

Qualification Pack



Metal Inert Gas/ Metal Active Gas/ Gas Metal Arc Welder (MIG/MAG/GMAW) (Optional: Flux cored Arc Welder (Semi-Automatic))

Options: Perform semi-automatic flux cored arc welding (FCAW) process to prepare joints

QP Code: CSC/Q0209

Version: 4.0



Qualification Pack

NSQF Level: 4

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CSC/Q0209: Metal Inert Gas/ Metal Active Gas/ Gas Metal Arc Welder (MIG/MAG/GMAW) (Optional: Flux cored Arc Welder (Semi-Automatic))

Brief Job Description

The incumbent in the job is responsible for performing metal inert gas/metal active gas welding (MIG/MAG) for welding joints as per welding procedure specification (WPS). The incumbent is also responsible for performing Oxy gas cutting and plasma cutting to cut metal into required specification as per welding procedure specification (WPS).

Personal Attributes

The job holder must have an eye for detail as well as the patience and discipline required to carry out detailed and repetitive tasks. The candidate should be able to read and understand technical manuals, instructions and warnings.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [CSC/N1335: Follow the health and safety practices at the work](#)
2. [CSC/N0209: Manually weld metals by using MIG/MAG welding](#)
3. [CSC/N0201: Manually cut metal and metal alloys using oxy-fuel gas](#)
4. [CSC/N0207: Manually cut metal material using plasma arc](#)
5. [DGT/VSQ/N0101: Employability Skills \(30 Hours\)](#)

Options(Not mandatory):

Option : Perform semi-automatic flux cored arc welding (FCAW) process to prepare joints

This unit is about performing of semi-automatic flux cored arc welding process for producing various welding joints and meeting standard welding job requirement as per welding procedure specifications (WPS)

1. [CSC/N0205: Perform semi-automatic flux cored arc welding \(FCAW\) process to prepare joints](#)

Qualification Pack (QP) Parameters

Sector	Capital Goods
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Sub-Sector	Machine Tools
Occupation	Welding and Cutting
Country	India
NSQF Level	4
Credits	12
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7212.0303
Minimum Educational Qualification & Experience	12th Class (or equivalent) OR Completed 2nd year of the 3-year diploma after 10 (Electrical/Mechanical) OR 10th grade pass with 2 year NTC plus 1 year NAC (or equivalent) OR 10th Class (Pass) with 3 Years of experience relevant OR 11th grade pass with 1.5 years of experience relevant OR Previous relevant Qualification of NSQF Level (3.5) with 1.5 years of experience relevant OR Previous relevant Qualification of NSQF Level (3) with 3 Years of experience relevant
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	30/04/2028
NSQC Approval Date	08/05/2025
Version	4.0
Reference code on NQR	QG-04-CG-03935-2025-V2-CGSSC
NQR Version	4.0

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CSC/N1335: Follow the health and safety practices at the work

Description

This OS unit is about following the appropriate health and safety practices at work. It covers responsibilities towards self and others to ensure a safe work environment.

Scope

The scope covers the following :

- Maintain personal health and safety
- Assist in hazard management
- Check the first aid box, firefighting and safety equipment
- Assist in waste management
- Follow the fire safety guidelines
- Follow the emergency and first-aid procedures
- Carry out relevant documentation and review

Elements and Performance Criteria

Maintain personal health and safety

To be competent, the user/individual on the job must be able to:

- PC1. follow the recommended practices to ensure protection from infections and transmission to others, such as the use of hand sanitiser and face mask
- PC2. check the work conditions, assess the potential health and safety risks, and take appropriate measures to mitigate them
- PC3. select and use the appropriate Personal Protective Equipment (PPE) relevant to the task and work conditions
- PC4. follow the recommended techniques while lifting and moving heavy objects to avoid injury
- PC5. follow the manufacturer's instructions and workplace safety guidelines while working on heavy machinery, tools and equipment

Assist in hazard management

To be competent, the user/individual on the job must be able to:

- PC6. identify existing and potential hazards at work
- PC7. assess the potential risks and injuries associated with the identified hazards
- PC8. coordinate with the supervisor or other relevant personnel to prevent or minimise the identified hazards
- PC9. handle hazardous materials safely and store them in the designated storage

Check the first aid box, firefighting and safety equipment

To be competent, the user/individual on the job must be able to:

- PC10. check the first aid box to ensure it is updated with the relevant first aid supplies
- PC11. check and test the firefighting and various safety equipment to ensure they are in usable condition

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PC12. coordinate with the supervisor for the repair and replacement of firefighting and safety equipment

Assist in waste management

To be competent, the user/individual on the job must be able to:

PC13. segregate waste into appropriate categories

PC14. recycle the recyclable waste appropriately

PC15. dispose of the non-recyclable waste in an environment-friendly manner, complying with the applicable regulations

Follow the fire safety guidelines

To be competent, the user/individual on the job must be able to:

PC16. use the appropriate type of fire extinguisher to extinguish different types of fires safely

PC17. follow the recommended practices for a safe rescue during a fire emergency

PC18. coordinate with the fire department to request assistance to extinguish a serious fire

Follow the emergency and first-aid procedures

To be competent, the user/individual on the job must be able to:

PC19. follow the organisational health and safety guidelines during workplace emergencies to ensure own and co-workers' safety

PC20. follow the recommended practices to minimise loss to organisational property during an emergency

PC21. follow the recommended procedure to free a person from electrocution

PC22. administer appropriate first aid to the injured personnel

PC23. perform Cardiopulmonary Resuscitation (CPR) on a potential victim of cardiac arrest

PC24. coordinate with the emergency services to request medical assistance for seriously injured/ ill personnel requiring professional medical attention or hospitalisation

Carry out relevant documentation and review

To be competent, the user/individual on the job must be able to:

PC25. carry out appropriate documentation following a health and safety incident at work, including all the required information

PC26. coordinate with the relevant personnel to review health and safety conditions at work regularly or following an incident

PC27. assist in implementing appropriate changes to improve the health and safety conditions at work

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the recommended practices to be followed to ensure protection from infections and transmission to others, such as the use of hand sanitiser and face mask

KU2. the importance and process of checking the work conditions, assessing the potential health and safety risks, and take appropriate measures to mitigate them

KU3. the importance and process of selecting and using the appropriate PPE relevant to the task and work conditions

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- KU4. the recommended techniques to be followed while lifting and moving heavy objects to avoid injury
- KU5. the importance of following the manufacturer's instructions and workplace safety guidelines while working on heavy machinery, tools and equipment
- KU6. the importance and process of identifying existing and potential hazards at work
- KU7. the process of assessing the potential risks and injuries associated with the various hazards
- KU8. how to prevent or minimise different types of hazards
- KU9. how to handle and store hazardous materials safely
- KU10. the importance of ensuring the first aid box is updated with the relevant first aid supplies
- KU11. the process of checking and testing the firefighting and various safety equipment to ensure they are in a usable condition
- KU12. the criteria for segregating waste into appropriate categories
- KU13. the appropriate methods for recycling the recyclable waste
- KU14. the process of disposing of the non-recyclable waste safely and the applicable regulations
- KU15. Use of different types of fire extinguishers to extinguish different types of fires
- KU16. the recommended practices to be followed for a safe rescue during a fire emergency
- KU17. how to request assistance from the fire department to extinguish a serious fire
- KU18. the appropriate practices to be followed during workplace emergencies to ensure safety and minimise loss to organisational property
- KU19. common health and safety hazards present in a work environment, associated risks, and how to mitigate them
- KU20. safe working practices to be followed while working at various hazardous sites and using electrical equipment
- KU21. the importance of ensuring easy access to firefighting and safety equipment
- KU22. the appropriate preventative and remedial actions to be taken in the case of exposure to toxic materials, such as poisonous chemicals and gases
- KU23. various causes of fire in different work environments and the recommended precautions to be taken to prevent fire accidents
- KU24. different methods of extinguishing fire
- KU25. different materials used for extinguishing fire, such as sand, water, foam, CO₂, dry powder, etc.
- KU26. the applicable rescue techniques to be followed during a fire emergency
- KU27. the importance of placing safety signs and instructions at strategic locations in a workplace and following them
- KU28. different types of first aid treatment to be provided for different types of injuries
- KU29. potential injuries associated with incorrect manual handling
- KU30. how to move an injured person safely
- KU31. various hazards associated with the use of various machinery, tools, implements, equipment and materials
- KU32. the importance of ensuring no obstruction and free access to fire exits
- KU33. how to free a person from electrocution safely
- KU34. how to administer appropriate first aid to an injured person

