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Islamabad



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WELDER

Competency Standards

National Vocational Certificate Level 2-4

Version 1 - August 2019



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INTRODUCTION

A welder is a skilled tradesman who specializes in joining materials together or fills and repairs holes on metal constructions. Welders work on all types of industrial, manufacturing and construction applications; some even work underwater to repair oil rig foundations, ship hulls and other types of sub-aquatic structures. Skilled welders know the welding specifications of many types of materials. Apprenticeship or education/certification enables the learners to get familiar with advanced welding techniques. Through the application of these techniques and skills, they may weld manually or use machines to weld metal components.

Welders typically work from drawings or specifications, then use their knowledge of base metals and joining techniques to select the appropriate material for the job. They cut, position, and tack weld the material/s in preparation for one of the many welding processes. The difficulty of the job depends on the types of materials and welding positions. Regardless of the type of welding process, welders are exposed to intense and blinding heat and radiations and must take special care to ensure their own safety and the safety of those around them. Welders wear special gloves and aprons to prevent sparks and flame from burning their clothes and skin. In addition to taking safety precautions, welders also maintain their equipment and work with various power tools to prepare materials for welding. The specific job duties of a welder vary depending on the skills of the welder and the industry in which he works. Due to universal need for their skills, welders are in high demand not only nationally but also internationally.

In order to meet the domestic and worldwide demand for welders, National Vocational and Technical Training Commission (NAVTTTC) in collaboration with TVET Sector Support Programme (TVET-SSP) has developed national vocational qualifications comprising of generic, functional and technical competency standards for welder occupation. To facilitate the process of developing national qualifications for welder, a Qualification Development Committee (QDC) was established under NVQF Operational Manual-1.

Competency standards, which are benchmarks for the performance, cover the commercial aspects of a welder's job. Required skills, underpinning knowledge and attitudes expected of a welder have been incorporated in these competency standards while setting standards for the performance of a welder.

Sector Skills Council (SSC) for Construction and experts from related industries have thoroughly reviewed and validated the competency standards as proposed by the QDC in terms of their relevancy and currency to the requirement of the job. The validated competency standards will provide the basis for the development of further curricula, assessment materials and instructional materials that will support competency based training and assessment activities.

The purpose of these qualifications is to set high professional standards for welder’s job. These national qualifications will support training providers in enhancing the quality of training and assessment in Pakistan. The specific objectives of developing these qualifications are as under:

- Improve the overall quality of training delivery and setting national benchmarks for training of welders in the country
- Provide flexible pathways and progressions to learners enabling them to receive relevant, up-to-date and recent skills
- Provide basis for competency based assessment which is recognized and accepted by employers
- Establish a standardized and sustainable system of training for welders in the country

DATE OF VALIDATION

These national qualifications have been validated by the Qualifications Validation Committee (QVC) on 13th & 14th February 2018 and they will remain in currency until 13th February 2021.

CODE OF QUALIFICATION

Qualification Title	Code
National Vocational Certificate Level 2 in (Mechanical Technology) “Welder [Flat (1F, 1G) and Horizontal (2F, 2G) Positions]”	0715MMT30
National Vocational Certificate Level 3 in (Mechanical Technology) “Welder – [Vertical (3F, 3G) and Overhead (4F, 4G)]”	0715MMT29
National Vocational Certificate Level 4 in (Mechanical Technology) “Welder – [All Positions (6G)]”	0715MMT28

ENTRY REQUIREMENTS

- The entry requirement for NVC Level 2 in (Mechanical Technology) “Welder [Flat (1F, 1G) and Horizontal (2F, 2G) Positions]” is at least Middle qualification.
- The entry requirement for NVC Level 3 in (Mechanical Technology “Welder – [Vertical (3F, 3G) and Overhead (4F, 4G)]” is NVC Level 2 in (Mechanical Technology) “Welder [Flat (1F, 1G) and Horizontal (2F, 2G) Positions]”.
- The entry requirement for National Vocational Certificate Level 4 in (Mechanical Technology) “Welder – [All Positions (6G)]” is NVC Level 3 in (Mechanical Technology) “Welder – [Vertical (3F, 3G) and Overhead (4F, 4G)]”.

QUALIFICATIONS DEVELOPMENT COMMITTEE

The Qualifications Development Committee consisted of following members:

S.No.	Name	Organization
1.	Dr. Mirza Nadeem Baig	Pakistan Welding Institute (DACUM Facilitator)
2.	Saba Sadiq	DESCON Technical Institute, Lahore
3.	Basit Ali	Infinity College of Engineering, Lahore
4.	M. Aslam Khatak	Heavy Mechanical Complex, Taxila
5.	Malik M. Nazir Awan	Pakistan Welding Institute, Islamabad
6.	Aziz Ullah Khan	Technical Support Organization, Chashma Nuclear Power Generating Station, Kundian, Mianwali
7.	Azhar Iqbal	Heavy Mechanical Complex-3, Taxila
8.	Awais Tanoli	Heavy Mechanical Complex-3, Taxila

QUALIFICATIONS VALIDATION COMMITTEE

The Qualifications Validation Committee consisted of following members:

S.No.	Name	Organization
1.	Dr. Mirza Nadeem Baig	Pakistan Welding Institute (DACUM Facilitator)
2.	Dr. Rashid Rizwan	Heavy Mechanical Complex-3, Taxila
3.	Hannan Hussain Gilani	Heavy Mechanical Complex-3, Taxila
4.	Ehsan Elahi	Consultant/Principal® TEVTA, Punjab
5.	Shahid Hussain	DDFC Pvt. Ltd., Lahore
6.	Asad Mahmood	QADBROS Engineering, Lahore
7.	Muhammad Zahid	DESCON Technical Institute, Lahore
8.	Muhammad Nadeem	DESCON Technical Institute, Lahore
9.	Muhammad Uzair	DESCON Technical Institute, Lahore
10.	Muhammad Yasir	Shining Vocational College, Abbottabad

