

## QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR CAPITAL GOODS INDUSTRY

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### What are Occupational Standards(OS)?

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



### Introduction

#### Qualifications Pack: CNC Programmer

**SECTOR:** CAPITAL GOODS

**SUB-SECTOR:**

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

**OCCUPATION:** Design

**REFERENCE ID:** CSC/ Q 0129

**CNC Programmer:** Develops, loads and proves the machine tool programs for computer numerically controlled (CNC) machines using appropriate software, as per approved procedures.

**Brief Job Description:** Produce the component program using manual data input or by use of a remote computer, saving the prepared program on magnetic tape, disc or by downloading it into the machine controller from the computer. This involves understanding the CNC machine tools used in the process, their application and programming, editing and proving process, in adequate depth to provide a sound basis for carrying out the activities.

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

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<b>Job Details</b>	<b>Qualifications Pack Code</b>	CSC/ Q 0129		
	<b>Job Role</b>	CNC Programmer		
	<b>Credits NSQF [OPTIONAL]</b>		<b>Version number</b>	<b>1.0</b>
	<b>Sector</b>	<b>CAPITAL GOODS</b>	<b>Drafted on</b>	<b>10/04/14</b>
	<b>Sub-sector</b>	<ol style="list-style-type: none"> <li>1. Machine Tools</li> <li>2. Tools Dies And Press Tools</li> <li>3. Plastic 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</li> </ol>	<b>Last reviewed on</b>	
<b>Occupation</b>	<b>DESIGN</b>	<b>Next review date</b>	<b>15/04/14</b>	

Job Role	CNC Programmer
<b>Role Description</b>	Develops, loads and proves the machine tool programs for computer numerically controlled (CNC) machines using appropriate software, as per approved procedures.
<b>NSQF level</b>	L4
<b>Minimum Educational Qualifications*</b>	12 <sup>th</sup> Standard
<b>Maximum Educational Qualifications*</b>	
<b>Training</b> (Suggested but not mandatory)	Computer coding language and computer software used for CNC programming
<b>Experience</b>	Minimum 1 year apprenticeship
<b>Applicable National Occupational Standards (NOS)</b>	<p><b>Compulsory:</b></p> <p>CSC/ N 0140 Program computer numerically controlled (CNC) machines</p> <p>CSC/ N 0135 Use basic health and safety practices at the workplace</p> <p>CSC/ N 0136 Work effectively with others</p> <p><b>Optional:</b></p> <p>1. Nil</p>
<b>Performance Criteria</b>	As described in the relevant OS units

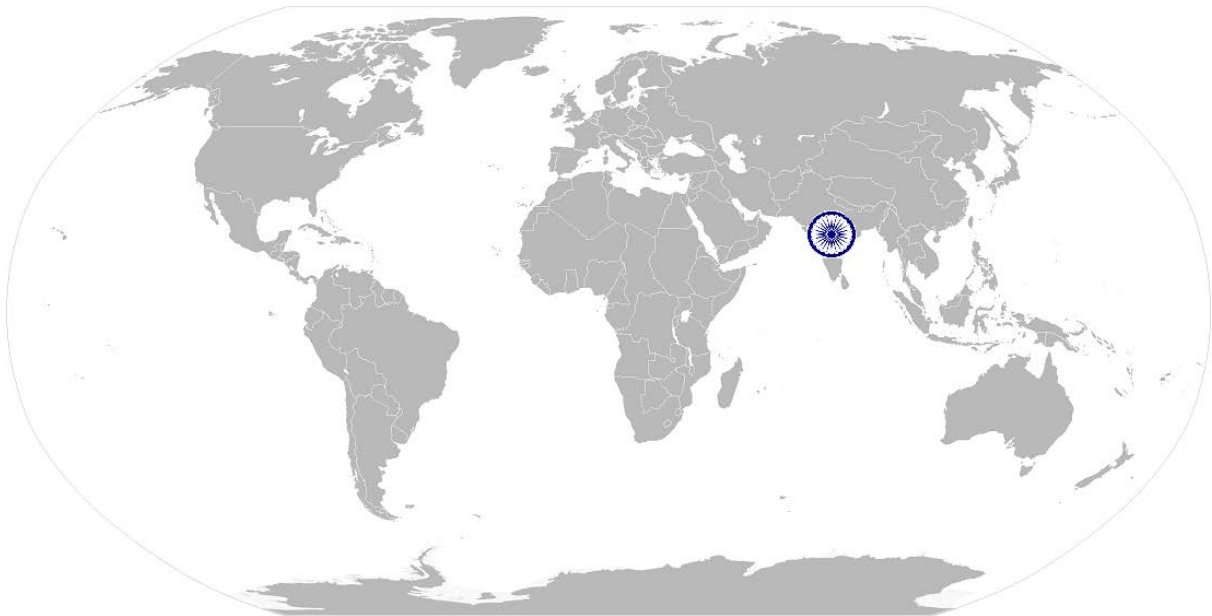
Keywords /Terms	Description
Core Skills/Generic Skills	Core Skills or Generic Skills are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the NOS, these include communication related skills that are applicable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

Keywords /Terms	Description
CNC	Computer Numerically Controlled
NC	Numerically Controlled
VMC	Vertical Machining Center
HMC	Horizontal Machining Center
CAD	Computer Aided Design
2D	2 Dimensional
3D	3 Dimensional
CO2	Carbon dioxide
CPR	Cardiac Pulmonary Resuscitation
ISO	International Organization for Standardization
PPE	Personal Protective Equipment

**CSC/ N 0140: Program Computer Numerically Controlled (CNC) machines**

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# National Occupational Standard



## Overview

This unit covers how to produce, load and prove the machine tool programs for computer numerically controlled (CNC) machines using appropriate software, as per approved procedures.