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- KU35. how to perform Cardiopulmonary Resuscitation (CPR)
- KU36. the importance of coordinating with the emergency services to request urgent medical assistance for persons requiring professional medical attention or hospitalisation
- KU37. the appropriate documentation to be carried out following a health and safety incident at work, and the relevant information to be included
- KU38. the importance and process of reviewing the health and safety conditions at work regularly or following an incident
- KU39. the importance and process of implementing appropriate changes to improve the health and safety conditions at work

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1. maintain work-related notes and records
- GS2. communicate clearly and politely with co-workers and clients
- GS3. read the relevant literature to get the latest updates about the field of work
- GS4. listen attentively to understand the information being shared
- GS5. plan and prioritise tasks to ensure timely completion
- GS6. take quick decisions to deal with workplace emergencies and accidents
- GS7. identify possible disruptions to work and take appropriate preventive measures
- GS8. coordinate with the co-workers to achieve the work objectives
- GS9. evaluate all possible solutions to a problem to select the best one

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Maintain personal health and safety</i>	7	12	-	-
PC1. follow the recommended practices to ensure protection from infections and transmission to others, such as the use of hand sanitiser and face mask	2	3	-	-
PC2. check the work conditions, assess the potential health and safety risks, and take appropriate measures to mitigate them	1	2	-	-
PC3. select and use the appropriate Personal Protective Equipment (PPE) relevant to the task and work conditions	1	2	-	-
PC4. follow the recommended techniques while lifting and moving heavy objects to avoid injury	1	3	-	-
PC5. follow the manufacturer's instructions and workplace safety guidelines while working on heavy machinery, tools and equipment	2	2	-	-
<i>Assist in hazard management</i>	4	10	-	-
PC6. identify existing and potential hazards at work	1	1	-	-
PC7. assess the potential risks and injuries associated with the identified hazards	1	3	-	-
PC8. coordinate with the supervisor or other relevant personnel to prevent or minimise the identified hazards	1	3	-	-
PC9. handle hazardous materials safely and store them in the designated storage	1	3	-	-
<i>Check the first aid box, firefighting and safety equipment</i>	3	7	-	-
PC10. check the first aid box to ensure it is updated with the relevant first aid supplies	1	2	-	-
PC11. check and test the firefighting and various safety equipment to ensure they are in usable condition	1	3	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. coordinate with the supervisor for the repair and replacement of firefighting and safety equipment	1	2	-	-
<i>Assist in waste management</i>	3	8	-	-
PC13. segregate waste into appropriate categories	1	3	-	-
PC14. recycle the recyclable waste appropriately	1	3	-	-
PC15. dispose of the non-recyclable waste in an environment-friendly manner, complying with the applicable regulations	1	2	-	-
<i>Follow the fire safety guidelines</i>	3	12	-	-
PC16. use the appropriate type of fire extinguisher to extinguish different types of fires safely	1	4	-	-
PC17. follow the recommended practices for a safe rescue during a fire emergency	1	4	-	-
PC18. coordinate with the fire department to request assistance to extinguish a serious fire	1	4	-	-
<i>Follow the emergency and first-aid procedures</i>	7	12	-	-
PC19. follow the organisational health and safety guidelines during workplace emergencies to ensure own and co-workers' safety	1	2	-	-
PC20. follow the recommended practices to minimise loss to organisational property during an emergency	1	3	-	-
PC21. follow the recommended procedure to free a person from electrocution	1	2	-	-
PC22. administer appropriate first aid to the injured personnel	1	2	-	-
PC23. perform Cardiopulmonary Resuscitation (CPR) on a potential victim of cardiac arrest	1	2	-	-
PC24. coordinate with the emergency services to request medical assistance for seriously injured/ ill personnel requiring professional medical attention or hospitalisation	2	1	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Carry out relevant documentation and review</i>	3	9	-	-
PC25. carry out appropriate documentation following a health and safety incident at work, including all the required information	1	3	-	-
PC26. coordinate with the relevant personnel to review health and safety conditions at work regularly or following an incident	1	3	-	-
PC27. assist in implementing appropriate changes to improve the health and safety conditions at work	1	3	-	-
NOS Total	30	70	-	-

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National Occupational Standards (NOS) Parameters

NOS Code	CSC/N1335
NOS Name	Follow the health and safety practices at the work
Sector	Capital Goods
Sub-Sector	Machine Tools, Process Plant Machinery, Dies, Moulds and Press Tools, Electrical and Power Machinery, Plastics Manufacturing Machinery, Light Engineering Goods, Textile Manufacturing Machinery
Occupation	Machining
NSQF Level	3
Credits	TBD
Version	2.0
Last Reviewed Date	01/10/2025
Next Review Date	01/10/2028
NSQC Clearance Date	01/10/2025

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CSC/N0209: Manually weld metals by using MIG/MAG welding

Description

This unit is about performing MIG/MAG welding for producing various types of joints on metal and metal alloys as per the given specifications and standards specified by the organisation.

Scope

The scope covers the following :

- Prepare for welding operations
- Perform MIG/MAG welding operations
- Perform post-welding operations

Elements and Performance Criteria

Prepare for welding operations

To be competent, the user/individual on the job must be able to:

- PC1. identify the work to be done and product specifications by interpreting the product drawing, Welding Procedure Specification (WPS) and job orders
- PC2. identify the tools, MIG welding machines, measuring instruments, accessories, consumables and input materials (i.e. ferrous metals/materials: carbon steel, stainless steel etc.) as per the requirements mentioned in WPS or drawing
- PC3. select and arrange the right material, equipment, fixtures, accessories, welding torch and consumables i.e. electrode, filler wire, shielding gas etc. as per the SOP and job requirements
- PC4. check the input material, tools and equipment for any defects and that they are as per the required quality standards
- PC5. prepare the work area for welding activities
- PC6. prepare the materials (i.e. sheet (less than 1.5 mm), plate, structural section, pipe/tube, other forms) and joint for welding process
- PC7. clean wire feeder and torch tip
- PC8. set the MIG welding machine and its parameters i.e. wire feed rate, amperage, gas flow rate etc. as per the WPS and SOP
- PC9. connect and adjust regulators and flow meters to cylinders
- PC10. choose appropriate mode of metal transfer
- PC11. set pre-purge with shielding gas as required
- PC12. install the work pieces and fixture on the apparatus and align them with the electrodes as per the job requirements
- PC13. verify set up by running test weld on the specimen (scrap plate)

Perform MIG/MAG welding operations

To be competent, the user/individual on the job must be able to:

- PC14. follow safety precautions during welding work as per SOP and organizational guidelines
- PC15. start the MIG welding machine for welding operations

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- PC16. perform MIG welding process in all welding positions as per SOP and tack weld the joint at appropriate intervals to produce joints of the specified quality, dimensions and profile
- PC17. adjust wire stick-out as per requirement
- PC18. produce joints of the required quality and of specified dimensional accuracy which achieve a weld quality equivalent to Level C of ISO 5817
- PC19. ensure correct angle of torch, travel speed, direction of weld and feed during the welding operation
- PC20. monitor the welding process parameters (air pressure, electrode force, electrode distance, gas flow etc.) are within standards by reading the various gauges and correct them if not within standards
- PC21. measure the final welded piece and compare with the dimensions as prescribed in the WPS and engineering drawing
- PC22. remove extra material, slag etc. by using brush, chipping hammers, grinders etc., from the welded piece
- PC23. shut down the welding equipment and remove the workpiece after completion of welding activities

Perform post-welding operations

To be competent, the user/individual on the job must be able to:

- PC24. check the work pieces as per the work instructions for product quality
- PC25. identify various weld defects by conducting visual inspection, destructive and non-destructive tests on the work pieces
- PC26. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair
- PC27. clean and store all the tools, machine and equipment after completion of work
- PC28. dispose scrap or waste material in accordance with the company policies and environmental regulations
- PC29. check the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction
- PC30. report to the supervisor about any problems faced or anticipated during the complete process

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. relevant legislation, standards, policies, and procedures followed in the organization
- KU2. MIG welding and its process flow
- KU3. various types of welding joints i.e. fillet lap joints, tee fillet joints, corner joints, butt joints (square, single, vee, double vee)
- KU4. various welding positions i.e. flat (PA) 1G/1F, horizontal vertical (PB)2F, horizontal (PC)2G, vertical upwards (PF) 3F / 3G, vertical downwards (PG) 3F / 3G, Plate to Pipe (Fixed) 5F
- KU5. how to read and interpret WPS, welding drawings and symbols

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- KU6.**
- welding specific equipment requirements for MIG/MAG welding
 - MIG equipment: rectifier (diode, thyristor/transistor), inverter, generator; wire feed system; measurement equipment for measuring; electrical output and continuity (voltmeter/multi-meter, ammeter/shunts/coils, tong tester); welding cables - wire feed to torch (air cooled, harness construction); welding guns/torches (air cooled, construction, types [push, pull, reel-on-gun] swan neck design, pistol design); nozzles (dip, spray); return clamps (types, clamping mechanisms) and cables; solenoid valves (shielding gas); jog-feed control, gas purge control; ancillary equipment (angle grinders, wire brushes, linishers, hammer, power saw, angle, pedestal and straight grinders, chisel); other tools and equipment such as wrenches, wire cutters and MIG pliers
- KU7.** SOP recommended by the manufacturer for using tools, measuring instruments, accessories, MMAW welding machine etc. during the welding process
- KU8.** main components and controls of welding equipment
- KU9.** ISO colour codes for welding apparatus such as gas cylinder, hoses, electric cables, etc.
- KU10.** joint preparation process: 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 (e.g. chamfering machine, grinding and stripping, gas or plasma cutting, etc.); correctly positioned (positioning: devices and techniques; jigs and fixtures; setting up joint in correct position & alignment)
- KU11.** impact of various welding parameters like voltage, current, gas flow rate, speed, pressure, torch angle, cycle time, electrode distance etc. on the quality and quantity of welding
- KU12.** relationship between wire feed, speed control and welding current
- KU13.** MIG/MAG welding technique: e.g. fine adjustment of parameters, correct manipulation of the torch, blending in stops/starts, tack welds, angle of the torch, setting of individual parameters like wire feed speed, voltage, gas flow rate, stick-out, etc. various materials used for GMAW welding and their properties
- KU14.** SOP recommended by the organisation for operating MIG welding machine and its accessories
- KU15.** current and polarity required for GMAW
- KU16.** types, selection and application of filler wires and welding electrodes
- KU17.**
- reasons for using shielding gases, and the types and application of the various gases
 - Shielding gases: applications for shielding gases/gas mixtures (argon, mixture, helium, argon/helium mixtures, helium/argon mixtures, argon/hydrogen mixtures, nitrogen argon/nitrogen mixtures, CO₂ and CO₂ mixtures); flow rates for applications; identify percentage of purity and mixture with respect to WPS/PQR
- KU18.**
- use, impact and importance of gas pressures and flow rates (in relationship to the type of material being welded)
 - Types of ferrous metals/materials: carbon steel, stainless steel
- KU19.**
- methods/modes of metal transfer and their uses
 - Methods: globular, short circuit transfer, spray arc, pulse, surface tension transfer (STT)
- KU20.** purpose and correct use of anti-spatter compound
- KU21.** importance and procedure to clean torch tip and liner
- KU22.**
- factors that determine weld bead shape
 - Factors: gun angles and weld bead profiles (push, perpendicular, drag); electrode extensions stick out (short, normal, long); fillet weld electrode extension stick out (short, normal, long); gun travel speed (slow, normal, fast); current and voltage

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- KU23.** • types of beads, characteristics and uses (stringer, weave, weave patterns)
• Bead characteristics: spatter deposits, roughness, evenness, fill, crater, overlap
- KU24.** • weld bead quality characteristics
• Bead characteristics: spatter deposits, roughness, evenness, fill, crater, overlap, contour - convex, concave, mitre
- KU25.** SOP recommended by the organisation for checking irregularities in the product/work piece
- KU26.** • factors that affect weld quality standards
• Quality standards: required parameters for dimensional accuracy; weld finishes are built up to the full section of the weld; joins at stop/start positions merge smoothly; weld surface is (free from cracks; substantially free from porosity; free from any pronounced hump or crater; substantially free from shrinkage cavities; substantially free from trapped slag; substantially free from arcing or chipping marks); fillet welds are (equal in leg length, slightly convex in profile (where applicable), size of the fillet equivalent to the thickness of the material welded); weld contour is (of linear and of uniform profile; smooth and free from excessive undulations; regular and has an even ripple formations); welds are adequately fused, and there is minimal undercut, overlap and surface inclusions etc.
- KU27.** various defects associated with the MIG welding process
- KU28.** how to control distortion (such as welding sequence; deposition technique)
- KU29.** various testing techniques like visual, destructive and non-destructive
- KU30.** safety requirements during the welding work

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** read and interpret drawings, work instructions, equipment manuals and process documents
- GS2.** communicate the welding process requirements to the supervisor and co-workers
- GS3.** attentively listen and comprehend the information given by the supervisor/team members
- GS4.** write any work related information in English/regional language
- GS5.** recognise a workplace problem and take suitable action
- GS6.** analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
- GS7.** plan and organize tools, machines and consumables for carrying out welding job
- GS8.** complete the assigned tasks with minimum supervision
- GS9.** report to the supervisor or deal with a colleague individually, depending on the type of concern

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for welding operations</i>	15	21	-	7
PC1. identify the work to be done and product specifications by interpreting the product drawing, Welding Procedure Specification (WPS) and job orders	1	2	-	1
PC2. identify the tools, MIG welding machines, measuring instruments, accessories, consumables and input materials (i.e. ferrous metals/materials: carbon steel, stainless steel etc.) as per the requirements mentioned in WPS or drawing	3	2	-	1
PC3. select and arrange the right material, equipment, fixtures, accessories, welding torch and consumables i.e. electrode, filler wire, shielding gas etc. as per the SOP and job requirements	2	3	-	1
PC4. check the input material, tools and equipment for any defects and that they are as per the required quality standards	2	3	-	1
PC5. prepare the work area for welding activities	1	1	-	-
PC6. prepare the materials (i.e. sheet (less than 1.5 mm), plate, structural section, pipe/tube, other forms) and joint for welding process	1	1	-	1
PC7. clean wire feeder and torch tip	-	1	-	-
PC8. set the MIG welding machine and its parameters i.e. wire feed rate, amperage, gas flow rate etc. as per the WPS and SOP	1	2	-	1
PC9. connect and adjust regulators and flow meters to cylinders	1	1	-	-
PC10. choose appropriate mode of metal transfer	1	1	-	-
PC11. set pre-purge with shielding gas as required	1	1	-	1
PC12. install the work pieces and fixture on the apparatus and align them with the electrodes as per the job requirements	1	2	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. verify set up by running test weld on the specimen (scrap plate)	-	1	-	-
<i>Perform MIG/MAG welding operations</i>	8	17	-	8
PC14. follow safety precautions during welding work as per SOP and organizational guidelines	-	1	-	-
PC15. start the MIG welding machine for welding operations	1	2	-	-
PC16. perform MIG welding process in all welding positions as per SOP and tack weld the joint at appropriate intervals to produce joints of the specified quality, dimensions and profile	2	4	-	2
PC17. adjust wire stick-out as per requirement	1	1	-	1
PC18. produce joints of the required quality and of specified dimensional accuracy which achieve a weld quality equivalent to Level C of ISO 5817	1	4	-	2
PC19. ensure correct angle of torch, travel speed, direction of weld and feed during the welding operation	1	1	-	1
PC20. monitor the welding process parameters (air pressure, electrode force, electrode distance, gas flow etc.) are within standards by reading the various gauges and correct them if not within standards	1	1	-	1
PC21. measure the final welded piece and compare with the dimensions as prescribed in the WPS and engineering drawing	1	1	-	1
PC22. remove extra material, slag etc. by using brush, chipping hammers, grinders etc., from the welded piece	-	1	-	-
PC23. shut down the welding equipment and remove the workpiece after completion of welding activities	-	1	-	-
<i>Perform post-welding operations</i>	7	12	-	5
PC24. check the work pieces as per the work instructions for product quality	1	2	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC25. identify various weld defects by conducting visual inspection, destructive and non-destructive tests on the work pieces	2	3	-	2
PC26. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair	1	1	-	1
PC27. clean and store all the tools, machine and equipment after completion of work	1	2	-	1
PC28. dispose scrap or waste material in accordance with the company policies and environmental regulations	1	1	-	-
PC29. check the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction	1	2	-	-
PC30. report to the supervisor about any problems faced or anticipated during the complete process	-	1	-	-
NOS Total	30	50	-	20