REGULATIONS FOR THE QUALIFICATION AND SCHEDULE OF UNITS

Not Applicable

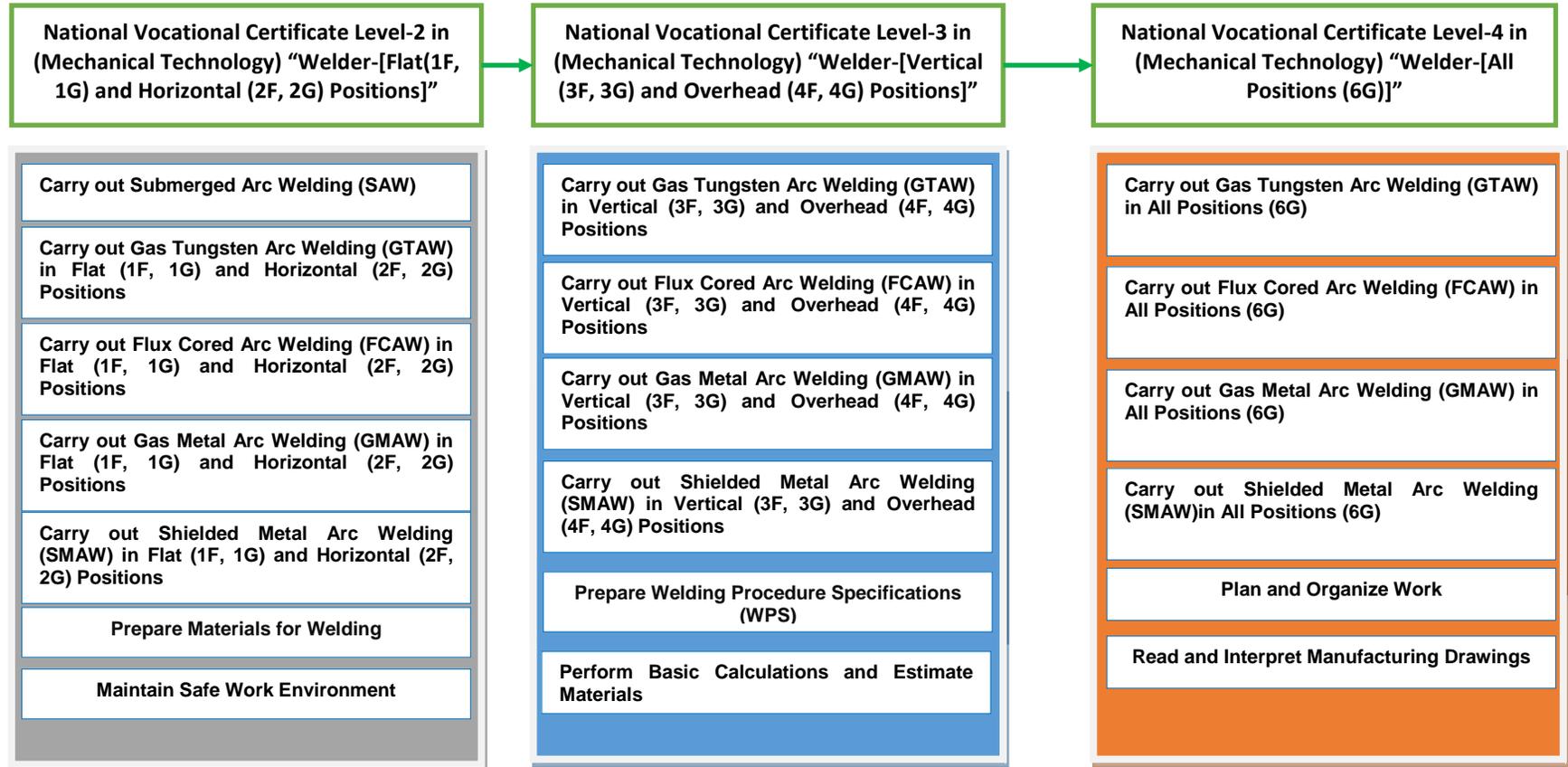
SUMMARY OF COMPETENCY STANDARDS

Code	Competency Standards	Level	Credits	Category
061100560	Maintain Safe Work Environment	2	03	Generic
071500513	Read and Interpret Manufacturing Drawings	4	15	Functional
071500514	Perform Basic Calculations and Estimation for welding Work	3	05	Functional
071500515	Plan and Organize Work	4	10	Functional
071500516	Prepare Welding Procedure Specifications (WPS)	3	15	Functional
071500517	Prepare Materials for Welding	2	10	Technical
071500518	Carry out Shielded Metal Arc Welding (SMAW) in Flat (1F, 1G) and Horizontal (2F, 2G) Positions	2	20	Technical
071500519	Carry out Shielded Metal Arc Welding (SMAW) in Vertical (3F, 3G) and Overhead (4F, 4G) Positions	3	20	Technical
071500520	Carry out Shielded Metal Arc Welding (SMAW) in All Positions (6G)	4	20	Technical
071500521	Carry out Gas Metal Arc Welding (GMAW) in Flat (1F, 1G) and Horizontal (2F, 2G) Positions	2	10	Technical
071500522	Carry out Gas Metal Arc Welding (GMAW) in Vertical (3F, 3G) and Overhead (4F, 4G) Positions	3	20	Technical
071500523	Carry out Gas Metal Arc Welding (GMAW) in All Positions (6G)	4	20	Technical
071500524	Carry out Flux Cored Arc Welding (FCAW) in Flat (1F, 1G) and Horizontal (2F, 2G) Positions	2	10	Technical

Code	Competency Standards	Level	Credits	Category
071500525	Carry out Flux Cored Arc Welding (FCAW) in Vertical (3F, 3G) and Overhead (4F, 4G) Positions	3	20	Technical
071500526	Carry out Flux Cored Arc Welding (FCAW) in All Positions (6G)	4	20	Technical
071500527	Carry out Gas Tungsten Arc Welding (GTAW) in Flat (1F, 1G) and Horizontal (2F, 2G) Positions	2	20	Technical
071500528	Carry out Gas Tungsten Arc Welding (GTAW) in Vertical (3F, 3G) and Overhead (4F, 4G) Positions	3	20	Technical
071500529	Carry out Gas Tungsten Arc Welding (GTAW) in All Positions (6G)	4	20	Technical
071500530	Carry out Submerged Arc Welding (SAW)	2	10	Technical
041600453	Occupational health and safety	2	3	Technical
041600455	Communicate in the workplace to support customers and team	3	6	Technical
041600459	Work effectively in a customer service - sales environment	3	7	Technical
041600460	Develop professionalism	3	3	Technical
041600461	Comply with health and safety regulations	3	2	Technical

PACKAGING OF QUALIFICATIONS

The National Vocational Qualifications have been packaged as detailed below:



061100560 Maintain Safe Work Environment

Overview

This Competency Standard identifies the competencies required to apply occupational safety and health (OSH) at workplace in accordance with the organization's approved guidelines and procedures. You will be expected to identify and use Personal Protective Equipment (PPE) according to the job requirement and potential hazards at workplace. The underpinning knowledge regarding OSH will be sufficient to provide the basis for your work.

Competency Units	Performance Criteria
1. Identify Hazards at Workplace	P1. Read and interpret work processes and procedures correctly to identify risk of hazards at workplace P2. Recognize engineering processes, tools, equipment and consumable materials that have the potential to cause harm P3. Identify any potential hazards and take appropriate action to minimize the risk
2. Observe Occupational Safety and Health (OSH)	P1. Work safely always, complying with health and safety precautions, regulations and other relevant guidelines P2. Identify health and safety hazards at the workplace so that potential for personal injury, damage to equipment or workplace is prevented, and corrective action is taken P3. Deal with problems which are within your control, and report those that cannot be resolved to the safety officer P4. Wear, adjust, and maintain personal protective equipment to ensure correct fit and optimum protection in compliance with company procedures P5. Keep work area clean and clear of obstructions, and storing tools or equipment so that the potential for accident or injury is prevented

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Types of hazards that are most likely to cause harm to health and safety Health and safety precautions
- Health and safety signs and symbols
- Techniques and methods to identify the risks of hazards at workplace
- Dealing with hazards to avoid any accident or injury
- Safety reporting procedures and documentation
- Use of Personal Protective Equipment
- First aid treatment methods including methods of resuscitation
- Fire-fighting methods
- Safe methods of handling heavy loads

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Identify possible hazards at workplace

Use correct Personal Protective Equipment (PPE) for the assigned job

071500513 Read and Interpret Manufacturing Drawings

Overview

This competency standard is designed to gain basic knowledge and skills required to read and interpret manufacturing drawings and welding symbols. The standard covers specific knowledge related to reading and understanding manufacturing drawings, interpreting welding symbols, recognizing materials and specifications, and bill of material/s and manufacturing parts according to manufacturing drawings.

Competency Units	Performance Criteria
1. Read and Understand Manufacturing Drawings	P1. Recognize basics of lines used in engineering drawings P2. Describe uses of lines in engineering drawings P3. Recognize and explain orthographic and isometric views of a drawing P4. Identify manufacturing requirements according to drawings P5. Prepare job layout according to manufacturing requirements
2. Interpret Welding Symbols	P1. Understand basic and supplementary welding symbols used in manufacturing drawings P2. Understand and differentiate between types of welds and joints P3. Identify welding requirements according to welding symbols given in the manufacturing drawings
3. Recognize Material Specifications and Bill of Material (BOM)	P1. Identify material specifications according to manufacturing drawing P2. Identify bill of material (BOM) according to manufacturing drawing
4. Manufacture Parts	P1. Interpret dimensional tolerances according to manufacturing drawing P2. Assemble and tack weld parts according to manufacturing drawing

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Basic elements of engineering drawing
- Drawing symbols
- Dimensioning techniques
- Tolerances
 - General tolerance
 - Angular tolerance
 - Geometric tolerance
- Drawing techniques
 - Perspective
 - Exploded view
 - Hidden view technique
- Projections
 - First angle projections
 - Third angle projections

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Prepare and interpret technical drawings and sketches based on provided specifications

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Drawing or Sketch
2.	Layout Tools
3.	Measuring Devices

S. No.	Items
4.	Handheld Calculator
5.	Fabrication and Welding Equipment
6.	Base Metals
7.	Welding Consumables

071500514 Perform Basic Calculations and Estimation for Welding Work

Overview

This competency standard identifies the competencies required to prepare estimates in accordance with client's guidelines. You will be expected to estimate materials, ensuring cost effectiveness, conforming to standards and regulations. The underpinning knowledge regarding calculations and estimation will be sufficient to provide the basis for your work.

Competency Units	Performance Criteria
1. Perform Fundamental Mathematical Operations	P1. Interpret the requirement for mathematical operations as per given job P2. Perform simple calculations involving whole numbers, mixed numbers, fractions and decimals using four mathematical fundamental operations
2. Perform Conversion of Units	P1. Convert units to the required figures using the given formulae P2. Convert English measurements to metric measurements according to procedure
3. Calculate Volume of Welds	P1. Identify the requirements for calculation such as volume, mass and, or density of the materials P2. Calculate correct volume of welds as per standard procedures
4. Estimate Welding Materials	P1. Recognize the requirements of welding materials as per job requirements P2. Estimate required welding materials as per job requirements

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Basic engineering terminologies used in welding work
- English and metric system of measurements
- Methods of conversion from one unit to the other
- Four fundamental mathematical operations i.e. addition, subtraction, multiplication and division
- Method of transposing formulae
- Methods of formulation of equation
- Interpretation of drawings, sketches and symbols used in mechanical work
- Types of welding materials
- Methods of estimation of materials for welding

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

For a given specification and drawing, carry out estimation of materials for welding work

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Relevant Literature/Books/Formulae Sheet
2.	Measuring Tools
3.	Components

S. No.	Items
4.	Calculator
5.	Pen and Paper
6.	Tools and Facilities Appropriate to Processes or Activity
7.	Materials Relevant to the Proposed Activity
8.	Working Drawing or Plans or Sketches or Welding Procedure Specifications (WPS) Required by Client

071500515 Plan and Organize Work

Overview

This competency standard is designed to gain basic knowledge and skills required to plan and organize work at workplace. The standard covers specific knowledge of setting objectives, planning and scheduling work activities, implementing work plans, monitoring work activities and reviewing and evaluating work plans.

