Health and safety</li> <li>• Fire safety</li> <li>• Emergencies, rescue and first-aid procedure</li> </ul>
<b>Performance Criteria(PC) w.r.t. the Scope</b>	
<b>Element</b>	<b>Performance Criteria</b>
<b>Health and safety</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p>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</p> <p>PC2. state the name and location of people responsible for health and safety in the workplace</p> <p>PC3. state the names and location of documents that refer to health and safety in the workplace</p> <p>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; oxyfuel 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</p>

**CSC/N1335**

### **Use basic health and safety practices at the workplace**

	<p>drunkenness); health hazards (such as untreated injuries and contagious illness)</p> <p>PC5. carry out safe working practices while dealing with hazards to ensure the safety of self and others</p> <p>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.</p> <p>PC6. state methods of accident prevention in the work environment of the job role</p> <p>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</p> <p>PC7. state location of general health and safety equipment in the workplace</p> <p>General health and safety equipment: fire extinguishers; first aid equipment; safety instruments and clothing; safety installations(eg fire exits, exhaust fans)</p> <p>PC8. inspect for faults, set up and safely use steps and ladders in general use</p> <p>Ladder faults: corrosion of metal components, deterioration, splits and cracks timber components, imbalance, loose rungs, missing/ unfixed nuts or bolts, etc.</p> <p>Ladders set up: firm/level base, clip/lash down, leaning at the correct angle, etc.</p> <p>PC9. work safely in and around trenches, elevated places and confined areas</p> <p>PC10. lift heavy objects safely using correct procedures</p> <p>PC11. apply good housekeeping practices at all times</p> <p>Good housekeeping practices: clean/tidy work areas, removal/disposal of waste products, protect surfaces</p> <p>PC12. identify common hazard signs displayed in various areas</p> <p>Various areas: on chemical containers; equipment; packages; inside buildings; in open areas and public spaces, etc.</p> <p>PC13. retrieve and/or point out documents that refer to health and safety in the workplace</p>
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**CSC/N1335      Use basic health and safety practices at the workplace**

	<p>Documents: fire notices, accident reports, safety instructions for equipment and procedures, company notices and documents, legal documents (eg government notices)</p>
<b>Fire safety</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC14. use the various appropriate fire extinguishers on different types of fires correctly</p> <p>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.</p> <p>(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)</p> <p>PC15. demonstrate rescue techniques applied during fire hazard</p> <p>PC16. demonstrate good housekeeping in order to prevent fire hazards</p> <p>PC17. demonstrate the correct use of a fire extinguisher</p>
<b>Emergencies, rescue and first-aid procedures</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC18. demonstrate how to free a person from electrocution</p> <p>PC19. administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.</p> <p>PC20. demonstrate basic techniques of bandaging</p> <p>PC21. respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments</p> <p>PC22. perform and organize loss minimization or rescue activity during an accident in real or simulated environments</p> <p>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</p> <p>PC24. demonstrate the artificial respiration and the CPR Process</p> <p>PC25. participate in emergency procedures</p> <p>Emergency procedures: raising alarm, safe/efficient, evacuation, correct means of escape, correct assembly point, roll call, correct return to work</p> <p>PC26. complete a written accident/incident report or dictate a report to another person, and send report to person responsible</p> <p>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</p> <p>PC27. demonstrate correct method to move injured people and others during an</p>

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

	emergency
<b>Knowledge and Understanding (K)</b>	
<b>A. Organizational Context</b> (Knowledge of the company / organization and its processes)	<p>The user/individual on the job needs to know and understand:</p> <ul style="list-style-type: none"> <li>KA1. names (and job titles if applicable), and where to find, all the people responsible for health and safety in a workplace</li> <li>KA2. names and location of documents that refer to health and safety in the workplace</li> </ul>
<b>B. Technical Knowledge</b>	<p>The user/individual on the job needs to know and understand:</p> <ul style="list-style-type: none"> <li>KB1. meaning of “hazards” and “risks”</li> <li>KB2. health and safety hazards commonly present in the work environment and related precautions</li> <li>KB3. possible causes of risk, hazard or accident in the workplace and why risk and/or accidents are possible</li> <li>KB4. possible causes of risk and accident</li> </ul> <p>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)</p> <ul style="list-style-type: none"> <li>KB5. methods of accident prevention</li> </ul> <p>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</p> <ul style="list-style-type: none"> <li>KB6. safe working practices when working with tools and machines</li> <li>KB7. safe working practices while working at various hazardous sites</li> <li>KB8. where to find all the general health and safety equipment in the workplace</li> <li>KB9. various dangers associated with the use of electrical equipment</li> <li>KB10. preventative and remedial actions to be taken in the case of exposure to toxic materials</li> </ul> <p>Exposure: ingested, contact with skin, inhaled</p> <p>Preventative action: ventilation, masks, protective clothing/ equipment);</p> <p>Remedial action: immediate first aid, report to supervisor</p> <p>Toxic materials: solvents, flux, lead</p> <ul style="list-style-type: none"> <li>KB11. importance of using protective clothing/equipment while working</li> <li>KB12. precautionary activities to prevent the fire accident</li> <li>KB13. various causes of fire</li> </ul> <p>Causes of fires: heating of metal; spontaneous ignition; sparking; electrical heating; loose fires (smoking, welding, etc.); chemical fires; etc.</p>