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National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0209
NOS Name	Manually weld metals by using MIG/MAG welding
Sector	Capital Goods
Sub-Sector	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery, Light Engineering Goods
Occupation	Welding and Cutting
NSQF Level	4
Credits	TBD
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2028
NSQC Clearance Date	08/05/2025

Qualification Pack

CSC/N0201: Manually cut metal and metal alloys using oxy-fuel gas

Description

This unit is about performing gas cutting and post-cutting operations as per the given work order and the standards specified by the organization.

Scope

The scope covers the following :

- Prepare for cutting operations
- Perform oxy-gas cutting operations
- Perform post-cutting operations

Elements and Performance Criteria

Prepare for cutting operations

To be competent, the user/individual on the job must be able to:

- PC1. identify the cutting work to be done by interpreting the engineering drawing, Welding Procedure Specification (WPS) and job orders
- PC2. identify the tools, cutting torch, machine, measuring instruments, accessories, consumables and input materials (mild carbon steel, high tensile and special steels, other materials) as per the requirements mentioned in WPS or drawing
- PC3. select and arrange the right material, equipment, fixtures, accessories such as regulators, hoses and valve and consumables such as shielding gas etc. as per the SOP and job requirements
- PC4. select the correct type of nozzle, consumables, gases and oxy-gas cutting equipment required for the job by following WPS and drawing
- PC5. check the input material, tools, equipment and accessories for any defects, leakages and that they are as per the required quality standards
- PC6. prepare the work area for cutting activities
- PC7. set the oxy-gas cutting apparatus and its parameters as per the WPS and SOP
- PC8. ensure that a flashback arrestor is fitted with the apparatus
- PC9. use correct technique for lighting, adjusting and extinguishing the arc
- PC10. adjust torch valve for the type of flame such as neutral, carburizing and oxidizing
- PC11. mark the correct measurements on the workpiece by using appropriate tools and measuring instruments as specified in drawing or WPS

Perform oxy-gas cutting operations

To be competent, the user/individual on the job must be able to:

- PC12. follow safety precautions during cutting work as per SOP and organizational guidelines
- PC13. start the gas cutting machine for cutting operations
- PC14. adjust cylinder valves and regulator for operating pressure to achieve required specifications
- PC15. perform oxy-gas cutting process as per SOP and produce items/cut shapes to the dimensions and profiles specified in WPS and drawing

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- PC16. perform various cutting operations correctly and produce thermal cuts in various forms of material (metal of 3mm and above) which meet specified quality criteria i.e. 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
- PC17. recognize and correct burn-back and flashback
- PC18. measure the final workpiece and compare with the dimensions as prescribed in the WPS and engineering drawing
- PC19. shut down the cutting equipment and remove the workpiece after completion of cutting activities

Perform post-cutting operations

To be competent, the user/individual on the job must be able to:

- PC20. check the work pieces as per the work instructions for product quality
- PC21. identify defects in the completed workpiece by using appropriate methods and equipment
- PC22. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair
- PC23. clean and store all the tools, machine and equipment after completion of work
- PC24. check the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction
- PC25. dispose scrap or waste material in accordance with the company policies and environmental regulations
- PC26. report to the supervisor about any problems faced or anticipated during the complete process

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. relevant legislation, standards, policies, and procedures followed in the organization
- KU2. the basic principle of oxy-gas process and its process flow
- KU3. SOP recommended by the manufacturer for using tools, measuring instruments, accessories, gas cutting apparatus etc. during the cutting process
- KU4. various materials such as mild steel, high tensile/special steel and other appropriate metal and their properties used for gas cutting
- KU5. various forms of material used for cutting are plate, rolled section, pipe/tube, solid bars etc.
- KU6. different cutting gases used in oxy-gas cutting and their selection criteria
- KU7. various cutting operations i.e. Downhand straight cuts (freehand), Making straight cuts (track guided), Cutting regular shapes, Cutting irregular shapes, Making angled cuts, Cutting chamfers, Making radial cuts, Gouging, flushing, Bevelled edge - weld preparations and cutting out holes
- KU8. ISO colour codes for cutting apparatus such as gas cylinder, hoses, electric cables, etc.
- KU9. impact of various cutting parameters on the quality and quantity of output
- KU10. holding methods that are used to aid thermal cutting
- KU11. types of flames and their implication for cutting

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- KU12. various quality check parameters i.e. shape and length of the draglines, smoothness of the sides, sharpness of the top edges and amount of slag adhering to the metal
- KU13. effects of oil, grease, scale or dirt on the cutting process
- KU14. various types of cutting defects such as distortion, grooved, fluted or ragged cuts, poor draglines, rounded edges, tightly adhering slag, etc. and their remedies
- KU15. effects of oil, grease, scale or dirt on the cutting process
- KU16. emergency procedures for backfires, flashback and other fires
- KU17. safety requirements during the cutting work

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1. read and interpret drawings, work instructions, equipment manuals and process documents
- GS2. communicate the welding process requirements to the supervisor and co-workers
- GS3. attentively listen and comprehend the information given by the supervisor/team members
- GS4. write any work related information in English/regional language
- GS5. recognise a workplace problem and take suitable action
- GS6. analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
- GS7. plan and organize tools, machines and consumables for carrying out welding job
- GS8. complete the assigned tasks with minimum supervision
- GS9. report to the supervisor or deal with a colleague individually, depending on the type of concern

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for cutting operations</i>	15	21	-	9
PC1. identify the cutting work to be done by interpreting the engineering drawing, Welding Procedure Specification (WPS) and job orders	1	2	-	1
PC2. identify the tools, cutting torch, machine, measuring instruments, accessories, consumables and input materials (mild carbon steel, high tensile and special steels, other materials) as per the requirements mentioned in WPS or drawing	3	2	-	2
PC3. select and arrange the right material, equipment, fixtures, accessories such as regulators, hoses and valve and consumables such as shielding gas etc. as per the SOP and job requirements	2	3	-	1
PC4. select the correct type of nozzle, consumables, gases and oxy-gas cutting equipment required for the job by following WPS and drawing	1	2	-	1
PC5. check the input material, tools, equipment and accessories for any defects, leakages and that they are as per the required quality standards	2	2	-	1
PC6. prepare the work area for cutting activities	1	2	-	-
PC7. set the oxy-gas cutting apparatus and its parameters as per the WPS and SOP	1	2	-	1
PC8. ensure that a flashback arrestor is fitted with the apparatus	1	-	-	1
PC9. use correct technique for lighting, adjusting and extinguishing the arc	1	2	-	1
PC10. adjust torch valve for the type of flame such as neutral, carburizing and oxidizing	1	2	-	-
PC11. mark the correct measurements on the workpiece by using appropriate tools and measuring instruments as specified in drawing or WPS	1	2	-	-
<i>Perform oxy-gas cutting operations</i>	9	17	-	6