Competency Units	Performance Criteria
1. Set Objectives	<ul style="list-style-type: none"> P1. Identify realistic and attainable objectives P2. Set objectives consistent with and linked to work activities in accordance with organizational aims P3. Set objectives with clear time frames P4. Support team members to achieve objectives
2. Plan and Schedule Work Activities	<ul style="list-style-type: none"> P1. Identify and prioritize tasks/work activities to be completed as directed P2. Break down tasks/work activities into steps in accordance with set time frames P3. Allocate resources as per requirements of the activities P4. Coordinate schedule of work activities with concerned personnel
3. Implement Work Plans	<ul style="list-style-type: none"> P1. Identify work methods and practices in consultation with concerned personnel P2. Implement work plans in accordance with set time frames, resources and standards
4. Monitor Work Activities	<ul style="list-style-type: none"> P1. Monitor and compare work activities with set objectives P2. Monitor work performance P3. Report deviations from work activities and coordinate recommendations with appropriate personnel P4. Observe timeliness of report P5. Establish and maintain files in accordance with standard operating procedures (SOPs)
5. Review and Evaluate Work Plans	<ul style="list-style-type: none"> P1. Review work plans, strategies and implementation based on accurate, relevant and current information P2. Provide results of review to concerned parties P3. Conduct performance appraisal in accordance with organization rules and regulations

Competency Units	Performance Criteria
	P4. Prepare recommendations and present to appropriate personnel and authorities P5. Implement feedback mechanisms in line with organization policies

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Organization's strategic plan, policies rules and regulations, laws and objectives for work unit activities and priorities
- Organization's policies, strategic plans, guidelines related to the role of the work unit
- Team work and consultation strategies

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Setting objectives for the work
- Plan and schedule work activities
- Implement work plans
- Monitor work activities
- Review and evaluate work plans and activities

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Tools, Equipment and Facilities Appropriate to the Proposed Activities
2.	Materials Relevant to the Proposed Activities
3.	Work Plan Schedules
4.	Drawings, Sketches or Blueprint
5.	Desktop Computer/Laptop
6.	Multimedia
7.	Overhead Projector
8.	Printer

071500516 Prepare Welding Procedure Specifications (WPS)

Overview

This competency standard is designed to gain basic knowledge and skills required to prepare Welding Procedure Specifications (WPS). The standard covers specific knowledge related to recognizing, interpreting and explaining and preparing Welding Procedure Specifications (WPS).

Competency Units	Performance Criteria
1. Recognize Welding Procedure Specifications (WPS)	P1. Describe and understand contents of Welding Procedure Specifications (WPS) P2. Recognize common acronyms used in Welding Procedure Specifications (WPS)
2. Interpret and Explain Welding Procedure Specifications (WPS)	P1. Recognize materials specifications (base metals and fillers) according to Welding Procedure Specifications (WPS) P2. Recognize weld type and joint design according to Welding Procedure Specifications (WPS) P3. Recognize welding positions and parameters according to Welding Procedure Specifications (WPS)
3. Prepare a Welding Procedure Specifications (WPS)	P1. Prepare sample Welding Procedure Specifications (WPS) following a simple welding procedure P2. Follow written Welding Procedure Specifications (WPS) to produce a production/sample weld

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Written communication skills (reading and comprehension)
- Purpose of Welding Procedure Specifications
- Common contents of WPS Groupings of materials
- Thickness range Types of welds

- Joint design
- Welding processes Welding positions
- Welding consumables
- Electrical characteristics - volts, current, polarity Shielding gases
- Purge gas
- Gas flow rate
- Nozzle diameter
- Pre-heat/Post-heat Welding speed

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Interpret a range of WPS documents

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Welding Procedure Specifications (WPS)
2.	Applicable Manufacturing Codes/Standards
3.	Relevant Literature/Books

071500517 Prepare Materials for Welding

Overview

This competency standard is designed to gain basic knowledge and skills required to prepare materials for a specific job. The standard covers specific knowledge of marking the material as per drawing/job requirement, setting up cutting equipment, cutting and preparing edges of base materials, cleaning surfaces and edges, preparing welding consumables and fitting up base materials.

Competency Units	Performance Criteria
1. Select and Mark Material/s as per Drawing/Job Requirement	P1. Select and obtain required material/s as per job P2. Select appropriate marking tools as per job requirements P3. Mark the area to be cut as per drawing/job requirements
2. Cut and Prepare Edge/s of Base Materials	P1. Select appropriate cutting equipment as per job requirements P2. Set-up cutting equipment as per manufacturer's instructions/job requirements P3. Cut the base material as per job specifications and dimensions provided in the drawing P4. Prepare edges of the base materials as per drawing/WPS P5. Check dimensions of the prepared edges as per drawing/WPS P6. Select proper tools and chemicals for cleaning P7. Clean the edges of the base materials as per job requirements
3. Prepare Consumables Welding	P1. Select relevant welding consumables as per job requirements/WPS P2. Prepare consumables in accordance with required specifications
4. Fit-up Base Materials	P1. Select proper tools and equipment to fit-up base materials P2. Tack weld joint/s as per drawing/welding procedure specifications (WPS) P3. Check root gap as per drawing/welding procedure specifications (WPS) P4. Check alignment as per applicable code/standard

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Interpretation of drawings and sketches
- Selection of appropriate method of edge preparation
- Selection of appropriate cutting equipment, accessories and supplies Operation of cutting equipment such as mechanical, gas and plasma
- Operation of grinding equipment
- Safety procedures for cutting and grinding

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform edge preparation in accordance with WPS and safety procedures

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Cutting equipment and Accessories
2.	Grinding Equipment and Accessories
3.	Measuring Tools
4.	Personal Protective Equipment (PPE)
5.	Relevant Documentation such as WPS and Working Drawing

S. No.	Items
6.	Stand-by Fire-Fighting Equipment
7.	Supplies and Materials
8.	Cutting Gases (Oxygen, Acetylene)
9.	Gouging Electrodes
10.	Grinding/Cutting Discs
11.	Run on/Run off, Backing Plates/Ring

071500518 Carry Out Shielded Metal Arc Welding (SMAW) in Flat (1F, 1G) and Horizontal (2F, 2G) Positions

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Shielded Metal Arc Welding (SMAW) operations in Flat (1F, 1G) and Horizontal (2F, 2G) positions at workplace. The standard covers specific knowledge of performing Shielded Metal Arc Welding (SMAW) by selecting and setting up welding equipment, installing consumables, adjusting welding parameters and making fillet and groove welds in Flat (1F, 1G) and Horizontal (2F, 2G) positions of plate. The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
1. Prepare Welding Machine and Accessories for SMAW	P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings P2. Prepare SMAW welding machine in accordance with welding procedure specifications/ manufacturer instructions P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer's instructions P4. Connect welding machine to an independent power supply P5. Set polarity indicated in the welding procedure specifications
2. Make Fillet Welds on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Flat (1F) and Horizontal (2F) positions following standard procedures P4. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
3. Make Groove Welds on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Flat (1G) and Horizontal (2G) positions following standard procedures

Competency Units	Performance Criteria
	P4. Deposit root pass as per welding procedure specifications/job requirements P5. Deposit filling passes as per welding procedure specifications/job requirements P6. Deposit capping pass as per welding procedure specifications/job requirements P7. Check root, filling and capping passes for any visual discontinuities as per acceptance standards P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
4. Perform Post Welding Operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings
- Electrical supply AC and DC
- Polarity setting according to standard specifications
- Specifications/ classification of electrode/s required for the job
- Welding procedure specifications (WPS)
- Method of Pre-heating of base metal
- Electrical parameters like (voltage, current etc.) and their effects on weld Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform SMAW fillet weld at 1F, 2F positions, groove weld at 1G, 2G positions as per given job specification

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	SMAW Power Source with All Accessories
2.	Carbon Steel Plates/Pipes
3.	SMAW Electrodes
4.	Electrode Backing Oven
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine
9.	Chipping Hammer
10.	MS Wire Brush
11.	Acetone
12.	File Set
13.	Adjustable Wrench

S. No.	Items
14.	Torque Wrench
15.	Ear Plugs
16.	Fume Extractors
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves
28.	Leather Apron
29.	Welding Gloves
30.	Welding Helmet
31.	Safety Goggles
32.	Safety Helmet

S. No.	Items
33.	Safety Shoes
34.	Set of Nose Pliers
35.	Set of Screw Drivers
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

071500519 Carry Out Shielded Metal Arc Welding (SMAW) in Vertical (3F, 3G) and Overhead (4F, 4G) Positions

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Shielded Metal Arc Welding (SMAW) operations in Vertical (3F, 3G) and Overhead (4F, 4G) positions at workplace. The standard covers specific knowledge of performing Shielded Metal Arc Welding (SMAW) by selecting and setting up welding equipment, installing consumables, adjusting welding parameters and making fillet and groove welds in Flat (1F, 1G) and Horizontal (2F, 2G) positions of plate. The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
1. Prepare Welding Machine and Accessories for SMAW	<ul style="list-style-type: none"> P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings P2. Prepare SMAW welding machine in accordance with welding procedure specifications/ manufacturer's instructions P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer instructions P4. Connect welding machine to an independent power supply P5. Set polarity indicated in the welding procedure specifications
2. Make Fillet Welds on Carbon Steel Plate	<ul style="list-style-type: none"> P1. Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Flat (3F) and Horizontal (4F) positions following standard procedures P4. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
3. Make Groove Welds on Carbon Steel Plate	<ul style="list-style-type: none"> P1. Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices

Competency Units	Performance Criteria
	P3. Carry out welding in Flat (3G) and Horizontal (4G) positions following standard procedures P4. Deposit root pass as per welding procedure specifications/job requirements P5. Deposit filling passes as per welding procedure specifications/job requirements P6. Deposit capping pass as per welding procedure specifications/job requirements P7. Check root, filling and capping passes for any visual discontinuities as per acceptance standards P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
4. Perform Post Welding Operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings Electrical supply AC and DC
- Polarity setting according to standard specifications
- Specifications/ classification of electrode/s required for the job Welding procedure specifications (WPS)
- Method of Pre- heating of base metal
- Electrical parameters like (voltage, current etc.) and their effects on weld Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform SMAW fillet weld at 3F, 4F positions, groove weld at 3G, 4G positions as per given job specifications

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	SMAW Power Source with All Accessories
2.	Carbon Steel Plates/Pipes
3.	SMAW Electrodes
4.	Electrode Backing Oven
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine
9.	Chipping Hammer
10.	MS Wire Brush
11.	Acetone
12.	File Set
13.	Adjustable Wrench
14.	Torque Wrench

S. No.	Items
15.	Ear Plugs
16.	Fume Extractors
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves
28.	Leather Apron

S. No.	Items
29.	Welding Gloves
30.	Welding Helmet
31.	Safety Goggles
32.	Safety Helmet
33.	Safety Shoes
34.	Set of Nose Pliers
35.	Set of Screw Drivers

S. No.	Items
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

071500520 Carry Out Shielded Metal Arc Welding (SMAW) in All Positions (6G)

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Shielded Metal Arc Welding (SMAW) operations in all (6G) positions at workplace. The standard covers specific knowledge of performing Shielded Metal Arc Welding (SMAW) by selecting and setting up welding equipment, installing consumables, adjusting welding parameters and making fillet and groove welds in all (6G) positions of pipe. The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
1. Prepare Welding Machine and Accessories for SMAW	P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings P2. Prepare SMAW welding machine in accordance with welding procedure specifications/ manufacturer instructions P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer's instructions P4. Connect welding machine to an independent power supply P5. Set polarity indicated in the welding procedure specifications
2. Make Groove Welds on Carbon Steel Pipe	P1. Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in all (6G) positions following standard procedures P4. Deposit root pass as per welding procedure specifications/job requirements P5. Deposit filling passes as per welding procedure specifications/job requirements P6. Deposit capping pass as per welding procedure specifications/job requirements P7. Check root, filling and capping passes for any visual discontinuities as per recognized standards

Competency Units	Performance Criteria
	P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
3. Perform Post Welding Operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings Electrical supply AC and DC
- Polarity setting according to standard specifications
- Specifications/ classification of electrode/s required for the job Welding procedure specifications (WPS)
- Method of Pre- heating of base metal
- Electrical parameters like (voltage, current etc.) and their effects on weld Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform SMAW welding in all (6G) positions as per given job specification

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	SMAW Power Source with All Accessories
2.	Carbon Steel Plates/Pipes
3.	SMAW Electrodes
4.	Electrode Backing Oven
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine
9.	Chipping Hammer
10.	MS Wire Brush
11.	Acetone
12.	File Set
13.	Adjustable Wrench
14.	Torque Wrench

S. No.	Items
15.	Ear Plugs
16.	Fume Extractors
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves
28.	Leather Apron

S. No.	Items
29.	Welding Gloves
30.	Welding Helmet
31.	Safety Goggles
32.	Safety Helmet
33.	Safety Shoes
34.	Set of Nose Pliers
35.	Set of Screw Drivers

S. No.	Items
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

071500521 Carry Out Gas Metal Arc Welding (GMAW) in Flat (1F, 1G) and Horizontal (2F, 2G) Positions

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Gas Metal Arc Welding (GMAW) operations in Flat (1F, 1G) and Horizontal (2F, 2G) positions at workplace. The standard covers specific knowledge of performing Gas Metal Arc Welding (GMAW) by selecting and setting up welding equipment, installing consumables, adjusting welding parameters and making fillet and groove welds in Flat (1F, 1G) and Horizontal (2F, 2G) positions of plate. The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
1. Prepare Welding Machine and Accessories for GMAW	P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings P2. Prepare GMAW welding machine in accordance with welding procedure specifications/ manufacturer instructions P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer instructions P4. Connect welding machine to an independent power supply P5. Set polarity indicated in the welding procedure specifications
2. Make Fillet Welds on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage, wire feed speed etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Flat (1F) and Horizontal (2F) positions following standard procedures P4. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects

Competency Units	Performance Criteria
3. Make Groove Welds on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage, wire feed speed etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Flat (1G) and Horizontal (2G) positions following standard procedures P4. Deposit root pass as per welding procedure specifications/job requirements P5. Deposit filling passes as per welding procedure specifications/job requirements P6. Deposit capping pass as per welding procedure specifications/job requirements P7. Check root, filling and capping passes for any visual discontinuities as per acceptance standards P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
4. Perform Post Welding Operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings Electrical supply (AC and DC)
- Polarity setting according to standard specifications
- Specifications/Classification of electrode/s required for the job Welding procedure specifications (WPS)
- Method of Pre – heating of base metal
- Electrical parameters like (voltage, current etc.) and their effects on weld

- Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform GMAW fillet weld in Flat (1F) and Horizontal (2F) positions, groove weld in Flat (1G) and Horizontal (2G) positions as per given job specification

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	GMAW Power Source with All Accessories
2.	Wire spools (Mild steel)
3.	CO2 gas cylinders with regulators
4.	Mild steel plates
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine

S. No.	Items
9.	Chipping Hammer
10.	MS Wire Brush
11.	Acetone
12.	File Set
13.	Adjustable Wrench
14.	Torque Wrench
15.	Ear Plugs
16.	Fume Extractors

S. No.	Items
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves
28.	Leather Apron
29.	Welding Gloves

S. No.	Items
30.	Welding Helmet
31.	Safety Goggles
32.	Safety Helmet
33.	Safety Shoes
34.	Set of Nose Pliers
35.	Set of Screw Drivers
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

071500522 Carry Out Gas Metal Arc Welding (GMAW) in Vertical (3F, 3G) and Overhead (4F, 4G) Positions

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Gas Metal Arc Welding (GMAW) operations in Vertical (3F, 3G) and Overhead (4F, 4G) positions at workplace. The standard covers specific knowledge of performing Gas Metal Arc Welding (GMAW) by selecting and setting up welding equipment, installing consumables, adjusting welding parameters and making fillet and groove in Vertical (3F, 3G) and Overhead (4F, 4G) positions of plate. The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
1. Prepare Welding Machine and Accessories for GMAW	P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings P2. Prepare GMAW welding machine in accordance with welding procedure specifications/ manufacturer instructions P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer instructions P4. Connect welding machine to an independent power supply P5. Set polarity indicated in the welding procedure specifications
2. Make Fillet Welds on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage, wire feed speed etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Vertical (3F) and Overhead (4F) positions following standard procedures P4. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
3. Make Groove Welds on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage, wire feed speed etc.) as per welding procedure specifications/job requirements to produce acceptable weld

Competency Units	Performance Criteria
	P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Vertical (3G) and Overhead (4G) positions following standard procedures P4. Deposit root pass as per welding procedure specifications/job requirements P5. Deposit filling passes as per welding procedure specifications/job requirements P6. Deposit capping pass as per welding procedure specifications/job requirements P7. Check root, filling and capping passes for any visual discontinuities as per acceptance standards P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
4. Perform Post Welding Operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings Electrical supply (AC and DC)
- Polarity setting according to standard specifications
- Specifications/Classification of electrode/s required for the job Welding procedure specifications (WPS)
- Method of Pre – heating of base metal
- Electrical parameters like (voltage, current etc.) and their effects on weld Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform GMAW fillet weld in Vertical (3F) and Overhead (4F) positions, groove weld in Vertical (3G) and Overhead (4G) positions as per given job specifications

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	GMAW Power Source with All Accessories
2.	Wire spools (Mild steel)
3.	CO2 gas cylinders with regulators
4.	Mild steel plates
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine
9.	Chipping Hammer
10.	MS Wire Brush

S. No.	Items
11.	Acetone
12.	File Set
13.	Adjustable Wrench
14.	Torque Wrench
15.	Ear Plugs
16.	Fume Extractors
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves
28.	Leather Apron
29.	Welding Gloves

S. No.	Items
30.	Welding Helmet
31.	Safety Goggles
32.	Safety Helmet
33.	Safety Shoes
34.	Set of Nose Pliers
35.	Set of Screw Drivers
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

071500523 Carry Out Gas Metal Arc Welding (GMAW) in All Positions (6G)

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Gas Metal Arc Welding (GMAW) operations in all positions (6G) at workplace. The standard covers specific knowledge of performing Gas Metal Arc Welding (GMAW) by selecting and setting up welding equipment, installing consumables, adjusting welding parameters and making groove welding in all positions(6G) of pipe. The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
1. Prepare Welding Machine and Accessories for GMAW	<ul style="list-style-type: none"> P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings P2. Prepare GMAW welding machine in accordance with welding procedure specifications/ manufacturer instructions P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer instructions P4. Connect welding machine to an independent power supply P5. Set polarity indicated in the welding procedure specifications
2. Make Groove Welds on Carbon Steel Pipe	<ul style="list-style-type: none"> P1. Adjust welding parameters (current, voltage, wire feed speed etc.) as per welding procedure specifications/ job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in all positions (6G) following standard procedures P4. Deposit root pass as per welding procedure specifications/job requirements P5. Deposit filling passes as per welding procedure specifications/job requirements P6. Deposit capping pass as per welding procedure specifications/job requirements P7. Check root, filling and capping passes for any visual discontinuities as per acceptance standards