**CSC/ N 0140: Program Computer Numerically Controlled (CNC) machines**

National Occupational Standard

<b>Unit Code</b>	<b>CSC / N 0140</b>
<b>Unit Title (Task)</b>	<b>Programming computer numerically controlled (CNC) machines</b>
<b>Description</b>	<p>This unit covers how to produce, load and prove the machine tool programs for computer numerically controlled (CNC) machines using appropriate software, as per approved procedures. This can be done by inputting data manually or by use of a remote computer and downloading it into the machine controller from the computer.</p> <p>This involves learning the computer coding language, understanding the CNC machine tools used in the process and their application, and the programming, editing and proving process.</p> <p>It also involves checking the program using single block run, adjusting the machine tool equipment and program, following proving/editing procedures, correcting faults and ensuring the machine controller is set up to produce the components to the required specification.</p> <p>The candidate will be expected to perform with a minimum of supervision, taking personal responsibility for one's own actions and for the quality and accuracy of the work produced.</p> <p>The candidate will have knowledge and understanding of the machine tool applications and functions and the programming procedures used.</p> <p>The candidate will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.</p> <p>The candidate will be expected to work as per instructions given, taking personal responsibility for their actions and for the quality and accuracy of the work that they produce.</p>
<b>Scope</b>	<p>This unit/task covers the following:</p> <p>Valid sources for job specifications are:</p> <ul style="list-style-type: none"> <li>• job instruction sheet/job card</li> <li>• work drawings and instructions</li> <li>• planning documentation</li> <li>• quality control documents</li> <li>• operation sheets</li> <li>• process specifications</li> <li>• instructions from supervisor</li> </ul> <p>Job specification documents are:</p> <ul style="list-style-type: none"> <li>• detailed component drawings</li> <li>• approved sketches/illustrations</li> <li>• national, international and organisational standards</li> <li>• reference tables and charts</li> <li>• fabrication/casting drawings</li> <li>• operational diagrams</li> <li>• contractual specifications</li> </ul>



**CSC/ N 0140: Program Computer Numerically Controlled (CNC) machines**

Reference charts, tables and graphs are used for:

- tapping sizes and threads
- feeds and speeds
- component ratings
- machining symbols and tolerances

Job requirements to be established are:

- 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
- projections
  - orthographic (first angle, third angle)
  - isometric (including exploded, oblique)

- reference points, lines, edges and surfaces
- dimensions (baseline, continuous)
- workholding devices, instruments and tools to be used
- interdependencies
- timelines

CNC programming operations are:

- preparing
- loading
- storing in appropriate format
- proving the part program
- trial runs

Features of program produced are:

- positional information of the machine type
- appropriate letter address codes
- preparatory commands
- machine management
- repetitive programs (sub-routines, canned cycles, labels)
- absolute or incremental systems of measurement
- tool change positions
- tool information (lengths, offsets, radius compensation, wire size)

CNC machines used are:

- 2-axis CNC machine
- 3-axis machine
- machining centres (eg. VMC, HMC, Grinding, etc.)





## CSC/ N 0140: Program Computer Numerically Controlled (CNC) machines

Means to produce CNC programs are:

- written
- directly entered into the machine controller
- using computer software

Tools for proving the part program are:

- single block run
- graphic displays
- full dry run
- search facilities
- program save/store facilities
- edit facilities
- program override controls (speed, feed, tool data)
- data input facilities

Tool data to be entered into the program includes:

- tool lengths
- tool offsets
- radius compensation
- auxiliary functions

Checks to be performed before allowing the machine to operate in full program run mode are:

- ensure that all operations are carried out to the program co-ordinates
- check tool change positions are safe and clear of the workpiece and machine equipment
- inspect whether the correct tools are selected at the appropriate points in the program
- check if the tool cutter paths are executed safely and correctly
- ensure that the auxiliary functions operate at the correct point in the program(cutter start/stop, coolant flow)
- programs have been saved in the appropriate format
- after proving the program, measure the dimensions of the component on the machine and correct accordingly
- unload the component after all the dimensions are as per specifications
- inspect the component for all dimensions and record findings in specified formats
- make a note of the corrections to be made in the tool wear offsets and correct accordingly
- run the next component
- ensure that all dimensions are within specifications
- if dimensions are not within specifications, correct using appropriate actions
- repeat this till parts come within specifications without any correction requirement

Hazards associated with the use CNC machines are:

- automatic machine operations

**CSC/ N 0140: Program Computer Numerically Controlled (CNC) machines**

	<ul style="list-style-type: none"> <li>• revolving/moving parts of machinery</li> <li>• airborne and hot metal particles</li> <li>• sharp cutting tools</li> <li>• lifting and handling workholding devices</li> <li>• burrs and sharp edges on component</li> <li>• use of power operated chucks</li> <li>• moving machinery</li> <li>• hot and airborne metal and particles and fluid</li> </ul> <p>The safe working practices and procedures to be followed when preparing and using CNC machine tool operating program are:</p> <ul style="list-style-type: none"> <li>• using the appropriate reference manuals and programming codes to suit the machine controller</li> <li>• prepare the machine controller ready to accept the operating program</li> <li>• input/load the prepared program into the controller safely and correctly</li> <li>• store programs safely and correctly in the appropriate format and away from contaminants or electromagnetic sources</li> <li>• use the correct control program and ensure it is correctly loaded into the machine controller</li> <li>• the personal protective equipment (PPE) to be worn for the CNC activities</li> <li>• as correctly fitting overalls and safety glasses</li> <li>• ensuring that long hair, it is tied back or netted</li> <li>• removing any jewellery or other items that can become entangled in the machinery</li> </ul> <p>The safety mechanisms on the CNC machine tool operating program are:</p> <ul style="list-style-type: none"> <li>• emergency stop buttons</li> <li>• emergency brakes</li> </ul> <p>Mode of machine control is:</p> <ul style="list-style-type: none"> <li>• program operating and control buttons</li> </ul> <p>The factors which will determine selection and use of tungsten carbide and tips are:</p> <ul style="list-style-type: none"> <li>• hardness of the material</li> <li>• the cutting characteristics of the material</li> <li>• tolerances to be achieved</li> <li>• component surface finish</li> <li>• component specifications</li> </ul>
<b>Performance Criteria(PC) w.r.t. the Scope</b>	
<b>Element</b>	<b>Performance Criteria</b>
<b>Working safely</b>	<p>The user/individual on the job should be able to:</p> <p>PC1. comply with health and safety, environmental and other relevant regulations and guidelines at work</p>

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	<p>PC2. adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while programming CNC machines</p> <p>PC3. work following laid down procedures and instructions</p> <p>PC4. ensure work area is clean and safe from hazards</p> <p>PC5. ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition</p>
<p><b>Preparing for programming CNC machine for production</b></p>	<p>PC6. obtain job specification from a valid and approved source</p> <p>PC7. read and establish job requirements from the job specification document accurately</p> <p>PC8. follow job instructions, assembly drawings and laid down procedures at all times</p> <p>PC9. report and rectify incorrect and inconsistent information in job specification documents as per organization procedures</p> <p>PC10. prepare the work area as per procedure or operational specification</p> <p>PC11. conduct a preliminary check of the readiness of the program so that the CNC machine operates correctly</p> <p>PC12. obtain appropriate equipment or tools needed as per job requirements</p> <p>PC13. ensure that all measuring equipment is calibrated and approved for usage</p> <p>PC14. determine what operational objectives and targets need to be achieved and how best the machine needs to be programmed to achieve this</p> <p>PC15. extract and use information from engineering drawings and related specifications in relation to work undertaken</p> <p>PC16. identify tool requirements from tooling layout and assess their suitability</p> <p>PC17. identify suitable workholding or fixturing device as per the job requirement</p> <p>PC18. ensure that the tools and fixtures are in usable condition(eg. free from breakage, damage, calibration, etc.)</p> <p>PC19. ensure the correct and latest part-program is uploaded onto the CNC system</p> <p>PC20. pre-set the tooling appropriately using setting jigs/fixtures</p> <p>PC21. seek any necessary instruction/training on the operation of the machine where required</p>
<p><b>Carrying out programming for CNC machine</b></p>	<p>PC22. enter computer coding language in CNC programs with regard to machine axes, positional information, machine management and auxiliary functions</p> <p>PC23. produce CNC programs using appropriate computer software or by directly uploading into the system</p> <p>PC24. develop part programs as applicable to the machine type</p> <p>PC25. prepare part programs, using operational sequences and machining techniques to avoid unnecessary tool/cutter movements or tool changes</p> <p>PC26. check that the tools have a specific tool number in relation to the operating program</p> <p>PC27. load and correctly set up all associated equipment</p> <p>PC28. enter all relevant tool data to the operating program</p> <p>PC29. prepare, load and prove programs to the CNC system</p> <p>PC30. conduct trial runs using single block run, dry run and feed and speed override controls</p>

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	<p>PC31. adjust the equipment and program operating parameters to optimize the outcomes to be achieved</p> <p>PC32. use repetitive programs and canned cycles, to reduce program size and input time</p> <p>PC33. set tool datams, positions, lengths, offsets and radius compensation</p> <p>PC34. place the machine into the correct operating mode</p> <p>PC35. access the program edit facility, in order to enter tooling data such as tool datams, positions, lengths, offsets and radius compensation</p> <p>PC36. mount tools in the correct position in the tool posts, turrets, magazine or carousel</p> <p>PC37. perform the necessary checks before allowing the machine to operate in full program run mode</p> <p>PC38. save the completed programs in the appropriate format</p> <p>PC39. deal with error messages and faults on the program or equipment</p> <p>PC40. follow the correct procedures for calling up the program and dealing with any error messages or faults</p> <p>PC41. handle the typical problems that can occur with the programming, loading and editing activities effectively using approved procedures</p> <p>PC42. set the machine tool operating parameters (eg. hydraulic pressure, clamping) as per the component requirements</p> <p>PC43. hand-over the machine after set-up to the machine operator along with relevant instructions and documentation</p> <p>PC44. complete relevant documentation as per organizational procedure</p> <p>PC45. switch the CNC machine on and off in normal and emergency situations</p> <p>PC46. return the old cutting tools, workholding device/fixtures/instruments/drawings and verified tapes and programs back to store, safely and correctly</p> <p>PC47. ensure that there is no damage to the tool/fixture while doing the prove-out</p> <p>PC48. complete documentation during and post operations as per organizational procedures</p> <p>PC49. shut down the equipment to a safe condition on conclusion of the activities</p> <p>PC50. leave the work area in a safe and tidy condition on completion of the fitting activities</p> <p>PC51. return all tools and equipment to the correct location on completion of the activities</p>
<p><b>Dealing with exigencies</b></p>	<p>PC52. deal promptly and effectively with problems within span of responsibility and control and report those that cannot be solved</p>
<p><b>Knowledge and Understanding (K)</b></p>	
<p><b>A. Organizational Context</b> (Knowledge of the company / organization and its processes)</p>	<p>The user/individual on the job needs to know and understand:</p> <p>KB1. legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions</p> <p>KB2. relevant health and safety requirements applicable in the work place</p> <p>KB3. importance of working in clean and safe environment</p> <p>KB4. own job role and responsibilities and sources for information pertaining to employment terms, entitlements, job role and responsibilities</p> <p>KB5. reporting structure, inter-dependent functions, lines and procedures in the</p>