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. follow safety precautions during cutting work as per SOP and organizational guidelines	-	1	-	-
PC13. start the gas cutting machine for cutting operations	1	2	-	1
PC14. adjust cylinder valves and regulator for operating pressure to achieve required specifications	1	2	-	1
PC15. perform oxy-gas cutting process as per SOP and produce items/cut shapes to the dimensions and profiles specified in WPS and drawing	2	4	-	1
PC16. perform various cutting operations correctly and produce thermal cuts in various forms of material (metal of 3mm and above) which meet specified quality criteria i.e. 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	2	4	-	2
PC17. recognize and correct burn-back and flashback	1	1	-	1
PC18. measure the final workpiece and compare with the dimensions as prescribed in the WPS and engineering drawing	1	2	-	-
PC19. shut down the cutting equipment and remove the workpiece after completion of cutting activities	1	1	-	-
<i>Perform post-cutting operations</i>	6	12	-	5
PC20. check the work pieces as per the work instructions for product quality	1	2	-	1
PC21. identify defects in the completed workpiece by using appropriate methods and equipment	2	3	-	1
PC22. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair	1	1	-	1
PC23. clean and store all the tools, machine and equipment after completion of work	1	2	-	1

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC24. check the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction	1	2	-	1
PC25. dispose scrap or waste material in accordance with the company policies and environmental regulations	-	1	-	-
PC26. report to the supervisor about any problems faced or anticipated during the complete process	-	1	-	-
NOS Total	30	50	-	20

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0201
NOS Name	Manually cut metal and metal alloys using oxy-fuel gas
Sector	Capital Goods
Sub-Sector	Machine Tools, Process Plant Machinery, Dies, Moulds and Press Tools, Electrical and Power Machinery, Plastics Manufacturing Machinery, Light Engineering Goods, Textile Manufacturing Machinery
Occupation	Welding and Cutting
NSQF Level	2
Credits	TBD
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	30/04/2028
NSQC Clearance Date	08/05/2025

Qualification Pack

CSC/N0207: Manually cut metal material using plasma arc

Description

This unit is about performing plasma arc cutting and post-cutting operations as per the given work order and the standards specified by the organization

Scope

The scope covers the following :

- Prepare for cutting operations
- Perform plasma arc cutting operations
- Perform post-cutting operations

Elements and Performance Criteria

Prepare for cutting operations

To be competent, the user/individual on the job must be able to:

- PC1. identify the cutting work to be done by interpreting the engineering drawing, Cutting Procedure Specification (CPS) and job orders
- PC2. identify the tools, plasma cutting equipment, measuring instruments, accessories, consumables and input materials (mild steel; high alloy steel; stainless steel; aluminium and its alloys; other appropriate metal) as per the requirements mentioned in WPS or drawing
- PC3. select and arrange the right material, plasma cutting equipment, fixtures, accessories such as cutting guides, regulators, hoses and valve and consumables such as plasma cutting gas etc. as per the SOP and job requirements
- PC4. select the correct type of nozzle, consumables, gases and plasma cutting equipment required for the job by following the WPS and drawing
- PC5. check the input material, tools, equipment and accessories for any defects, leakages and that they are as per the required quality standards
- PC6. prepare the work area for cutting activities
- PC7. set the plasma arc cutting apparatus and its parameters as per the WPS and SOP
- PC8. use the correct procedure for lighting, adjusting and extinguishing the arc
- PC9. mark the correct measurements on the workpiece by using appropriate tools and measuring instruments as specified in drawing or CPS

Perform plasma arc cutting operations

To be competent, the user/individual on the job must be able to:

- PC10. follow safety precautions during cutting work as per SOP and organizational guidelines
- PC11. start the plasma cutting machine for cutting operations
- PC12. perform plasma arc cutting process as per SOP and produce items/cut shapes to the dimensions and profiles specified in CPS and drawing

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- PC13. perform various cutting operations correctly and produce thermal cuts in various forms of material which meet specified quality criteria i.e. dimensional accuracy is within the tolerances specified on the drawing/specification, or within +/- 1mm; angled/radial cuts are within specification requirements; cuts are clean and smooth and free from flutes; no drags
- PC14. ensure correct angles of torch and right speed for cutting during the cutting operations
- PC15. measure the final workpiece and compare with the dimensions as prescribed in the CPS and engineering drawing
- PC16. shut down the cutting equipment and remove the workpiece after completion of cutting activities

Perform post-cutting operations

To be competent, the user/individual on the job must be able to:

- PC17. check the work pieces as per the work instructions for product quality
- PC18. identify defects in the completed workpiece by using appropriate methods and equipment
- PC19. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair
- PC20. clean and store all the tools, machine and equipment after completion of work
- PC21. check the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction
- PC22. dispose scrap or waste material in accordance with the company policies and environmental regulations
- PC23. report to the supervisor about any problems faced or anticipated during the complete process

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. relevant legislation, standards, policies, and procedures followed in the organization
- KU2. the basic principle of plasma arc cutting process and its process flow
- KU3. SOP recommended by the manufacturer for using tools, measuring instruments, accessories, plasma arc cutting apparatus etc. during the cutting process
- KU4. various materials such as mild steel, high tensile/special steel and other appropriate metal and their properties used for plasma arc cutting
- KU5. various forms of material used for cutting are plate, rolled section, pipe/tube, solid bars etc.
- KU6. Types of gases: Primary Plasma Gas - used to create the plasma arc (Nitrogen, Argon, Hydrogen, Compressed air); Secondary Shielding Gas - used to protect the cut metals from oxidation (CO₂, Compressed Air)
- KU7. types of regulators such as low- and high-pressure, and single- and two-stage
- KU8. nozzle type as per type and thickness of base materials
- KU9.
 - importance of torch to arc distance in relation to thickness of materials, types of torches and gases
 - Torches: air plasma, oxygen injected, dual gas
- KU10. factors that impact nozzle life

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- KU11. cutting techniques: stand-off, circle cutting, profile cutting, edge, stenting hole, piercing technique
- KU12. various cutting operations i.e. Down-hand straight cuts (freehand), Making straight cuts (track guided), Cutting regular shapes, Cutting irregular shapes, Making angled cuts, Cutting chamfers, Making radial cuts, Gouging/flushing, Bevelled edge - weld preparations and Cutting out holes
- KU13. ISO colour codes for cutting apparatus such as gas cylinder, hoses, electric cables, etc.
- KU14. impact of various cutting parameters on the quality and quantity of output
- KU15. holding methods that are used to aid thermal cutting
- KU16. various quality check parameters i.e. shape and length of the draglines, smoothness of the sides, sharpness of the top edges and amount of slag adhering to the metal
- KU17. various types of cutting defects such as distortion, grooved, fluted or ragged cuts, poor draglines, rounded edges, tightly adhering slag, etc. and their remedies
- KU18. effects of oil, grease, scale or dirt on the cutting process
- KU19. gouging and back gouging principles, methods and procedures
- KU20. safety requirements during the cutting work

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1. read and interpret drawings, work instructions, equipment manuals and process documents
- GS2. communicate the welding process requirements to the supervisor and co-workers
- GS3. attentively listen and comprehend the information given by the supervisor/team members
- GS4. write any work related information in English/regional language
- GS5. recognise a workplace problem and take suitable action
- GS6. analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
- GS7. plan and organize tools, machines and consumables for carrying out welding job
- GS8. complete the assigned tasks with minimum supervision
- GS9. report to the supervisor or deal with a colleague individually, depending on the type of concern