Competency Units	Performance Criteria
	P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
3. Perform Post Welding Operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings Electrical supply (AC and DC)
- Polarity setting according to standard specifications
- Specifications/Classification of electrode/s required for the job Welding procedure specifications (WPS)
- Method of Pre – heating of base metal
- Electrical parameters like (voltage, current etc.) and their effects on weld Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform groove weld in all positions (6G) of pipe as per given job specifications

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	GMAW Power Source with All Accessories
2.	Wire Spools (Mild Steel)
3.	CO2 gas cylinders with regulators
4.	Mild steel plates
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine
9.	Chipping Hammer
10.	MS Wire Brush
11.	Acetone
12.	File Set
13.	Adjustable Wrench
14.	Torque Wrench
15.	Ear Plugs
16.	Fume Extractors

S. No.	Items
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves
28.	Leather Apron
29.	Welding Gloves
30.	Welding Helmet
31.	Safety Goggles
32.	Safety Helmet
33.	Safety Shoes
34.	Set of Nose Pliers
35.	Set of Screw Drivers

S. No.	Items
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

071500524 Carry out Flux Cored Arc Welding (FCAW) in Flat (1F, 1G) and Horizontal (2F, 2G) Positions

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Flux Cored Arc Welding (FCAW) operations at workplace. The standard covers specific knowledge of performing Flux Cored Arc Welding (FCAW) by selecting and setting up welding equipment, installing consumables, adjusting welding parameters and making fillet and groove welds in Flat (1F, 1G) and Horizontal (2F, 2G) Positions of plate. The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
1. Prepare Welding Machine and Accessories for FCAW	P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings P2. Prepare FCAW welding machine in accordance with welding procedure specifications/manufacturer instructions P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer instructions P4. Connect welding machine to an independent power supply P5. Set polarity indicated in the welding procedure specifications
2. Make Fillet Welds on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage, wire feed speed etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in in Flat (1F) and Horizontal (2F) Positions following standard procedures P4. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects

Competency Units	Performance Criteria
3. Make Groove Welds on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage, wire feed speed etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Flat (1G) and Horizontal (2G) Positions following standard procedures P4. Deposit root pass as per welding procedure specifications/job requirements P5. Deposit filling passes as per welding procedure specifications/job requirements P6. Deposit capping pass as per welding procedure specifications/job requirements P7. Check root, filling and capping passes for any visual discontinuities as per acceptance standards P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
4. Perform post welding operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings Electrical supply (AC and DC)
- Polarity setting according to standard specifications
- Specifications/Classification of electrode/s required for the job Welding procedure specifications (WPS)
- Procedure of FCAW
- Method of Pre – heating of base metal

- Electrical parameters like (voltage, current etc.) and their effects on weld
- Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform FCAW fillet weld at 1F,2F positions, groove weld at 1G, 2G positions as per given job specification

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	FCAW Power Source with All Accessories
2.	Flux cored wire spools (Mild steel)
3.	CO2 gas cylinders with regulators
4.	Mild steel plates
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine

S. No.	Items
9.	Chipping Hammer
10.	MS Wire Brush
11.	Acetone
12.	File Set
13.	Adjustable Wrench
14.	Torque Wrench
15.	Ear Plugs
16.	Fume Extractors
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves

S. No.	Items
28.	Leather Apron
29.	Welding Gloves
30.	Welding Helmet
31.	Safety Goggles
32.	Safety Helmet
33.	Safety Shoes
34.	Set of Nose Pliers
35.	Set of Screw Drivers
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

071500525 Carry out Flux Cored Arc Welding (FCAW) in Vertical (3F, 3G) and Overhead (4F, 4G) Positions

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Flux Cored Arc Welding (FCAW) operations at workplace. The standard covers specific knowledge of performing Flux Cored Arc Welding (FCAW) by selecting and setting up welding equipment, installing consumables, adjusting welding parameters and making fillet and groove welds at different positions of plate. The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
<p>1. Prepare Welding Machine and Accessories for FCAW</p>	<p>P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings</p> <p>P2. Prepare FCAW welding machine in accordance with welding procedure specifications/manufacturer instructions</p> <p>P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer instructions</p> <p>P4. Connect welding machine to an independent power supply</p> <p>P5. Set polarity indicated in the welding procedure specifications</p>
<p>2. Make Fillet Welds on Carbon Steel Plate</p>	<p>P1. Adjust welding parameters (current, voltage, wire feed speed etc.) as per welding procedure specifications/job requirements to produce acceptable weld</p> <p>P2. Maintain gap between electrode and base metal as per standard practices</p> <p>P3. Carry out welding in Vertical (3F) and Overhead (4F) positions following standard procedures</p> <p>P4. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects</p>

Competency Units	Performance Criteria
3. Make Groove on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage, wire feed speed etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Vertical (3G) and Overhead (4G) positions following standard procedures P4. Deposit root pass as per welding procedure specifications/job requirements P5. Deposit filling passes as per welding procedure specifications/job requirements P6. Deposit capping pass as per welding procedure specifications/job requirements P7. Check root, filling and capping passes for any visual discontinuities as per acceptance standards P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
4. Preform Post Welding Operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings Electrical supply (AC and DC)
- Polarity setting according to standard specifications
- Specifications/Classification of electrode/s required for the job Welding procedure specifications (WPS)
- Procedure of FCAW
- Method of Pre – heating of base metal

- Electrical parameters like (voltage, current etc.) and their effects on weld
- Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform FCAW fillet weld in 3F, 4F positions, groove weld in 3G, 4G positions as per given job specifications

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	FCAW Power Source with All Accessories
2.	Flux cored wire spools (Mild steel)
3.	CO2 gas cylinders with regulators
4.	Mild steel plates
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine

S. No.	Items
9.	Chipping Hammer
10.	MS Wire Brush
11.	Acetone
12.	File Set
13.	Adjustable Wrench
14.	Torque Wrench
15.	Ear Plugs
16.	Fume Extractors
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves

S. No.	Items
28.	Leather Apron
29.	Welding Gloves
30.	Welding Helmet
31.	Safety Goggles
32.	Safety Helmet
33.	Safety Shoes
34.	Set of Nose Pliers
35.	Set of Screw Drivers
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

071500526 Carry out Flux Cored Arc Welding (FCAW) in All (6G) Positions

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Flux Cored Arc Welding (FCAW) operations at workplace. The standard covers specific knowledge of performing Flux Cored Arc Welding (FCAW) by selecting and setting up welding equipment, installing consumables, adjusting welding parameters and making groove weld in all positions (6G) of pipe. The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
<p>1. Prepare Welding Machine and Accessories for FCAW</p>	<p>P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings</p> <p>P2. Prepare FCAW welding machine in accordance with welding procedure specifications/manufacturer instructions</p> <p>P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer instructions</p> <p>P4. Connect welding machine to an independent power supply</p> <p>P5. Set polarity indicated in the welding procedure specifications</p>
<p>2. Make groove welds in all positions on carbon steel plates</p>	<p>P1. Adjust welding parameters (current, voltage, wire feed speed etc.) as per welding procedure specifications/job requirements to produce acceptable weld</p> <p>P2. Maintain gap between electrode and base metal as per standard practices</p> <p>P3. Carry out welding in all positions (6G) following standard procedures</p> <p>P4. Deposit root pass as per welding procedure specifications/job requirements</p> <p>P5. Deposit filling passes as per welding procedure specifications/job requirements</p> <p>P6. Deposit capping pass as per welding procedure specifications/job requirements</p>

Competency Units	Performance Criteria
	P7. Check root, filling and capping passes for any visual discontinuities as per acceptance standards P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
3. Perform Post Welding Operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization's guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings Electrical supply (AC and DC)
- Polarity setting according to standard specifications
- Specifications/Classification of electrode/s required for the job Welding procedure specifications (WPS)
- Procedure of FCAW
- Method of Pre – heating of base metal
- Electrical parameters like (voltage, current etc.) and their effects on weld
- Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform FCAW groove weld in 6G position as per given job specification

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	FCAW Power Source with All Accessories
2.	Flux cored wire spools (Mild steel)
3.	CO2 gas cylinders with regulators
4.	Mild steel plates
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine
9.	Chipping Hammer
10.	MS Wire Brush
11.	Acetone
12.	File Set
13.	Adjustable Wrench
14.	Torque Wrench
15.	Ear Plugs

S. No.	Items
16.	Fume Extractors
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves
28.	Leather Apron
29.	Welding Gloves
30.	Welding Helmet
31.	Safety Goggles
32.	Safety Helmet
33.	Safety Shoes
34.	Set of Nose Pliers

S. No.	Items
35.	Set of Screw Drivers
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

071500527 Carry Out Gas Tungsten Arc Welding (GTAW) in Flat (1F, 1G) and Horizontal (2F, 2G) Positions

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Gas Tungsten Arc Welding (GTAW) operations at workplace. The standard covers specific knowledge of performing Gas Tungsten Arc Welding (GTAW) by selecting and setting up welding equipment, installing consumables, adjusting welding parameters and making fillet and groove welds in Flat (1F, 1G) and Horizontal (2F, 2G) positions of plate. The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
1. Prepare Welding Machine and Accessories for GTAW	P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings P2. Prepare GTAW welding machine in accordance with welding procedure specifications/manufacturer instructions P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer instructions P4. Connect welding machine to an independent power supply P5. Set polarity indicated in the welding procedure specifications
2. Make Fillet Welds on P1. Carbon Steel Plate	Adjust welding parameters (current, voltage, polarity etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Flat (1F) and Horizontal (2F) positions following standard procedures P4. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
3. Make Groove Welds on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage, polarity etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices

Competency Units	Performance Criteria
	P3. Carry out welding in Flat (1G) and Horizontal (2G) positions following standard procedures P4. Deposit root pass as per welding procedure specifications/job requirements P5. Deposit filling passes as per welding procedure specifications/job requirements P6. Deposit capping pass as per welding procedure specifications/job requirements P7. Check root, filling and capping passes for any visual discontinuities as per acceptance standards P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
4. Perform Post Welding Operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings Electrical supply (AC and DC)
- Polarity setting according to standard specifications
- Specifications/Classification of electrode/s required for the job Welding procedure specifications (WPS)
- Process of GTAW
- Method of Pre – heating of base metal
- Electrical parameters like (voltage, current etc.) and their effects on weld Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform GTAW fillet weld in Flat (1F) and Horizontal (2F) positions, groove weld in Flat (1G) and Horizontal (2G) positions as per given job specification

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	GTAW Power Source with All Accessories
2.	Filler rod/wire (Mild steel)
3.	Tungsten Electrodes
4.	Argon gas cylinders with regulators
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine
9.	Chipping Hammer
10.	MS Wire Brush
11.	Acetone

S. No.	Items
12.	File Set
13.	Adjustable Wrench
14.	Torque Wrench
15.	Ear Plugs
16.	Fume Extractors
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves
28.	Leather Apron
29.	Welding Gloves
30.	Welding Helmet

S. No.	Items
31.	Safety Goggles
32.	Safety Helmet
33.	Safety Shoes
34.	Set of Nose Pliers
35.	Set of Screw Drivers
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

071500528 Carry Out Gas Tungsten Arc Welding (GTAW) in Vertical (3F, 3G) and Overhead (4F, 4G) Positions

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Gas Tungsten Arc Welding (GTAW) operations at workplace. The standard covers specific knowledge of performing Gas Tungsten Arc Welding (GTAW) by selecting and setting up welding equipment, installing consumables, adjusting welding parameters and making fillet and groove welds in Vertical (3F, 3G) and Overhead (4F, 4G) positions of plate. The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
1. Prepare Welding Machine and Accessories for GTAW	<ul style="list-style-type: none"> P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings P2. Prepare GTAW welding machine in accordance with welding procedure specifications/manufacturer instructions P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer instructions P4. Connect welding machine to an independent power supply P5. Set polarity indicated in the welding procedure specifications
2. Make Fillet Welds on Carbon Steel Plate	<ul style="list-style-type: none"> P1. Adjust welding parameters (current, voltage, polarity etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Vertical (3F) and Overhead (4F) positions following standard procedures P4. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
3. Make Groove Welds on Carbon Steel Plate	<ul style="list-style-type: none"> P1. Adjust welding parameters (current, voltage, polarity etc.) as per welding procedure specifications/job requirements to produce acceptable weld

Competency Units	Performance Criteria
	P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Vertical (3G) and Overhead (4G) positions following standard procedures P4. Deposit root pass as per welding procedure specifications/job requirements P5. Deposit filling passes as per welding procedure specifications/job requirements P6. Deposit capping pass as per welding procedure specifications/job requirements P7. Check root, filling and capping passes for any visual discontinuities as per acceptance standards P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
4. Perform Post Welding Operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings Electrical supply (AC and DC)
- Polarity setting according to standard specifications
- Specifications/Classification of electrode/s required for the job Welding procedure specifications (WPS)
- Process of GTAW
- Method of Pre – heating of base metal
- Electrical parameters like (voltage, current etc.) and their effects on weld Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform GTAW fillet weld in Vertical (3F) and Overhead (4F) positions, groove weld in Vertical (3G) and Overhead (4G) positions as per given job specification

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	GTAW Power Source with All Accessories
2.	Tungsten electrodes
3.	Filler rod/wire (Mild steel)
4.	Argon gas cylinders with regulators
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine
9.	Chipping Hammer
10.	MS Wire Brush

S. No.	Items
11.	Acetone
12.	File Set
13.	Adjustable Wrench
14.	Torque Wrench
15.	Ear Plugs
16.	Fume Extractors
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves
28.	Leather Apron
29.	Welding Gloves

S. No.	Items
30.	Welding Helmet
31.	Safety Goggles
32.	Safety Helmet
33.	Safety Shoes
34.	Set of Nose Pliers
35.	Set of Screw Drivers
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

071500529 Carry Out Gas Tungsten Arc Welding (GTAW) in All Positions (6G)

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Gas Tungsten Arc Welding (GTAW) operations at workplace. The standard covers specific knowledge of performing Gas Tungsten Arc Welding (GTAW) by selecting and setting up welding equipment, installing consumables, adjusting welding parameters and making fillet and groove welds in All positions of plate and pipe (6G). The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
1. Prepare Welding Machine and Accessories for GTAW	P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings P2. Prepare GTAW welding machine in accordance with welding procedure specifications/manufacturer instructions P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer instructions P4. Connect welding machine to an independent power supply P5. Set polarity indicated in the welding procedure specifications
2. Make Groove Welds on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage, polarity etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in Vertical (3G) and Overhead (4G) positions following standard procedures P4. Deposit root pass as per welding procedure specifications/job requirements P5. Deposit filling passes as per welding procedure specifications/job requirements P6. Deposit capping pass as per welding procedure specifications/job requirements

Competency Units	Performance Criteria
	P7. Check root, filling and capping passes for any visual discontinuities as per acceptance standards P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
3. Perform Post Welding Operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization's guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings Electrical supply (AC and DC)
- Polarity setting according to standard specifications
- Specifications/ classification of electrode/s required for the job
- Welding procedure specifications (WPS)
- Process of GTAW
- Method of Pre – heating of base metal
- Electrical parameters like (voltage, current etc.) and their effects on weld Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform GTAW fillet weld in Vertical (3F) and Overhead (4F) positions, groove weld in All Positions (6G) positions as per given job specification

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	GTAW Power Source with All Accessories
2.	Tungsten electrodes
3.	Argon gas cylinders with regulators
4.	Filler rod/wire (Mild steel)
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine
9.	Chipping Hammer
10.	MS Wire Brush
11.	Acetone
12.	File Set
13.	Adjustable Wrench

14.	Torque Wrench
15.	Ear Plugs
16.	Fume Extractors
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves
28.	Leather Apron
29.	Welding Gloves
30.	Welding Helmet
31.	Safety Goggles
32.	Safety Helmet
33.	Safety Shoes

34.	Set of Nose Pliers
35.	Set of Screw Drivers
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

071500530 Carry Out Submerged Arc Welding (SAW)

Overview

This Competency Standard is designed to gain basic knowledge and skills required to perform Submerged Arc Welding (SAW) operations at workplace. The standard covers specific knowledge of performing Submerged Arc Welding (SAW) by selecting and setting up welding equipment, installing consumables, adjusting and welding parameters and making fillet and groove welds at different positions of plate. The standard also covers post welding operations comprising cleaning, measuring, inspecting and repairing welds at workplace.

Competency Units	Performance Criteria
1. Prepare Welding Machine and Accessories for SAW	P1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings P2. Prepare SAW welding machine in accordance with welding procedure specifications/manufacturer instructions P3. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer instructions P4. Connect welding machine to an independent power supply P5. Set polarity indicated in the welding procedure specifications
2. Make Fillet Weld on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage, wire feed speed, welding speed etc.) as per welding procedure specifications/job requirements to produce acceptable weld P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in 1F position following standard procedures P4. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
3. Make Groove Weld on Carbon Steel Plate	P1. Adjust welding parameters (current, voltage, wire feed speed, welding speed etc.) as per welding procedure specifications/job requirements to produce acceptable weld

Competency Units	Performance Criteria
	P2. Maintain gap between electrode and base metal as per standard practices P3. Carry out welding in 1G position following standard procedures P4. Deposit root pass as per welding procedure specifications/job requirements P5. Deposit filling passes as per welding procedure specifications/job requirements P6. Deposit capping pass as per welding procedure specifications/job requirements P7. Check root, filling and capping passes for any visual discontinuities as per acceptance standards P8. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects
4. Perform Post Welding Operations	P1. Carry out finishing work of welds following standard procedures P2. Inspect weld visually and mark any visual defects, as required P3. Carry out repair work in accordance with approved procedures, as required P4. Clean work area in accordance with workplace safety practices P5. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Understanding of technical drawings Electrical supply (AC and DC)
- Polarity setting according to standard specifications
- Specifications/Classification of electrode/s and flux required for the job
- Welding procedure specifications (WPS)
- Process of SAW
- Method of Pre – heating of base metal
- Electrical parameters like (voltage, current etc.) and their effects on weld
- Welding techniques as per WPS/instruction sheet
- Visual welding defects
- Welding codes and standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

Perform SAW fillet weld at 1F position and groove weld at 1G position as per given job specification

Tools and Equipment Required

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	GTAW Power Source with All Accessories
2.	Tungsten electrodes
3.	Filler rod/wire (Mild steel)
4.	Argon gas cylinders with regulators
5.	Grinder
6.	Cutting Discs
7.	Grinding Discs
8.	Bevelling Machine
9.	Chipping Hammer
10.	MS Wire Brush

S. No.	Items
11.	Acetone
12.	File Set
13.	Adjustable Wrench
14.	Torque Wrench
15.	Ear Plugs
16.	Fume Extractors
17.	Exhaust Fans
18.	Pencil Grinder
19.	WPS/ Instruction Sheet
20.	Pre-Heating Equipment
21.	Gouging Equipment with All Accessories
22.	Air Compressor
23.	Welding Tables
24.	Jigs and Fixtures
25.	Fire Blankets
26.	Fire Extinguishers
27.	Cotton Gloves
28.	Leather Apron
29.	Welding Gloves

S. No.	Items
30.	Welding Helmet
31.	Safety Goggles
32.	Safety Helmet
33.	Safety Shoes
34.	Set of Nose Pliers
35.	Set of Screw Drivers
36.	Bench Vice
37.	Spanner Set
38.	Measuring Tools/Gauges/Templates
39.	Screw Driver Set
40.	Allen Key Set
41.	Emergency Lights

Occupational health and safety

Purpose

It is for the safety of persons working in that environment.