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	<p>work area</p> <p>KB6. relevant people and their responsibilities within the work area</p> <p>KB7. escalation matrix and procedures for reporting work and employment related issues</p> <p>KB8. documentation and related procedures applicable in the context of employment and work</p> <p>KB9. importance and purpose of documentation in context of employment and work</p>
<p><b>B. Technical Knowledge</b></p>	<p>The user/individual on the job needs to know and understand:</p> <p>KB10. specific safe working practices, CNC programming procedures and environmental regulations that must be observed</p> <p>KB11. hazards associated with carrying out the machining operations on a CNC machine and how can they be minimized</p> <p>KB12. personal protective equipment to be used during the machining activities on a CNC machine and where can it be obtained</p> <p>KB13. types and sources of appropriate job specifications</p> <p>KB14. common terminology used in CNC programming</p> <p>KB15. how to read and interpret first and third angle component drawings</p> <p>KB16. how to extract information from engineering drawings or data and related specifications</p> <p>KB17. how to use the function keys and operating system of the machine computer control system</p> <p>KB18. setting of machine datams for each of the machine axes being used</p> <p>KB19. main features and working parts of the CNC machine, and the accessories that can be used</p> <p>KB20. importance of following specified machining sequences and procedures</p> <p>KB21. importance of ensuring suitability of workpieces/materials and consumables for the specified job and related procedures</p> <p>KB22. importance and procedures to ensure that tools and equipment are in a safe and usable condition</p> <p>KB23. various CNC operations that can be performed, and the methods and equipment used</p> <p>KB24. methods of setting the work-holding devices, and the tools and equipment that can be used</p> <p>KB25. various tool holding devices that are used, and the methods of correctly mounting and securing the cutting tools to the tool holders</p> <p>KB26. how to set the machine controller in the program and editing mode, and enter or download the prepared program</p> <p>KB27. various tool posts, magazines and carousels used</p> <p>KB28. how to position and identify the tools in relationship to the operating program</p> <p>KB29. function of error messages, and appropriate subsequent action</p> <p>KB30. importance of proving the program and how to do it</p> <p>KB31. need for storing program tapes and disks safely and correctly, away from contaminants and electromagnetic sources</p> <p>KB32. quality control procedures that are used, inspection checks to be carried out, and the equipment that will need to be used</p> <p>KB33. importance to report problems in a timely manner</p> <p>KB34. methods of checking quality of the shaped components against the required quality standards</p>



**CSC/ N 0140: Program Computer Numerically Controlled (CNC) machines**

	<p>KB35. range of materials used in common engineering applications</p> <p>KB36. how to identify materials by their physical properties</p>
<b>Skills (S) [Optional]</b>	
<b>A. Core Skills/ Generic Skills</b>	<b>Communication</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, manuals, health and safety instructions, memos, etc. applicable to the job in English and/or local language</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. convey and share technical information clearly using appropriate language</p> <p>SA4. check and clarify task-related information</p> <p>SA5. liaise with appropriate authorities using correct protocol</p> <p>SA6. communicate with people in respectful form and manner in line with organizational protocol</p>
	<b>Numerical and computational skills</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <p>SA7. undertake numerical operations, and calculations/ formulae</p> <p>SA8. identify and draw various basic, compound and solid shapes as per dimensions given</p> <p>SA9. use appropriate measuring techniques and units of measurement</p> <p>SA10. use appropriate units and number systems to express degree of accuracy</p> <p>SA11. interpret and express tolerance in terms of limits on dimensions</p> <p>SA12. calculation of the value of angles in a triangle</p>
	<b>Learning</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <p>SA13. maintain current knowledge of applicable standards, legislation, codes of practice and product/process developments</p> <p>SA14. participate in on-the-job and other learning, training and development interventions and assessment</p> <p>SA15. clarify task related information with appropriate personnel or technical adviser</p> <p>SA16. seek to improve and modify own work practices</p>
<b>B. Professional Skills</b>	<b>Problem Solving</b>
	<p>The user/individual on the job needs to know and understand how to:</p> <p>SB1. identify problems with work planning, procedures, output and behavior and their implications</p> <p>SB2. prioritize and plan for problem solving</p> <p>SB3. communicate problems appropriately to others</p> <p>SB4. identify sources of information and support for problem solving</p> <p>SB5. seek assistance and support from other sources to solve problems</p> <p>SB6. identify effective resolution techniques</p> <p>SB7. select and apply resolution techniques</p> <p>SB8. seek evidence for problem resolution</p>

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	<b>Plan and Organize</b>
	The user/individual on the job needs to know and understand how to: SB9. plan, prioritize and sequence work operations as per job requirements SB10. organize and analyze information relevant to work SB11. basic concepts of shop-floor work productivity including waste reduction, efficient material usage and optimization of time
	<b>Initiative and Enterprise</b>
	The user/individual on the job needs to know and understand: SB12. importance and impact of initiative and enterprise for achieving better results for self, others and organization SB13. how to undertake and express new ideas and initiatives to others SB14. modify work plan to overcome unforeseen difficulties or developments that occur as work progresses SB15. participate in improvement procedures including process, quality and internal/external customer/supplier relationships SB16. one's competencies can and should be applied in new and different situations and contexts to achieve more
	<b>Self-Management</b>
	The user/individual on the job needs to know and understand: SB17. importance of taking responsibility for own work outcomes SB18. importance of adherence to work timings, dress code and other organizational policies SB19. importance of following laid down rules, procedures, instructions and policies SB20. importance of exercising restraint while expressing dissent and during conflict situations SB21. how to avoid and manage distractions to be disciplined at work SB22. importance of time management for achieving better results
	<b>Teamwork</b>
The user/individual on the job needs to know and understand how to: SB23. work in a team in order to achieve better results SB24. identify and clarify work roles within a team SB25. communicate and cooperate with others in the team SB26. seek assistance from fellow team members	