**CSC/N1335**

### **Use basic health and safety practices at the workplace**

	<ul style="list-style-type: none"> <li>KB14. techniques of using the different fire extinguishers</li> <li>KB15. different methods of extinguishing fire</li> <li>KB16. different materials used for extinguishing fire Materials: sand, water, foam, CO<sub>2</sub>, dry powder</li> <li>KB17. rescue techniques applied during a fire hazard</li> <li>KB18. various types of safety signs and what they mean</li> <li>KB19. appropriate basic first aid treatment relevant to the condition eg. shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries</li> <li>KB20. content of written accident report</li> <li>KB21. potential injuries and ill health associated with incorrect manual handling</li> <li>KB22. safe lifting and carrying practices</li> <li>KB23. personal safety, health and dignity issues relating to the movement of a person by others</li> <li>KB24. potential impact to a person who is moved incorrectly</li> </ul>
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#### **Skills (S)**

<b>A. Core Skills/ Generic Skills</b>	<b>Reading Skills</b> <p>The user/ individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SA1. read and comprehend basic content to read labels, charts, signages</li> <li>SA2. read and comprehend basic English to read manuals of operations</li> <li>SA3. read an accident/incident report in local language or English</li> </ul>
	<b>Writing Skills</b> <p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SA4. write an accident/incident report in local language or English</li> </ul>
	<b>Oral Communication (Listening and Speaking skills)</b> <p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SA5. question coworkers appropriately in order to clarify instructions and other issues</li> <li>SA6. give clear instructions to coworkers, subordinates others</li> </ul>
	<b>Decision Making</b> <p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>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</li> </ul>
	<b>Plan and Organize</b> <p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB2. plan and organize their own work schedule, work area, tools, equipment and materials to maintain decorum and for improved productivity</li> </ul>

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## Use basic health and safety practices at the workplace

	<b>CustomerCentricity</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB3. remain congenial while discussing and debating issues with co-workers</li> <li>SB4. follow appropriate protocols for communication based on situation, hierarchy, organizational culture and practice</li> <li>SB5. ask for, provide and receive required assistance where possible to ensure achievement of work related objectives</li> <li>SB6. thank coworkers for any assistance received</li> <li>SB7. offer appropriate respect based on mutuality and respect for fellow workmanship and authority</li> </ul>
	<b>Problem Solving</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB8. think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s)</li> <li>SB9. identify immediate or temporary solutions to resolve delays</li> <li>SB10. identify sources of support that can be availed of for problem solving for various kind of problems</li> <li>SB11. seek appropriate assistance from other sources to resolve problems</li> <li>SB12. report problems that you cannot resolve to appropriate authority</li> </ul>
	<b>Analytical Thinking</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB13. identify cause and effect relations in their area of work</li> <li>SB14. use cause and effect relations to anticipate potential problems and their solution</li> </ul>
	<b>Critical Thinking</b>
	NA