Classification ISCED

0416 Wholesale and retail sales

Available grade

Competent / Not yet competent

Modification history

N/A

Unit of Competency	Performance Criteria	Knowledge
I1. Identify and implement safe working practices	You must be able to: P1. Study of facility layout design and operations P2. Implement the health and safety measures	You must know and understand: K1. Knowledge of health and safety precautions

Communicate in the workplace to support customers and team

Purpose

This Competency standard identifies the competencies required to communicate in the workplace to support customers and team as per organization's approved guidelines and procedures. You will be expected to communicate face-to-face with customers, use technology to communicate with customers, communicate with customers and colleagues from diverse backgrounds, work in a team, ask appropriate probing / questioning from customers and provide continuous feedback to customers / colleagues. Your underpinning knowledge about basic communication tools and correspondence tactics will be sufficient for you to provide the basics of the work.

Classification ISCED

Available grade

Competent / Not yet competent

Modification history

N/A

Unit of Competency	Performance Criteria	Knowledge
B1. Communicate face-to-face with customers.	You must be able to: P1. Maintain welcoming customer environment that reflects company branding and market position and is in line with the company policy and procedures. P2. Greet customer warmly according to company policy	You must be able to: K1. Explain different techniques that can be applied when communicate with customer face to face K2. Describe types of customer behavior and dealings K3. Explain different communication skills and

Unit of Competency	Performance Criteria	Knowledge
	<p>and procedures.</p> <p>P3. Create effective service environment through verbal and non-verbal interaction according to company policy and procedures.</p> <p>P4. Use questioning and active listening to determine customer needs.</p> <p>P5. Use positive and inclusive language.</p> <p>P6. Recognize personal factors impact on customer service delivery</p>	<p>techniques</p> <p>K4. Explain the basic key elements of the communication process.</p> <p>K5. Describe a range of communication methods that can be used to effectively communicate with customers and identify the most appropriate to use in different situations.</p> <p>K6. Explain how 'body language' impacts on the communication process.</p>
<p>B2. Use technology to communicate with customers.</p>	<p>You must be able to:</p> <p>P1. Answer telephone according to the company procedures.</p> <p>P2. Questioning and active listening to identify caller and establish and confirm requirements.</p> <p>P3. Use telephone system functions according to instructions.</p> <p>P4. Use email, social networking sites and other technologies to receive and process information and customer requests in line with company policy and procedures.</p> <p>P5. Record and promptly pass on messages or information.</p> <p>P6. Inform customer of any problems and relevant action being taken.</p> <p>P7. Perform follow-up action as necessary.</p>	<p>You must be able to:</p> <p>K1. Identify the recognized principles of communicating electronically, by telephone and in writing.</p> <p>K2. Describe the different methods of collecting customer feedback on telephone.</p> <p>K3. Explain the importance of collecting customer feedback and how this can be used to improve customer service.</p> <p>K4. Describe how technology can affect and enhance the service delivery process.</p>

Unit of Competency	Performance Criteria	Knowledge
B3. Communicate with customers and colleagues from diverse backgrounds.	<p>You must be able to:</p> <p>P1. Treat customers and colleagues from diverse backgrounds with respect and sensitivity.</p> <p>P2. Consider cultural differences in verbal and non-verbal communication.</p> <p>P3. Use gestures or simple words to communicate where language barriers exist.</p> <p>P4. Obtain assistance from colleagues or supervisors when required to facilitate communications.</p>	<p>You must be able to:</p> <p>K1. Identify the barriers to effective communication that can arise and how best to deal with these.</p> <p>K2. Identify and explain when it is necessary to seek advice or assistance from colleagues and when to take own initiative.</p> <p>K3. Describe different types of dealings techniques with different types of behaviors</p>
B4. Work in a team.	<p>You must be able to:</p> <p>P1. Display a courteous and helpful manner at all times.</p> <p>P2. Complete allocated tasks willingly, according to set timeframes.</p> <p>P3. Actively seek or provide assistance by approaching other team members when difficulties arise.</p> <p>P4. Identify and use lines of communication with supervisors and peers according to company policy.</p> <p>P5. Encourage, acknowledge and act upon constructive feedback provided by other team members.</p> <p>P6. Use questioning to minimise misunderstandings.</p> <p>P7. Identify signs of potential workplace conflict wherever possible and take action to resolve the situation using open and respectful communication.</p>	<p>You must be able to:</p> <p>K1. Define team work.</p> <p>K2. Explain the importance of team work.</p> <p>K3. Define company goals and objectives as well as SOPs of the company</p> <p>K4. Explain different concepts and techniques of problem solving</p> <p>K5. Describe systematic decision making process</p> <p>K6. Describe characteristics of a successful teamwork experience.</p>

Unit of Competency	Performance Criteria	Knowledge
	P8. Participate in team problem solving. P9. Interpret organization's goals and objectives and translate them into individual targets P10. Prepare plan of action to achieve individual as well as team goals	
B5. Ask appropriate probing / questioning from customers	You must be able to: P1. Use different types of questions when appropriate. P2. Allow the other person to answer freely. P3. Collect facts, information and data about the other person's situation. P4. Focus on the necessary information (information that links directly to product or service)	You must be able to: K1. Explain: Open-ended questions Close-ended questions High gain questions Mirror questions Probing questions Situation questions
B6. Provide continuous feed-back	You must be able to: P1. Give and receive feed-back with customers. P2. Apply appropriate body language and read customers body language. P3. Give and receive feed-back with internal departments. P4. Design a communication system / process and share information. P5. Gain commitment from others to work together in the interest of the customers. P6. Conduct meetings. P7. Utilize the feed-back to identify opportunities for product / service improvement.	You must be able to: K1. Explain how to use customer feed-back to improve your business K2. Define importance of body language. K3. Explain communication ethics. K4. Define organizational Jargon.

Work effectively in a customer service/ sales environment

Purpose

This Competency standard identifies the competencies required Work Effectively in a Customer Service/Sales Environment as per Organization's approved guidelines and procedures. You will be expected to work within organizational requirements, support the work team, maintain personal presentation, develop effective work habits, portray ethical behaviour and acquire up to date product / service knowledge. Your underpinning knowledge about Work Effectively in a Customer Service/Sales Environment will be sufficient for you to provide the basics of the work.

Classification ISCED

0416 Wholesale and retail sales

Available grade

Competent / Not yet competent

Modification history

N/A

Unit of Competency	Performance Criteria	Knowledge
F1. Work within organizational requirements.	You must be able to: P1. Identify and read organisation's requirements and responsibilities and seek advice from appropriate people where necessary.	You must be able to: K1. Define industry awards and agreements that relate to personal job role and terms and conditions of employment. K2. Differentiate between employer and employee responsibilities.

	<p>P2. Interpret staff rosters and provide sufficient notice of unavailability for rostered hours according to workplace policy and procedures.</p> <p>P3. Develop and use a current working knowledge and understanding of employee and employer rights and responsibilities.</p> <p>P4. Comply with relevant duty of care and legal responsibilities, and support organisational culture.</p> <p>P5. Identify roles and responsibilities of colleagues and immediate supervisors.</p> <p>P6. Identify standards and values considered to be detrimental to the organisation and communicate this through appropriate channels.</p> <p>P7. Identify, recognise and follow behaviour that contributes to a safe and sustainable work environment.</p>	<p>K3. Explain different relevant legislation and statutory requirements.</p>
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F2.Support the work team.

You must be able to:

- P1. Display courteous and helpful behaviour at all times.
- P2. Take opportunities to enhance the level of assistance offered to colleagues and meet all

You must be able to:

- K1. Explain the importance of team work
- K2. Define workplace relations
- K3. Explain workplace policies, plans and procedures, including:
 - Dealing with grievances

reasonable requests for assistance within acceptable workplace timeframes.

- P3. Complete allocated tasks as required.
- P4. Seek assistance when difficulties arise.
- P5. Use questioning techniques to clarify instructions or responsibilities.
- P6. Identify and display a non-discriminatory attitude in all contacts with customers and other staff members.