**CSC/ N 0140: Program Computer Numerically Controlled (CNC) machines**

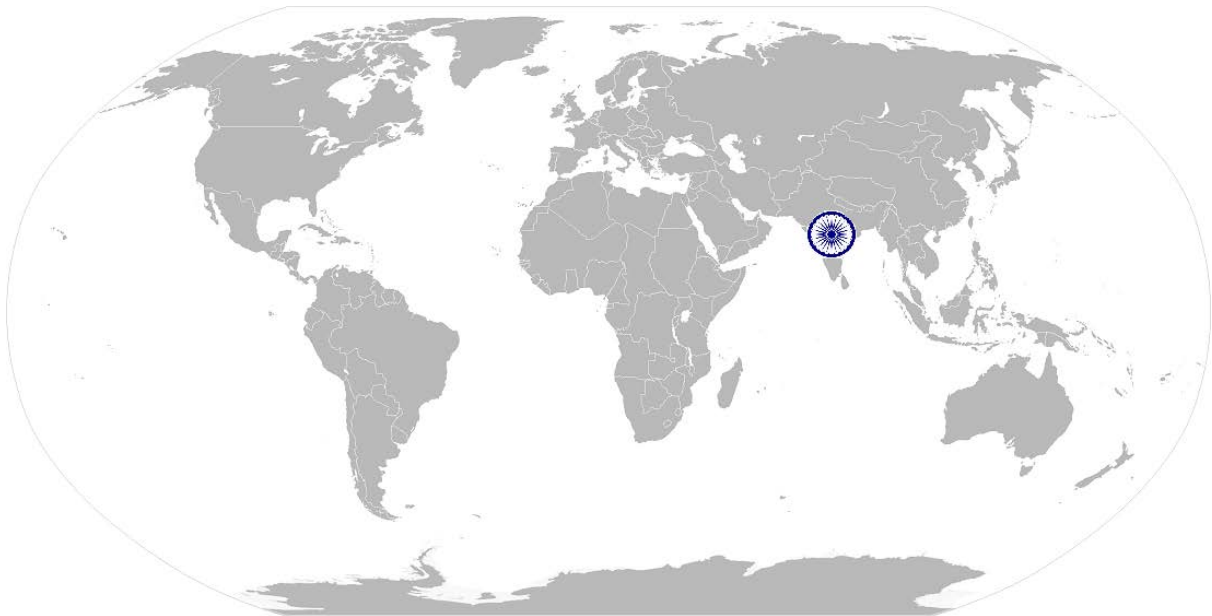
**NOS Version Control**

<b>NOS Code</b>	<b>CSC / N 0140</b>		
<b>Credits(NSQF) [OPTIONAL]</b>		<b>Version number</b>	<b>1.0</b>
<b>Industry</b>	<b>Capital Goods</b>	<b>Drafted on</b>	<b>10/04/14</b>
<b>Industry Sub-sector</b>	<ol style="list-style-type: none"> <li>1. Machine Tools</li> <li>2. Tools Dies And Press Tools</li> <li>3. Plastic 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</li> </ol>	<b>Last reviewed on</b>	
		<b>Next review date</b>	<b>15/04/14</b>

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

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# National Occupational Standard



## Overview

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

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

<b>Unit Code</b>	<b>CSC / N 0135</b>
<b>Unit Title (Task)</b>	<b>Use basic health and safety practices at the workplace</b>
<b>Description</b>	<p>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.</p> <p>It includes understanding of risks and hazards in the workplace, alongwith common techniques to minimize risk, deal with accidents, emergencies, etc.</p> <p>It covers knowledge of fire safety, common first aid applications, safe practices and emergency procedures.</p>
<b>Scope</b>	<p>This unit/task covers the following:</p> <p>Protective clothing includes:</p> <ul style="list-style-type: none"> <li>• leather or asbestos gloves</li> <li>• flame proof aprons</li> <li>• flame proof overalls buttoned to neck</li> <li>• cuffless (without folds) trousers</li> <li>• reinforced footwear</li> <li>• helmets/hard hats</li> <li>• cap and shoulder covers</li> <li>• ear defenders/plugs,</li> <li>• safety boots,</li> <li>• knee pads</li> <li>• particle masks,</li> <li>• glasses/goggles/visors</li> </ul>  <p>Equipment includes:</p> <ul style="list-style-type: none"> <li>• hand shields,</li> <li>• machine guards,</li> <li>• residual current devices,</li> <li>• shields,</li> <li>• dust sheets,</li> <li>• respirator</li> </ul> <p>Hazards include:</p> <ul style="list-style-type: none"> <li>• working with electrical and thermal tools and equipment</li> <li>• sharp edged and heavy tools,</li> <li>• heated metals</li> <li>• oxyfuel and gas cylinders</li> <li>• welding radiation</li> <li>• Surfaces: sharp, slippery, uneven, chipped, broken, etc.</li> <li>• Substances: chemicals, gas, oxy-fuel, fumes, dust, etc.</li> <li>• Physical: working at heights, large and heavy objects and machines, sharp and piercing objects, tolls and machines, intense light, load noise,</li> </ul>