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

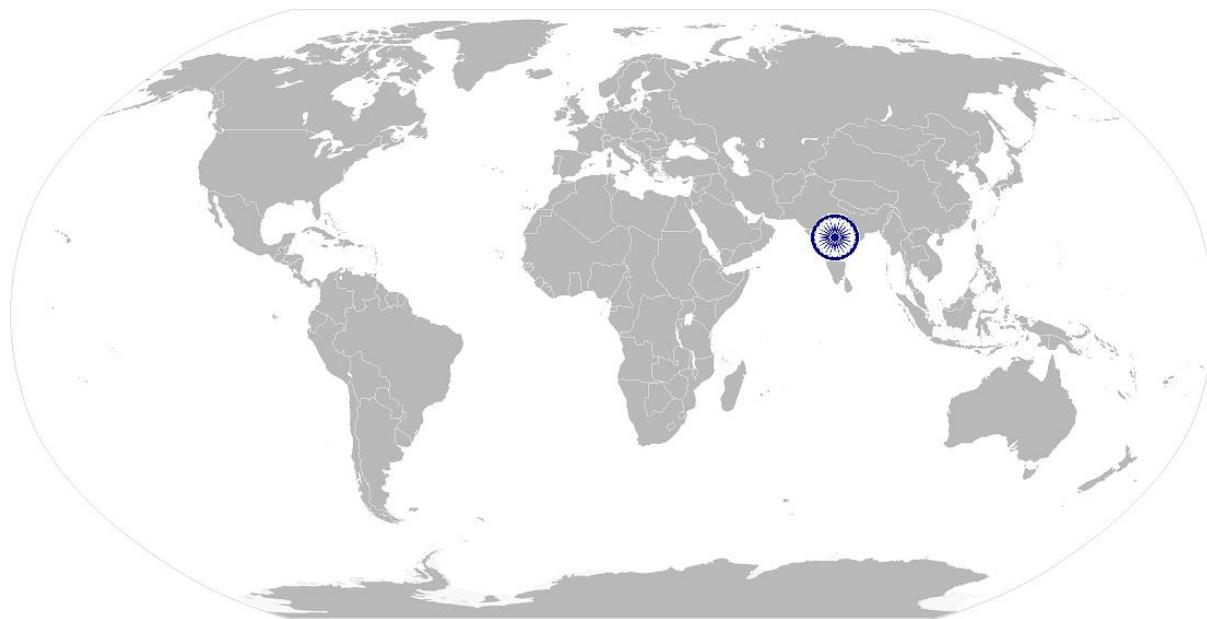
**NOS Version Control**

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	Fitting and Assembly	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

<b>Unit Code</b>	CSC/N1336
<b>Unit Title (Task)</b>	<b>Work effectively with others</b>
<b>Description</b>	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.
<b>Scope</b>	<p>This unit/task covers the following:</p> <ul style="list-style-type: none"> <li>• Work effectively with others</li> </ul>
<b>Performance Criteria(PC) w.r.t. the Scope</b>	
<b>Element</b>	<b>Performance Criteria</b>
<b>Work effectively with others</b>	<p>To be competent, the user/individual on the job must be able to:</p> <p class="list-item-l1">PC1. accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required</p> <p class="list-item-l1">PC2. accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt</p> <p class="list-item-l1">PC3. give information to others clearly, at a pace and in a manner that helps them to understand</p> <p class="list-item-l1">PC4. display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible</p> <p class="list-item-l1">PC5. consult with and assist others to maximize effectiveness and efficiency in carrying out tasks</p> <p class="list-item-l1">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.</p> <p class="list-item-l1">PC7. display active listening skills while interacting with others at work</p> <p class="list-item-l1">PC8. use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism</p> <p class="list-item-l1">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.</p> <p class="list-item-l1">PC10. escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict</p>
<b>Knowledge and Understanding (K)</b>	
<b>A. Organizational Context (Knowledge of the company /</b>	<p>The user/individual on the job needs to know and understand:</p> <p class="list-item-l1">KA1. legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions</p> <p class="list-item-l1">KA2. reporting structure, inter-dependent functions, lines and procedures in the</p>

**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>B. Technical Knowledge</b>	The user/individual on the job needs to know and understand: KB1. various categories of people that one is required to communicate and coordinate 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
<b>Skills (S)</b>	
<b>A. Core Skills/ Generic Skills</b>	<b>Reading Skills</b> 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
	<b>Writing Skills</b> 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

	<b>Oral Communication (Listening and Speaking skills)</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>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</li> <li>SA6. give clear instructions to co-workers about the type of output required and answer queries</li> <li>SA7. display active listening skills while interacting with co-workers and other in the workplace</li> </ul>
<b>B. Professional Skills</b>	<p><b>Decision Making</b></p> <p>NA</p> <p><b>Plan and organize</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB1. use appropriate planning to maintain a smooth relationship with fellow team members</li> <li>SB2. take steps within one's limits of authority to initiate modification in plan if the circumstances require it</li> </ul> <p><b>Customer centricity</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>SB3. check that work meets customer requirements</li> <li>SB4. deliver consistent and reliable service to internal and external customers</li> </ul> <p><b>Problem Solving</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> <li>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</li> </ul> <p><b>Analytical Thinking</b></p> <p>NA</p> <p><b>Critical Thinking</b></p> <p>NA</p>