Discriminatory behavior
 Equal opportunity issues.
 Staff rosters and notification of shift
 Availability or non-attendance
 Providing customer service to colleagues and customers.

<p>F3. Maintain personal presentation.</p>	<p>You must be able to:</p> <ul style="list-style-type: none"> P1. Observe appropriate dress code and presentation as required by the workplace, job role and level of customer contact. P2. Follow personal hygiene procedures according to organisational policy and relevant legislation. 	<p>You must be able to:</p> <ul style="list-style-type: none"> K1. Explain hygiene and personal presentation K2. Explain the importance of workplace ethics
<p>F4. Develop effective work habits.</p>	<p>You must be able to:</p> <ul style="list-style-type: none"> P1. Interpret, confirm and act on workplace information, instructions and procedures relevant to the particular task. P2. Ask questions to seek and clarify workplace information. P3. Plan and organise daily work routine within the scope of the job role. P4. Prioritise and complete tasks accordin 	<p>You must be able to:</p> <ul style="list-style-type: none"> K1. Explain staff counseling and disciplinary procedures K2. Describe workplace organizational structure.

g to required
timeframes.

- P5. Identify work and personal priorities and achieve a balance between competing priorities

<p>F5. Portray ethical behavior</p>	<p>You must be able to:</p> <p>P1. Follow ethical code of conduct.</p> <p>P2. Understand your customer's code of ethics.</p> <p>P3. Declare conflict of interest.</p> <p>P4. Maintain confidentiality.</p> <p>P5. Honour your commitments (timeframe, deliverables etc.)</p> <p>P6. Use internet for business only on company time.</p>	<p>You must be able to:</p> <p>K1. Explain the importance of ethical behavior.</p> <p>K2. Explain the importance of commitment in sales and customer services.</p>
<p>F6. Acquire up to date product / service knowledge</p>	<p>You must be able to:</p> <p>P1. Gather information about your product / services.</p> <p>P2. Identify the components of your product and services.</p> <p>P3. Recognize the essential selling features of your products and services.</p> <p>P4. Translate all essential features of your product and services.</p> <p>P5. Analyze product success.</p> <p>P6. Identify your market position.</p> <p>P7. Familiar with all product promotions, sales manuals and product literature.</p>	<p>You must be able to:</p> <p>K1. Explain:</p> <ul style="list-style-type: none"> Price per product. Profit per product / service. Price flection Product strengths Product weaknesses. Warranty / guarantee policies. Packaging facilities and potential. <p>K2. Explain how your product/service fits into your customers overall operations, business plan, sales success, operation cost etc.</p>

P8. Keep information of latest technology advances and seek ways to use these technologies in your work.

Develop professionalism

Purpose

This Competency standard identifies the competencies required to Develop Professionalism as per Organization's approved guidelines and procedures. You will be expected to create a personal vision / mission, manage your attitude, practice self-discipline, manage time, manage your professional development, and participate in trainings and performance review. Your underpinning knowledge about Develop Professionalism will be sufficient for you to provide the basics of the work.

Classification ISCED

0416 Wholesale and retail sales

Available grade

Competent / Not yet competent

Modification history

N/A

Unit of Competency	Performance Criteria	Knowledge
G1. Create a personal vision / mission	You must be able to: P1. Clarify / prioritize self-values and consider the value of others. P2. Clarify expectations of yourself and expectations others have of you. P3. Identify what you need to do to be successful (personal standards, targets, goals, principals)	You must be able to: K1. Explain long and short term goals. K2. Explain why personal vision and mission is important for success. K3. Describe the advantages of personal vision and mission.

	<p>P4. Set specific short and long term goals.</p> <p>P5. Translate the vision into actionable steps.</p> <p>P6. Integrate the vision into daily practice.</p> <p>P7. Recount frequently with your vision and change accordingly.</p>	
G2. Manage your attitude.	<p>You must be able to:</p> <p>P1. Challenge yourself, break old habits, and move out of your comfort zone.</p> <p>P2. Practice innovative techniques for out of the box creative thinking.</p> <p>P3. Seek out support and feedback from others on the team, in the organization / community etc.</p> <p>P4. Identify daily, weekly accomplishments.</p> <p>P5. Read inspirational material, audiotapes etc.</p>	<p>You must be able to:</p> <p>K1. Explain the importance of personal and professional motivation</p> <p>K2. Identify your positive attitude.</p> <p>K3. Explain the advantages of innovative ideas and techniques during job.</p>
G3. Practice self-discipline	<p>You must be able to:</p> <p>P1. Accountable for your performance.</p> <p>P2. Identify what you need to do to be successful.</p> <p>P3. Communicate your priorities to others.</p> <p>P4. Make and honour appointments with yourself and others.</p> <p>P5. Practice relaxation and energizing techniques.</p>	<p>You must be able to:</p> <p>K1. Explain the importance of communication.</p> <p>K2. Explain the advantages of self-discipline.</p>
G4. Manage time	<p>You must be able to:</p> <p>P1. Isolate key success activities and prioritize them.</p> <p>P2. Breakdown large tasks down into manageable</p>	<p>You must be able to:</p> <p>K1. Explain the importance of time management to achieve different tasks.</p>

action steps (set time frame).

- P3. Create or adopt action plans and follow it.
- P4. Set aside appropriate blocks of time for goal-related activities.
- P5. Make the best possible use of support people / recourses to accomplish tasks.

<p>G5.Manage your professional development</p>	<p>You must be able to:</p> <ul style="list-style-type: none"> P1. Take inventory of your personal interests, abilities, skills, knowledge etc. P2. Identify and prioritize the strengths and gaps. P3. Use available assessment tools. P4. Create a personal growth strategy / career path. P5. Set personal goals and timeframe for achieving them. P6. Learn from your mistakes. 	<p>You must be able to:</p> <ul style="list-style-type: none"> K1. Explain the importance and need of professional development.
<p>G6.Participate in trainings and performance review</p>	<p>You must be able to:</p> <ul style="list-style-type: none"> P1. Analyse, evaluate and improve performance, and report significant issues/problems to senior management P2. Demonstrate to-do attitude in profession P3. Demonstrate understanding of skills requirements P4. Use the competences acquired in trainings 	<p>You must be able to:</p> <ul style="list-style-type: none"> K1. Define concept about performance standards. K2. Explain policies, procedures and regulations regarding human resources of the organization. K3. Explain self-planning and management techniques K4. Define goals and strategies of self- development. K5. Explain relevant knowledge about training / job requirements

Comply with health and safety regulations

Purpose

This Competency standard identifies the competencies required to comply with health and Safety Regulations as per Organization's approved guidelines and procedures. You will be expected to interpret health and safety regulations, apply basic safety procedures and apply basic emergency procedures. Your underpinning knowledge about comply with health and safety regulations will be sufficient for you to provide the basics of the work.

Classification ISCED

0416 Wholesale and retail sales

Available grade

Competent / Not yet competent

Modification history

N/A

Unit of Competency	Performance Criteria	Knowledge
H1. Interpret health and safety regulations, standards and guidelines of an organization.	You must be able to: P1. Identify, understand and apply health and safety regulations at workplace P2. Assess risk of injury and equipment damages in common work situations and report to department concerned for timely response P3. Participate in quality	You must be able to: K1. Explain concepts and principles of health, safety, quality and environment regulations. K2. Define types of risk of injuring and equipment damages. K3. Describe types of risk and injury at workplace.

	<p>enhancement of products or services of the organization</p> <p>P4. Comply with quality and safety standards effectively</p> <p>P5. Handle toxic and hazardous material and product with caution</p> <p>P6. Assess risk of injuries and accidents and report it to senior management for avoiding serious injuries</p>	<p>K4. Explain the procedure of dealing with risk and injury situation.</p> <p>K5. Explain health and safety policies and guidelines of the organization.</p> <p>K6. define characteristics and types of toxic and hazardous material or products offered by company and their impact on environment.</p>
<p>H2. Apply basic safety procedures.</p>	<p>You must be able to:</p> <p>P1. Follow safety procedures to achieve a safe work environment, according to all relevant WHS legislation, including codes of practice relating to particular hazards in the industry or workplace.</p> <p>P2. Identify and report unsafe work practices , including faulty plant and equipment according to company policy and procedures</p> <p>P3. Manage dangerous goods and substances according to company policy and relevant legislation.</p> <p>P4. Identify potential manual handling risks and manage manual handling tasks according to company policy.</p> <p>P5. Report work-related incidents and accidents to designated personnel.</p>	<p>You must be able to:</p> <p>K1. Explain appropriate use of personal protective clothing.</p> <p>K2. Explain the procedure to eliminating hazards.</p> <p>K3. Explain first aid procedures.</p>

P6. Participate in consultative processes and procedures for WHS.

<p>H3. Apply basic emergency procedures.</p>	<p>You must be able to:</p> <p>P1. Follow fire and emergency procedures, including evacuation, according to company policy and legislation.</p> <p>P2. Identify designated personnel responsible for first aid and evacuation procedures.</p> <p>P3. Accurately identifies safety alarms.</p>	<p>You must be able to:</p> <p>K1. Define fire, chemical and electrical hazards</p> <p>K2. Explain slip, trips and falls</p> <p>K3. Explain the procedure of storage of dangerous goods and hazardous substances and waste.</p> <p>K4. Define communication and consultation processes.</p> <p>K5. Explain manual handling procedures.</p>
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