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	<p>obstructions in corridors, by doors, blind turns, noise, over stacked shelves and packages, etc.</p> <ul style="list-style-type: none"> <li>• Electrical: power supply and points, loose and naked cables and wires, electrical machines and appliances, etc.</li> </ul> <p>Safe working practices include:</p> <ul style="list-style-type: none"> <li>• using protective clothing and equipment</li> <li>• putting up and reading safety signs</li> <li>• handle tools in the correct manner and store and maintain them properly</li> <li>• keep work area clear of clutter, spillage and unsafe object lying casually</li> <li>• 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.</li> <li>• safe lifting and carrying practices</li> <li>• use equipment that is working properly and is well maintained</li> <li>• take due measures for safety while working in confined places, trenches or at heights, etc. including safety harness, fall arrestors, etc.</li> </ul> <p>Methods are:</p> <ul style="list-style-type: none"> <li>• training in health and safety procedures,</li> <li>• using health and safety procedures,</li> <li>• use of equipment and working practices (such as safe carrying procedures),</li> <li>• safety notices, advice</li> <li>• instruction from colleagues and supervisors</li> </ul> <p>Faults include:</p> <ul style="list-style-type: none"> <li>• corrosion of metal components</li> <li>• deterioration</li> <li>• splits and cracks timber components</li> <li>• imbalance</li> <li>• loose rungs</li> <li>• nuts or bolts, etc.</li> </ul> <p>Ladders set up includes:</p> <ul style="list-style-type: none"> <li>• firm/level base</li> <li>• clip/lash down</li> <li>• leaning at the correct angle, etc.</li> </ul> <p>Good housekeeping practices include:</p> <ul style="list-style-type: none"> <li>• clean/tidy work areas</li> <li>• removal/disposal of waste products</li> <li>• protect surfaces</li> </ul> <p>Emergency procedures include:</p> <ul style="list-style-type: none"> <li>• raising alarm</li> </ul>
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- safe/efficient evacuation
- correct means of escape
- correct assembly point
- roll call
- correct return to work

Various areas are:

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

General health and safety equipment includes:

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

Incident Report includes details of:

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

Job titles include:

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

Documents include:

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

Activities and causes include:



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	<ul style="list-style-type: none"> <li>• physical actions,</li> <li>• reading,</li> <li>• listening to and giving instructions,</li> <li>• inattention,</li> <li>• sickness and incapacity (such as drunkenness),</li> <li>• health hazards (such as untreated injuries and contagious illness)</li> </ul> <p>Exposure to toxic materials could be by:</p> <ul style="list-style-type: none"> <li>• exposure: ingested, contact with skin, inhaled</li> <li>• preventative action: ventilation, masks, protective clothing/equipment</li> <li>• remedial action: immediate first aid, report to supervisor</li> <li>• materials: solvents, flux, lead</li> </ul> <p>Types of fires are:</p> <ul style="list-style-type: none"> <li>• Class A: eg. ordinary solid combustibles, such as wood, paper, cloth, plastic, charcoal, etc.</li> <li>• Class B: flammable liquids and gases, such as gasoline, propane, diesel fuel, tar, cooking oil, and similar substances</li> <li>• Class C: eg. electrical equipment such as appliances, wiring, breaker panels, etc. (These categories of fires become Class A, B, and D fires when the electrical equipment that initiated the fire is no longer receiving electricity)</li> <li>• Class D: combustible metals such as magnesium, titanium, and sodium (These fires burn at extremely high temperatures and require special suppression agents)</li> </ul> <p>Causes of fires are:</p> <ul style="list-style-type: none"> <li>• heating of metal,</li> <li>• spontaneous ignition,</li> <li>• sparking,</li> <li>• electrical heating,</li> <li>• loose fires (smoking, welding, etc.),</li> <li>• chemical fires, etc.</li> </ul> <p>Fire extinguishers use:</p> <ul style="list-style-type: none"> <li>• sand</li> <li>• water</li> <li>• foam</li> <li>• CO2</li> <li>• dry powder</li> </ul>
<b>Performance Criteria(PC) w.r.t. the Scope</b>	
<b>Element</b>	<b>Performance Criteria</b>
<b>Health and safety</b>	The user/individual on the job should be able to:



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	<p>PC1. use protective clothing/equipment for specific tasks and work conditions</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.</p> <p>PC5. carry out safe working practices while dealing with hazards to ensure the safety of self and others state methods of accident prevention in the work environment of the job role</p> <p>PC6. state location of general health and safety equipment in the workplace</p> <p>PC7. inspect for faults, set up and safely use steps and ladders in general use</p> <p>PC8. work safely in and around trenches, elevated places and confined areas</p> <p>PC9. lift heavy objects safely using correct procedures</p> <p>PC10. apply good housekeeping practices at all times</p> <p>PC11. identify common hazard signs displayed in various areas</p> <p>PC12. retrieve and/or point out documents that refer to health and safety in the workplace</p>
<b>Fire safety</b>	<p>The user/individual on the job should be able to:</p> <p>PC13. use the various appropriate fire extinguishers on different types of fires correctly</p> <p>PC14. demonstrate rescue techniques applied during fire hazard</p> <p>PC15. demonstrate good housekeeping in order to prevent fire hazards</p> <p>PC16. demonstrate the correct use of a fire extinguisher.</p>
<b>Emergencies, rescue and first-aid procedures</b>	<p>The user/individual on the job should be able to:</p> <p>PC17. demonstrate how to free a person from electrocution</p> <p>PC18. administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.</p> <p>PC19. demonstrate basic techniques of bandaging</p> <p>PC20. respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments</p> <p>PC21. perform and organize loss minimization or rescue activity during an accident in real or simulated environments</p> <p>PC22. administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases</p> <p>PC23. demonstrate the artificial respiration and the CPR Process</p> <p>PC24. participate in emergency procedures.</p> <p>PC25. complete a written accident/incident report or dictate a report to another person, and send report to person responsible</p> <p>PC26. demonstrate correct method to move injured people and others during an emergency</p>
<b>Knowledge and Understanding (K)</b>	