CSC/N1336

**Work effectively with others**

## **NOS Version Control**

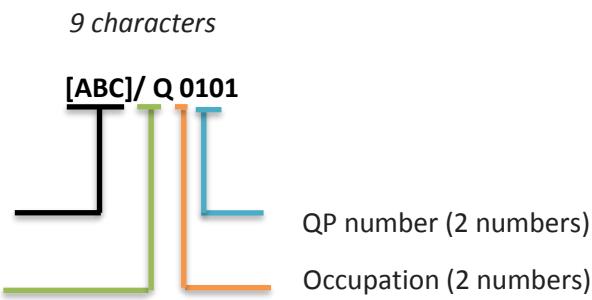
NOS Code	CSC/N1336		
Credits	TBD	Version number	1.0
Industry	Capital Goods	Drafted on	10/04/2014
Industry Sub-sector	1. Machine Tools 2. Dies, Moulds and Press Tools 3. Plastics  Manufacturing Machinery 4. Textile Manufacturing Machinery 5. Process Plant Machinery 6. Electrical and Power Machinery 7.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

## Annexure

### Nomenclature for QP and NOS

#### Qualifications Pack

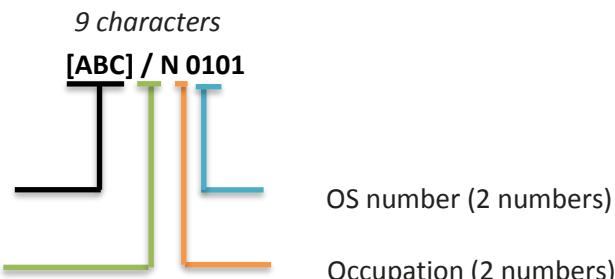
[Insert 3 letter codes for SSC]  
Q denoting Qualifications Pack



#### Occupational Standard

##### An example of NOS with 'N'

[Insert 3 letter codes for SSC]  
N denoting National Occupational Standard



### *Qualifications Pack for Fitter - Fabrication*

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

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

Sequence	Description	Example
<b>Three letters</b>	Capital Goods	CSC
<b>Slash</b>	/	/
<b>Next letter</b>	Whether QP or NOS	N
<b>Next two numbers</b>	Occupation code	01
<b>Next two numbers</b>	OS number	01

## Criteria For Assessment Of Trainees

**Job Role:** Fitter - Fabrication

**Qualification Pack:** CSC/Q0303

**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.

Compulsory NOS		Marks Allocation			
Total Marks: 500	Assessment Criteria for outcomes	Total Marks	Out of	Theory	Skills Practical
CSC/N0303 Perform fitting operations on metal components using hand tools and manually operated machines	PC1.comply with health and safety, environmental and other relevant regulations and guidelines at work	100	4	1	3
	PC2.adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing fabrication and fitting operations		4	1	3
	PC3.work following laid down procedures and instructions		2	0	2
	PC4.ensure work area is clean and safe from hazards		2	0	2
	PC5.ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		3	0	3
	PC6.obtain job specification from a valid and approved source		2	0	2

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	PC7.read and establish job requirements from the job specification document accurately		3	1	2
	PC8.report and rectify incorrect and inconsistent information in job specification documents as per organization procedures		5	2	3
	PC9.prepare the work area for the fabrication and fitting operations as per procedure or operational specification		4	1	3
	PC10.ensure that all measuring equipment is calibrated and approved for usage		3	0	3
	PC11.ensure that the components used are free from foreign objects, dirt or other contamination		2	0	2
	PC12.obtain correct workpieces/raw materials and consumables as per job requirements		3	1	2
	PC13.obtain appropriate tools and equipment as per job requirements		3	1	2
	PC14.set work pieces as per job requirements using appropriate positioning and/or holding devices and support mechanisms		4	0	4
	PC15.mark out specified features on the workpieces as per job specification using appropriate measuring and marking out tools and equipment		5	2	3
	PC16.mark out templates for tracing/transferring the specified features on the workpieces as per job specification		5	2	3
	PC17.trace/transfer the specified features from the templates onto the workpieces as per job specification		4	1	3
	PC18.identify range of materials by colour, appearance, sparks		3	1	2
	PC19.perform fabrication and fitting operations on various forms of metal components using a range of fabrication hand tools and manually operated machines		5	1	4
	PC20.follow the specified fabrication and fitting sequence and procedure as per job specifications		5	2	3
	PC21.check the fabricated and fitted products to ensure completeness of work		4	1	3
	PC22.check the quality of the components as per required standards using visual and dimensional parameters		5	2	3