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for cutting operations</i>	15	21	-	9
PC1. identify the cutting work to be done by interpreting the engineering drawing, Cutting Procedure Specification (CPS) and job orders	1	2	-	1
PC2. identify the tools, plasma cutting equipment, measuring instruments, accessories, consumables and input materials (mild steel; high alloy steel; stainless steel; aluminium and its alloys; other appropriate metal) as per the requirements mentioned in WPS or drawing	4	3	-	2
PC3. select and arrange the right material, plasma cutting equipment, fixtures, accessories such as cutting guides, regulators, hoses and valve and consumables such as plasma cutting gas etc. as per the SOP and job requirements	2	3	-	2
PC4. select the correct type of nozzle, consumables, gases and plasma cutting equipment required for the job by following the WPS and drawing	1	2	-	1
PC5. check the input material, tools, equipment and accessories for any defects, leakages and that they are as per the required quality standards	2	2	-	1
PC6. prepare the work area for cutting activities	1	2	-	-
PC7. set the plasma arc cutting apparatus and its parameters as per the WPS and SOP	2	3	-	1
PC8. use the correct procedure for lighting, adjusting and extinguishing the arc	1	2	-	1
PC9. mark the correct measurements on the workpiece by using appropriate tools and measuring instruments as specified in drawing or CPS	1	2	-	-
<i>Perform plasma arc cutting operations</i>	9	17	-	6
PC10. follow safety precautions during cutting work as per SOP and organizational guidelines	-	1	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. start the plasma cutting machine for cutting operations	1	2	-	1
PC12. perform plasma arc cutting process as per SOP and produce items/cut shapes to the dimensions and profiles specified in CPS and drawing	2	3	-	1
PC13. perform various cutting operations correctly and produce thermal cuts in various forms of material which meet specified quality criteria i.e. dimensional accuracy is within the tolerances specified on the drawing/specification, or within +/- 1mm; angled/radial cuts are within specification requirements; cuts are clean and smooth and free from flutes; no drags	2	4	-	2
PC14. ensure correct angles of torch and right speed for cutting during the cutting operations	2	4	-	2
PC15. measure the final workpiece and compare with the dimensions as prescribed in the CPS and engineering drawing	1	2	-	-
PC16. shut down the cutting equipment and remove the workpiece after completion of cutting activities	1	1	-	-
<i>Perform post-cutting operations</i>	6	12	-	5
PC17. check the work pieces as per the work instructions for product quality	1	2	-	1
PC18. identify defects in the completed workpiece by using appropriate methods and equipment	2	3	-	1
PC19. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair	1	1	-	1
PC20. clean and store all the tools, machine and equipment after completion of work	1	2	-	1
PC21. check the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction	1	2	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. dispose scrap or waste material in accordance with the company policies and environmental regulations	-	1	-	-
PC23. report to the supervisor about any problems faced or anticipated during the complete process	-	1	-	-
NOS Total	30	50	-	20

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0207
NOS Name	Manually cut metal material using plasma arc
Sector	Capital Goods
Sub-Sector	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery, Light Engineering Goods
Occupation	Welding and Cutting
NSQF Level	4
Credits	2
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2028
NSQC Clearance Date	08/05/2025

Qualification Pack

DGT/VSQ/N0101: Employability Skills (30 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

To be competent, the user/individual on the job must be able to:

PC1. understand the significance of employability skills in meeting the job requirements

Constitutional values - Citizenship

To be competent, the user/individual on the job must be able to:

PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices

Becoming a Professional in the 21st Century

To be competent, the user/individual on the job must be able to:

PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.

Basic English Skills

To be competent, the user/individual on the job must be able to:

PC4. speak with others using some basic English phrases or sentences

Communication Skills

To be competent, the user/individual on the job must be able to:

PC5. follow good manners while communicating with others

PC6. work with others in a team

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Diversity & Inclusion

To be competent, the user/individual on the job must be able to:

- PC7. communicate and behave appropriately with all genders and PwD
- PC8. report any issues related to sexual harassment

Financial and Legal Literacy

To be competent, the user/individual on the job must be able to:

- PC9. use various financial products and services safely and securely
- PC10. calculate income, expenses, savings etc.
- PC11. approach the concerned authorities for any exploitation as per legal rights and laws

Essential Digital Skills

To be competent, the user/individual on the job must be able to:

- PC12. operate digital devices and use its features and applications securely and safely
- PC13. use internet and social media platforms securely and safely

Entrepreneurship

To be competent, the user/individual on the job must be able to:

- PC14. identify and assess opportunities for potential business
- PC15. identify sources for arranging money and associated financial and legal challenges

Customer Service

To be competent, the user/individual on the job must be able to:

- PC16. identify different types of customers
- PC17. identify customer needs and address them appropriately
- PC18. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

To be competent, the user/individual on the job must be able to:

- PC19. create a basic biodata
- PC20. search for suitable jobs and apply
- PC21. identify and register apprenticeship opportunities as per requirement

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. need for employability skills
- KU2. various constitutional and personal values
- KU3. different environmentally sustainable practices and their importance
- KU4. Twenty first (21st) century skills and their importance
- KU5. how to use basic spoken English language
- KU6. Do and dont of effective communication
- KU7. inclusivity and its importance
- KU8. different types of disabilities and appropriate communication and behaviour towards PwD
- KU9. different types of financial products and services

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- KU10. how to compute income and expenses
- KU11. importance of maintaining safety and security in financial transactions
- KU12. different legal rights and laws
- KU13. how to operate digital devices and applications safely and securely
- KU14. ways to identify business opportunities
- KU15. types of customers and their needs
- KU16. how to apply for a job and prepare for an interview
- KU17. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1. communicate effectively using appropriate language
- GS2. behave politely and appropriately with all
- GS3. perform basic calculations
- GS4. solve problems effectively
- GS5. be careful and attentive at work
- GS6. use time effectively
- GS7. maintain hygiene and sanitisation to avoid infection

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Introduction to Employability Skills</i>	1	1	-	-
PC1. understand the significance of employability skills in meeting the job requirements	-	-	-	-
<i>Constitutional values - Citizenship</i>	1	1	-	-
PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	1	3	-	-
PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.	-	-	-	-
<i>Basic English Skills</i>	2	3	-	-
PC4. speak with others using some basic English phrases or sentences	-	-	-	-
<i>Communication Skills</i>	1	1	-	-
PC5. follow good manners while communicating with others	-	-	-	-
PC6. work with others in a team	-	-	-	-
<i>Diversity & Inclusion</i>	1	1	-	-
PC7. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC8. report any issues related to sexual harassment	-	-	-	-
<i>Financial and Legal Literacy</i>	3	4	-	-
PC9. use various financial products and services safely and securely	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. calculate income, expenses, savings etc.	-	-	-	-
PC11. approach the concerned authorities for any exploitation as per legal rights and laws	-	-	-	-
<i>Essential Digital Skills</i>	4	6	-	-
PC12. operate digital devices and use its features and applications securely and safely	-	-	-	-
PC13. use internet and social media platforms securely and safely	-	-	-	-
<i>Entrepreneurship</i>	3	5	-	-
PC14. identify and assess opportunities for potential business	-	-	-	-
PC15. identify sources for arranging money and associated financial and legal challenges	-	-	-	-
<i>Customer Service</i>	2	2	-	-
PC16. identify different types of customers	-	-	-	-
PC17. identify customer needs and address them appropriately	-	-	-	-
PC18. follow appropriate hygiene and grooming standards	-	-	-	-
<i>Getting ready for apprenticeship & Jobs</i>	1	3	-	-
PC19. create a basic biodata	-	-	-	-
PC20. search for suitable jobs and apply	-	-	-	-
PC21. identify and register apprenticeship opportunities as per requirement	-	-	-	-
NOS Total	20	30	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0101
NOS Name	Employability Skills (30 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	2
Credits	1
Version	1.0
Next Review Date	07/10/2028

Qualification Pack

CSC/N0205: Perform semi-automatic flux cored arc welding (FCAW) process to prepare joints

Description

This unit is about performing of semi-automatic flux cored arc welding process for producing various welding joints and meeting standard welding job requirement as per welding procedure specifications (WPS)

Scope

The scope covers the following :

- Prepare for welding operations
- Perform welding operations
- Perform Post-welding activities

Elements and Performance Criteria

Prepare for welding operations

To be competent, the user/individual on the job must be able to:

- PC1. identify the work to be done and product specifications by interpreting the product drawing, Welding Procedure Specification (WPS), Procedure Qualification Record (PQR) and job orders
- PC2. identify the tools, FCAW welding machines, measuring instruments, accessories, consumables and input materials (i.e. carbon steel, stainless steel, alloy steels, hard facing alloys etc.) as per the requirements mentioned in WPS or drawing
- PC3. select and arrange the right material, equipment, fixtures, accessories, welding torch and consumables i.e. electrode, shielding gas etc. as per the SOP and job requirements
- PC4. check the input material, tools and equipment for any defects and that they are as per the required quality standards
- PC5. plan the welding activities effectively and efficiently for achieving specifications as per WPS
- PC6. prepare the materials (sheet (less than 3 mm), plate, structural section, pipe/tube, other forms) and joint for welding as per job requirement (e.g.. as flat, square or bevelled)
- PC7. check the joint for accuracy before starting welding process
- PC8. clean wire feeder and torch tip using correct procedures
- PC9. set the FCAW welding machine and its parameters i.e. wire feed rate, amperage, gas flow rate etc. as per the WPS and SOP
- PC10. connect cables and ground clamps to power source, torch and its components, welding leads/cables, hoses, shielding gas supply and wire feed mechanisms by following SOP
- PC11. connect and adjust regulators and flow meters to cylinders correctly
- PC12. set pre-purge with shielding gas as required
- PC13. install the work pieces and fixture on the apparatus and align them with the electrodes as per the job requirements
- PC14. verify that heat treatment has been done appropriately as per requirement

Perform welding operations

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To be competent, the user/individual on the job must be able to:

- PC15. follow safety precautions during welding work as per SOP and organizational guidelines
- PC16. ensure that supplies of components and consumables are adequate and correctly prepared before starting welding work
- PC17. start the FCAW welding machine for welding operations
- PC18. perform FCAW welding process in all welding positions as per SOP and weld the joint at appropriate intervals to produce joints of the specified quality, dimensions and profile
- PC19. ensure correct work and travel angles, flow rate, travel speed and electrode extensions as required for the job
- PC20. adjust wire stick-out as per requirement
- PC21. produce joints and components of the required quality and of specified dimensional accuracy which achieve a weld quality equivalent to Level C of ISO 5817
- PC22. monitor the welding process and parameters (air pressure, electrode force, electrode distance, gas flow etc.) are within standards by reading the various gauges and correct them if not within standards
- PC23. measure the final welded component and compare with the dimensions as prescribed in the WPS and engineering drawing
- PC24. remove extra material, slag etc. by using brush, chipping hammers, grinders etc., from the welded component
- PC25. shut down the welding equipment and remove the component after completion of welding activities

Perform post-welding activities

To be competent, the user/individual on the job must be able to:

- PC26. check the work pieces for product quality, all dimensional and geometrical aspects of the weld by following work instructions
- PC27. identify various weld defects by conducting visual inspection, destructive and non-destructive tests on the work pieces
- PC28. detect surface imperfections and deal with them appropriately
- PC29. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair
- PC30. clean and store all the tools, machine and equipment after completion of work
- PC31. dispose scrap or waste material in accordance with the company policies and environmental regulations
- PC32. check the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction
- PC33. report to the supervisor about any problems faced or anticipated during the complete process

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. relevant legislation, standards, policies, and procedures followed in the organization
- KU2. the basic principle of FCAW welding including fusion welding

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- KU3.** FCAW welding and its process flow
- KU4.** various types of welding joints i.e. fillet lap joints, tee fillet joints, corner joints, butt joints (square, single, vee, double vee)
- KU5.** various welding positions i.e. flat (PA) 1G/1F, horizontal vertical (PB)2F, horizontal (PC)2G, vertical upwards (PF) 3F / 3G, vertical downwards (PG) 3F / 3G, Plate to Pipe (Fixed) 5F
- KU6.** how to read and interpret WPS, PQR, welding drawings and symbols
- KU7.** hazards associated with FCAW welding machines and how they can be minimized including use of PPE
- KU8.**
- tools and FCAW apparatus required during welding process
 - FCAW equipment: rectifier (diode, thyristor/transistor), inverter, generator; wire feed system; measurement equipment for measuring electrical output and continuity (voltmeter/multi-meter, ammeter/shunts/coils, tong tester); welding cables - wire feed to torch (air cooled, harness construction); welding guns/torches (air cooled, construction, types [push, pull, reel-on-gun] swan neck design, pistol design); nozzles (dip, spray); return clamps (types, clamping mechanisms) and cables; solenoid valves (shielding gas); jog-feed control, gas purge control; ancillary equipment (angle grinders, wire brushes, liners, hammer, power saw, angle, pedestal and straight grinders, chisel); other tools and equipment such as wrenches, wire cutters and pliers
- KU9.** difference in self-shielded and gas shielded FCAW equipment and consumables
- KU10.** SOP recommended by the manufacturer for using tools, measuring instruments, accessories, FCAW welding machine etc. during the welding process
- KU11.** selection criteria of welding torch and consumable depending on whether self-shielded or gas shielded FCAW
- KU12.** types of weld beads and uses (stringer, weave, weave patterns)
- KU13.**
- weld bead quality characteristic
 - Characteristics: spatter deposits, roughness, evenness, fill, crater, overlap, contour convex, concave, mitre
- KU14.** designation types of flux wires and their appropriate use in FCAW
- KU15.** procedures and techniques used to deposit a weld bead using FCAW welding equipment
- KU16.**
- factors that determine weld bead shape
 - Factors: gun angles and weld bead profiles (push, perpendicular, drag); electrode extensions stick out (short, normal, long); fillet weld electrode extension stick out (short, normal, long); gun travel speed (slow, normal, fast); current and voltage; thickness of material
- KU17.** electrode extension and appropriate travel speed and angle for the weld job
- KU18.** how to control gas flow rates and its importance in FCAW welding
- KU19.** uses, classification and considerations for usage of consumables such as filler wires and shielding gases
- KU20.** correct procedures to store consumables used for FCAW
- KU21.** use, features and impact of power sources (DC) in FCAW welding
- KU22.** how to set up and align the work piece, and the equipment to be used
- KU23.** methods used to set up and restrain the joint to achieve correct location of components and control of distortion
- KU24.** importance of checking equipment calibration and procedure to deal with non-calibrated equipment

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- KU25.** • techniques of welding and operation of the welding equipment to produce a range of joints in the various joint positions
 • Welding technique: fine adjustment of parameters, correct manipulation of the torch, blending in stops/starts, tack welds, angle of the torch, setting of individual parameters like wire feed speed, voltage, gas flow rate, stick-out
- KU26.** problems that can occur with the welding activities and explain how these can be overcome
- KU27.** purpose and correct use of anti-spatter compound
- KU28.** importance and procedure to clean torch tip and liner
- KU29.** effects of heat on base metal and job due to welding
- KU30.** significance of diffusible hydrogen for welds and how it is measured
- KU31.** importance, principles, methods and procedures of gouging and back gouging
- KU32.** • heat procedures for performing FCAW welds
 • Heat procedures: preheating, interpass temperature, post weld heat treatment, stress relieving, using temperature measuring devices
- KU33.** pre-heat, inter-pass and post-heat treatment requirements in FCAW welding
- KU34.** purpose and importance of pre-heating requirements for base metals for welding
- KU35.** purpose and importance of post-heating in welding
- KU36.** methods to achieve pre-heat and post heat requirements for weld jobs
- KU37.** tools and methods to measure temperature for pre-heat and post-heat welding requirements such as thermal chalk, thermocouple, etc.
- KU38.** organizational quality systems used and weld standards to be achieved
- KU39.** various defects associated with the FCAW welding process
- KU40.** • causes of distortion and methods of control
 • Distortion: Causes (improper sequence of weld runs; direction of weld runs; heat input errors; lack of inaccuracy of jigs and fixture); Control Methods (sequence of welding as materials; proper direction; tacking and its frequency (where applicable); use clamping and jigs and fixtures (where applicable))
- KU41.** • slag removal tools and techniques
 • Slag removal tools and techniques: chipping hammer, welding hammer, wire brush, angle grinder, etc.
- KU42.** • weld inspection techniques and test procedures for visual inspection of weld job
 • Visual inspections: use of visual techniques, distance of observation, angle of observation, adequate lighting, low powered magnification, fillet weld gauges
- KU43.** • types and procedure of destructive and non-destructive methods of testing for assessing weld quality
 • Non- destructive tests (NDT): dye penetrant (DPT), fluorescent penetrant (FPT), magnetic particle (MPT)
 • Destructive tests (DT): macro examination, nick break test, bend tests (such as face, root or side, as appropriate), mechanical (peel, tensile and shear, hardness, fatigue, impact tests), chemical
- KU44.** safety requirements during the welding work