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<p><b>A. Organizational Context</b> (Knowledge of the company / organization and its processes)</p>	<p>The user/individual on the job needs to know and understand:</p> <p>KA1. State the names (and job titles if applicable), and describe where to find, all the people responsible for health and safety in a workplace.</p> <p>KA2. State the names and location of documents that refer to health and safety in the workplace.</p>
<p><b>B. Technical Knowledge</b></p>	<p>The user/individual on the job needs to know and understand:</p> <p>KA3. meaning of “hazards” and “risks”</p> <p>KA4. health and safety hazards commonly present in the work environment and related precautions</p> <p>KA5. possible causes of risk, hazard or accident in the workplace and why risk and/or accidents are possible.</p> <p>KA6. activities and causes of risk and accident</p> <p>KA7. methods of accident prevention</p> <p>KA8. safe working practices when working with tools and machines</p> <p>KA9. safe working practices while working at various hazardous sites</p> <p>KA10. where to find all the general health and safety equipment in the workplace</p> <p>KA11. various dangers associated with the use of electrical equipment</p> <p>KA12. preventative and remedial actions to be taken in the case of exposure to toxic materials.</p> <p>KA13. importance of using protective clothing/equipment while working</p> <p>KA14. precautionary activities to prevent the fire accident</p> <p>KA15. various causes of fire</p> <p>KA16. techniques of using the different fire extinguishers</p> <p>KA17. different methods of extinguishing fire</p> <p>KA18. rescue techniques applied during a fire hazard</p> <p>KA19. various types of safety signs and what they mean</p> <p>KA20. appropriate basic first aid treatment relevant to the condition eg. shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries</p> <p>KA21. content of written accident report.</p> <p>KA22. potential injuries and ill health associated with incorrect manual handling</p> <p>KA23. safe lifting and carrying practices</p> <p>KA24. personal safety, health and dignity issues relating to the movement of a person by others.</p> <p>KA25. potential impact to a person who is moved incorrectly</p>
<p><b>Skills (S) [Optional]</b></p>	
<p><b>A. Core Skills/ Generic Skills</b></p>	<p><b>Reading and Writing Skills</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <p>SA1. read and comprehend basic content to read labels, charts, signages</p> <p>SA2. read and comprehend basic English to read manuals of operations</p> <p>SA3. read and write an accident/incident report in local language or English</p>

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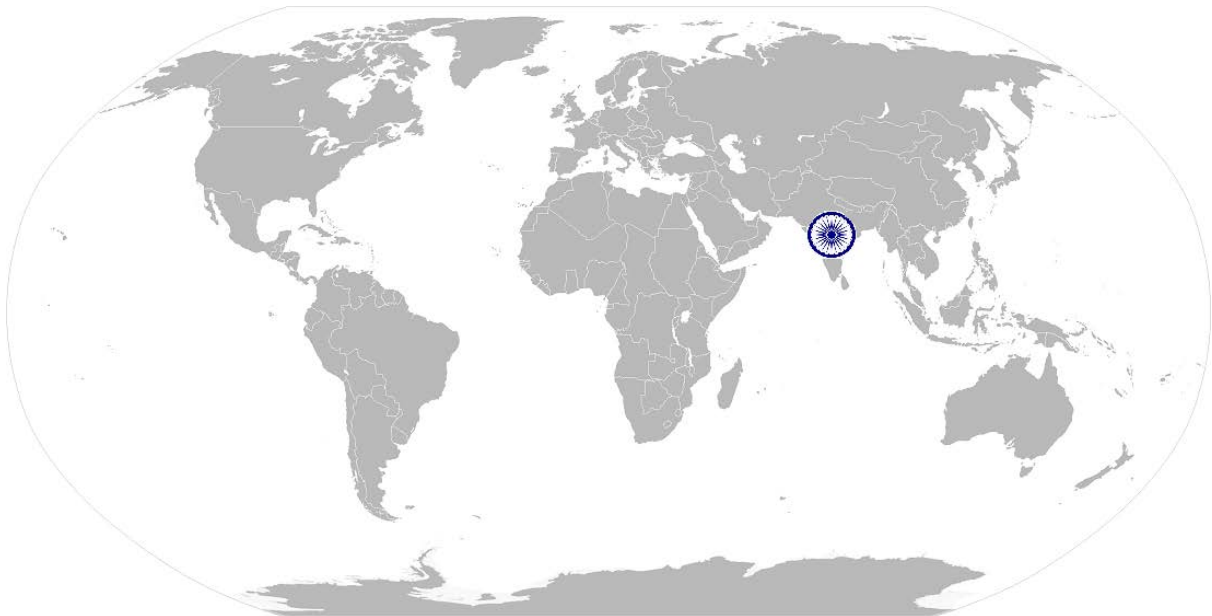
	<p><b>Oral Communication (Listening and Speaking skills)</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <p>SA4. question coworkers appropriately in order to clarify instructions and other issues</p> <p>SA5. give clear instructions to coworkers, subordinates others</p>
	<p><b>Decision Making</b></p> <p>The user/individual on the job needs to know and understand how to:</p> <p>SA6. make appropriate decisions pertaining to the concerned area of work with respect to intended work objective, span of authority, responsibility, laid down procedure and guidelines</p>
<p><b>B. Professional Skills</b></p>	<p><b>Plan and Organize</b></p>
	<p>The user/individual on the job needs to know and understand:</p> <p>SB1. plan and organize their own work schedule, work area, tools, equipment and materials to maintain decorum and for improved productivity</p>
	<p><b>Working with others</b></p>
	<p>The user/individual on the job needs to know and understand how to:</p> <p>SB2. remain congenial while discussing and debating issues with co-workers</p> <p>SB3. follow appropriate protocols for communication based on situation, hierarchy, organizational culture and practice</p> <p>SB4. ask for, provide and receive required assistance where possible to ensure achievement of work related objectives</p> <p>SB5. thank coworkers for any assistance received</p> <p>SB6. offer appropriate respect based on mutuality and respect for fellow workmanship and authority</p>
	<p><b>Problem Solving</b></p>
	<p>The user/individual on the job needs to know and understand how to:</p> <p>SB7. think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s)</p> <p>SB8. identify immediate or temporary solutions to resolve delays</p> <p>SB9. identify sources of support that can be availed of for problem solving for various kind of problems</p> <p>SB10. seek appropriate assistance from other sources to resolve problems</p> <p>SB11. report problems that you cannot resolve to appropriate authority</p>
<p><b>Analytical Thinking</b></p>	
<p>The user/individual on the job needs to know and understand how to:</p> <p>SB12. identify cause and effect relations in their area of work</p> <p>SB13. use cause and effect relations to anticipate potential problems and their solution</p>	