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	PC23.produce components with various features as per standards applicable to the process		5	2	3
	PC24.work to achieve production targets		2	0	2
	PC25.report conditions and seek appropriate assistance in a timely manner to address risk of failure to comply with necessary targets and specifications		3	1	2
	PC26.deal with finished components as per organizational guidelines		3	1	2
	PC27.complete documentation during and post operations as per organizational procedures		3	1	2
	PC28.return all tools and equipment to the correct location on completion of the fitting activities		2	0	2
	PC29.leave the work area in a safe and tidy condition on completion of job activities		2	0	2
		<b>Total</b>	<b>100</b>	<b>25</b>	<b>75</b>
CSC/N0201 Perform simple manual cutting operations on carbon steels using oxy-fuel 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		3	1	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		3	1	2
	PC5.check equipment is calibrated and approved for use		2	0	2
	PC6.check the correct size gas nozzle to the torch		3	1	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		3	1	2
	PC10.use the correct procedure for lighting, adjusting and extinguishing the flame		2	0	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.check if the locations for cutting have been marked out by authorised persons		2	0	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

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	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.seek clarification where marking out is not done or is not clear from authorised person		2	0	2
	PC20.perform trial cut to check for cut defects		2	0	2
	PC21.operate the oxy-fuel gas cutting equipment to produce items/cut shapes to the dimensions and profiles as per instructions given		5	1	4
	PC22.use various oxy-fuel gas lighting and cutting procedures		4	1	3
	PC23.perform various cutting operations correctly		4	1	3
	PC24.produce thermal cuts in low carbon steel (1.5mm to 10mm thickness)		3	1	2
	PC25.produce cut profiles for various type of materials and forms		4	1	3
	PC26.produce thermally-cut components which meet specified quality criteria		3	0	3
	PC27.recognize and correct burnback and flashback		3	1	2
	PC28.detect and correct defects in cut		3	1	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		3	1	2
	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		3	1	2

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	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		2	0	2
		<b>Total</b>	<b>100</b>	<b>20</b>	<b>80</b>
CSC/N0202 Manually weld carbon steels in simple welding positions 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		3	1	2
	PC3.check the condition of, welding leads, earthing arrangements and electrode holder		2	0	2
	PC4.report any faults or potential hazards to appropriate authority		3	0	3
	PC5.follow fume extraction safety procedures		4	1	3
	PC6.read and interpret routine information on written job instructions and drawings		4	1	3
	PC7.identify welding machines eg. transformers, rectifiers, inverters and generators, according to the task		4	1	3
	PC8.prepare the work area for the welding activities		3	0	3
	PC9.prepare the raw materials and joint in readiness for welding		3	1	2
	PC10.perform measurements for joint preparation and routine MMAW		4	1	3
	PC11.prepare workpiece prior to welding		3	0	3
	PC12.tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding		4	1	3
	PC13.receive the set up equipment and connect to power source		3	1	2
	PC14.use manual metal-arc welding and related equipment to include a. alternating		3	1	2
	PC15.verify set up by running test weld specimen (scrap plate)		3	0	3
	PC16.report any faults or problem to appropriate authority		3	0	3
	PC17.strike and maintain a stable arc		3	0	3
	PC18.stop and properly re-start arc to avoid welding defects (scratch start, tapping techniques)		3	0	3

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	PC19.maintain constant puddle by using appropriate travel speed		3	0	3
	PC20.maintain proper bead sequence with respect to groove/fillet configurationsand positions		3	0	3
	PC21.remove slag in an appropriate manner (eg. wire brush, hammer, etc.)		3	0	3
	PC22.produce fillet and groove joints in simple welding positions as per specific instructions given using single or multi-run welds(as instructed)		5	2	3
	PC23.produce joints on low carbon and low alloy steel materials using various methods		3	0	3
	PC24.weld the joint to the specified quality standards, dimensions and profile for sheets and plates from 1.5 mm – 24 mm		3	1	2
	PC25.ensure full penetration groove welds are back clipped prior to back welding		2	0	2
	PC26.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
	PC27.ensure welding is done according to welding parameter specified in WPS		2	0	2
	PC28.shut down and make safe the welding equipment on completion of the welding activities		2	0	2
	PC29.measure and check that all dimensional and geometrical aspects of the weld are as per instructions		4	1	3
	PC30.identify various weld defects using visual inspection		3	1	2
	PC31.detect and report surface imperfections to appropriate authority		3	1	2
	PC32.deal with defects in welding as per instructions given		3	1	2
			<b>Total</b>	<b>100</b>	<b>17</b>
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

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	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
		<b>Total</b>	<b>100</b>	<b>37</b>	<b>63</b>
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
		<b>Total</b>	<b>100</b>	<b>30</b>	<b>70</b>