Generic Skills (GS)

User/individual on the job needs to know how to:

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- GS1. read and interpret drawings, work instructions, equipment manuals and process documents
- GS2. fill up appropriate technical forms, process charts, activity logs as per organizational format in English and/or local language
- GS3. communicate with people in respectful form and manner in line with organizational protocol
- GS4. plan, prioritize and sequence work operations as per job requirements
- GS5. organize and analyse information relevant to work
- GS6. avoid and manage distractions to be disciplined at work
- GS7. manage own time for achieving better results
- GS8. work in a team in order to achieve better results
- GS9. communicate and cooperate with others in the team for better results
- GS10. seek assistance from fellow team members
- GS11. identify problems with work planning, procedures, output and behaviour and their implications
- GS12. prioritize and plan for problem solving
- GS13. communicate problems appropriately to others
- GS14. identify sources of information and support for problem solving
- GS15. identify effective resolution techniques
- GS16. undertake and express new ideas and initiatives to others
- GS17. enhance ones competencies in new and different situations and contexts to achieve more
- GS18. seek to improve and modify own work practices

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for welding operations</i>	15	21	-	7
PC1. identify the work to be done and product specifications by interpreting the product drawing, Welding Procedure Specification (WPS), Procedure Qualification Record (PQR) and job orders	1	2	-	1
PC2. identify the tools, FCAW welding machines, measuring instruments, accessories, consumables and input materials (i.e. carbon steel, stainless steel, alloy steels, hard facing alloys etc.) as per the requirements mentioned in WPS or drawing	2	2	-	1
PC3. select and arrange the right material, equipment, fixtures, accessories, welding torch and consumables i.e. electrode, shielding gas etc. as per the SOP and job requirements	2	3	-	1
PC4. check the input material, tools and equipment for any defects and that they are as per the required quality standards	1	2	-	1
PC5. plan the welding activities effectively and efficiently for achieving specifications as per WPS	1	1	-	-
PC6. prepare the materials (sheet (less than 3 mm), plate, structural section, pipe/tube, other forms) and joint for welding as per job requirement (e.g.. as flat, square or bevelled)	1	1	-	1
PC7. check the joint for accuracy before starting welding process	-	1	-	-
PC8. clean wire feeder and torch tip using correct procedures	1	1	-	1
PC9. set the FCAW welding machine and its parameters i.e. wire feed rate, amperage, gas flow rate etc. as per the WPS and SOP	1	2	-	1
PC10. connect cables and ground clamps to power source, torch and its components, welding leads/cables, hoses, shielding gas supply and wire feed mechanisms by following SOP	1	1	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. connect and adjust regulators and flow meters to cylinders correctly	1	1	-	-
PC12. set pre-purge with shielding gas as required	1	1	-	-
PC13. install the work pieces and fixture on the apparatus and align them with the electrodes as per the job requirements	1	2	-	-
PC14. verify that heat treatment has been done appropriately as per requirement	1	1	-	-
<i>Perform welding operations</i>	8	17	-	8
PC15. follow safety precautions during welding work as per SOP and organizational guidelines	-	1	-	-
PC16. ensure that supplies of components and consumables are adequate and correctly prepared before starting welding work	-	1	-	-
PC17. start the FCAW welding machine for welding operations	1	1	-	-
PC18. perform FCAW welding process in all welding positions as per SOP and weld the joint at appropriate intervals to produce joints of the specified quality, dimensions and profile	2	3	-	2
PC19. ensure correct work and travel angles, flow rate, travel speed and electrode extensions as required for the job	1	2	-	2
PC20. adjust wire stick-out as per requirement	1	1	-	1
PC21. produce joints and components of the required quality and of specified dimensional accuracy which achieve a weld quality equivalent to Level C of ISO 5817	1	3	-	1
PC22. monitor the welding process and parameters (air pressure, electrode force, electrode distance, gas flow etc.) are within standards by reading the various gauges and correct them if not within standards	1	2	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC23. measure the final welded component and compare with the dimensions as prescribed in the WPS and engineering drawing	1	1	-	1
PC24. remove extra material, slag etc. by using brush, chipping hammers, grinders etc., from the welded component	-	1	-	-
PC25. shut down the welding equipment and remove the component after completion of welding activities	-	1	-	-
<i>Perform post-welding activities</i>	7	12	-	5
PC26. check the work pieces for product quality, all dimensional and geometrical aspects of the weld by following work instructions	1	2	-	1
PC27. identify various weld defects by conducting visual inspection, destructive and non-destructive tests on the work pieces	2	3	-	2
PC28. detect surface imperfections and deal with them appropriately	1	1	-	-
PC29. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair	1	1	-	1
PC30. clean and store all the tools, machine and equipment after completion of work	1	2	-	1
PC31. dispose scrap or waste material in accordance with the company policies and environmental regulations	-	1	-	-
PC32. check the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction	1	1	-	-
PC33. report to the supervisor about any problems faced or anticipated during the complete process	-	1	-	-
NOS Total	30	50	-	20

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National Occupational Standards (NOS) Parameters

NOS Code	CSC/N0205
NOS Name	Perform semi-automatic flux cored arc welding (FCAW) process to prepare joints
Sector	Capital Goods
Sub-Sector	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery
Occupation	Welding and Cutting
NSQF Level	4
Credits	TBD
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2028
NSQC Clearance Date	08/05/2025

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for the Qualification Pack will be created by CGSC.
2. Performance Criteria (PC) have been assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
3. The assessment for the theory part will/may be based on knowledge bank of questions approved CGSC.
4. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
5. Assessment Agencies will create Assessor Guides comprising of Theory and Practical Assessment Set and Guidelines for each examination/training centre (as per assessment criteria below). The same will be approved by CGSC for adequacy.
6. To successfully attain Certification on the Qualification Pack, the trainee must score a minimum of 70% in each Core NOS and minimum of 70% in all non-core NOS. In addition, a candidate needs to attain a

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minimum overall pass percentage of 70% for certification.

7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Minimum Aggregate Passing % at QP Level : 70

(Please note: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CSC/N1335.Follow the health and safety practices at the work	30	70	-	-	100	10
CSC/N0209.Manually weld metals by using MIG/MAG welding	30	50	-	20	100	20
CSC/N0201.Manually cut metal and metal alloys using oxy-fuel gas	30	50	-	20	100	20
CSC/N0207.Manually cut metal material using plasma arc	30	50	-	20	100	25
DGT/VSQ/N0101.Employability Skills (30 Hours)	20	30	-	-	50	25
Total	140	250	-	60	450	100

Optional: 1 Perform semi-automatic flux cored arc welding (FCAW) process to prepare joints

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CSC/N0205.Perform semi-automatic flux cored arc welding (FCAW) process to prepare joints	30	50	-	20	100	30
Total	30	50	-	20	100	30



Qualification Pack

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Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
MIG	Metal Inert Gas
MAG	Metal Active Gas
GMAW	Gas Metal Arc Welding
WPS	Welding Procedure Speciation
NDT	Non-Destructive Testing
DT	Destructive Testing
RT	Radiographic Testing
UT	Ultrasonic Testing
DPT	Dye Penetrant Testing
MPT	Magnetic Particle Testing
FPT	Fluorescent Penetrant Testing
IS	Indian Standards
EN	European Standards
ASME	American Society of Mechanical Engineers
ISO	International Organization for Standardization
D.C.	Direct Current
STT	Surface Tension Transfer
PQR	Process Qualification Record
CO ₂	Carbon Dioxide
CPR	Cardiac Pulmonary Resuscitation
PPE	Personal Protective Equipment

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Glossary

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 (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) 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 OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
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.

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Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) 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. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
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.