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## NOS Version Control

NOS Code	CSC / N 0135		
Credits(NSQF) [OPTIONAL]		Version number	2.0
Industry	Capital Goods	Drafted on	10/04/14
Industry Sub-sector	<ol style="list-style-type: none"> <li>1. Machine Tools</li> <li>2. Tools Dies And Press Tools</li> <li>3. Plastic Manufacturing Machinery</li> <li>4. Textile Manufacturing Machinery</li> <li>5. Process Plant Machinery</li> <li>6. Electrical and Power Generation Machinery</li> <li>7. Light Engineering Goods</li> </ol>	Last reviewed on	
		Next review date	15/04/14


# National Occupational Standard



## Overview

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

**CSC/ N 0136: Work effectively with others**

<b>Unit Code</b>	<b>CSC / N 0136</b>
<b>Unit Title (Task)</b>	<b>Working effectively with others</b>
<b>Description</b>	<p>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.</p> <p>These cover areas such as communication etiquette, discipline, listening, handling conflict and grievances.</p>
<b>Scope</b>	<p>This unit/task covers the following:</p> <p>Etiquette includes:</p> <ul style="list-style-type: none"> <li>do not use abusive language</li> <li>use appropriate titles and terms of respect</li> <li>do not eat or chew while talking (vice versa)etc.</li> </ul> <p>Behaviors include:</p> <ul style="list-style-type: none"> <li>punctuality</li> <li>completing tasks as per given time and standards</li> <li>not gossiping and idling time</li> <li>eliminating waste</li> <li>honesty, etc.</li> </ul> 
<b>Performance Criteria (PC) w.r.t. the Scope</b>	
<b>Element</b>	<b>Performance Criteria</b>
	<p>The user/individual on the job should be able to:</p> <p>PC1. accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required</p> <p>PC2. accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt</p> <p>PC3. give information to others clearly, at a pace and in a manner that helps them to understand</p> <p>PC4. display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible</p> <p>PC5. consult with and assist others to maximize effectiveness and efficiency in carrying out tasks</p> <p>PC6. display appropriate communication etiquette while working</p> <p>PC7. display active listening skills while interacting with others at work</p> <p>PC8. use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism</p> <p>PC9. demonstrate responsible and disciplined behaviors at the workplace</p> <p>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</b>	The user/individual on the job needs to know and understand:

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<p>(Knowledge of the company / organization and its processes)</p>	<p>KA1. legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions</p> <p>KA2. reporting structure, inter-dependent functions, lines and procedures in the work area</p> <p>KA3. relevant people and their responsibilities within the work area</p> <p>KA4. escalation matrix and procedures for reporting work and employment related issues</p>
<p><b>B. Technical Knowledge</b></p>	<p>The user/individual on the job needs to know and understand:</p> <p>KB1. various categories of people that one is required to communicate and co-ordinate with in the organization</p> <p>KB2. importance of effective communication in the workplace</p> <p>KB3. importance of teamwork in organizational and individual success</p> <p>KB4. various components of effective communication</p> <p>KB5. key elements of active listening</p> <p>KB6. value and importance of active listening and assertive communication</p> <p>KB7. barriers to effective communication</p> <p>KB8. importance of tone and pitch in effective communication</p> <p>KB9. importance of avoiding casual expletives and unpleasant terms while communicating professional circles</p> <p>KB10. how poor communication practices can disturb people, environment and cause problems for the employee, the employer and the customer</p> <p>KB11. importance of ethics for professional success</p> <p>KB12. importance of discipline for professional success</p> <p>KB13. what constitutes disciplined behavior for a working professional</p> <p>KB14. common reasons for interpersonal conflict</p> <p>KB15. importance of developing effective working relationships for professional success</p> <p>KB16. Expressing and addressing grievances appropriately and effectively</p> <p>KB17. importance and ways of managing interpersonal conflict effectively</p>
<p><b>Skills (S) [Optional]</b></p>	

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