

National Vocational Certificate Level 2 in Mechanical Technology (Welding)



Competency Standards

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Table of Contents

| Sr. No: | Content | Page No: |
|----------------|--|-----------------|
| 1. | A: Follow Safety Rules | 4 |
| 2. | B: Perform Maintenance Operation | 7 |
| 3. | C: Perform Shielded Metal Arc Welding (SMAW) Operations | 9 |
| 4. | D: Perform Gas Metal Arc Welding (GMAW) Operations | 11 |
| 5. | E: Perform Gas Tungsten Arc Welding (GTAW) Operations | 15 |
| 6. | F : Perform Submerged Arc Welding (SAW) Operations | 18 |
| 7. | G: Repair welding defects | 21 |
| 8. | H: Develop Professionalism | 23 |
| 9. | List of Tools, Equipment & Machinery | 25 |

Title A. Follow Safety Rules

Overview: This Competency Standard identifies the competencies required to follow safety rules at workplace by welder in accordance with the organization's approved guidelines and procedures. You will be expected to apply personal safety measures, Apply workplace safety measures, Apply tools & equipment safety measures and Apply job/work piece safety measures at all times. Your underpinning knowledge regarding safety rules will be sufficient to provide you the basis for your work.

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|-------------------------------------|---|--|---|
| A1. Apply personal safety measures | <p>Trainee will be able to:</p> <p>P1. Select personal protective equipment in terms of type and quantity according to work permit.</p> <p>P2. Wear, adjust, and maintain personal protective equipment to ensure correct fit and optimum protection in compliance with company procedures.</p> <p>P3. Ensure personal protective equipment is cleaned and stored in proper place.</p> | <p>Trainee will be able to:</p> <p>K1. Explain Importance of using Personal Protective Equipment (PPE)</p> <p>K2. Define Types of PPE.</p> <p>K3. Identify Protective clothing and equipment (PPE) to be worn and from where it can be obtained.</p> <p>K4. Explain the Safe maintenance of PPEs.</p> | <p>Leather apron, safety gloves, safety goggles, welding helmet, safety shoes, ear plug, safety belt, fume mask, dungaree</p> |
| A2. Apply workplace safety measures | <p>Trainee will be able to:</p> <p>P1. Apply safety measures to the followings at workplace</p> <ul style="list-style-type: none"> • Ensure Ventilation • No Inflammable material nearby • Secure gas cylinders • Availability of Fire extinguishers • Secure Electrical connections • Ensure Earthing • No light reflection • Ensure availability of welding booths • Emergency exit | <p>Trainee will be able to:</p> <p>K1. Explain Importance of safety at workplace and its implications.</p> <p>K2. Describe Workplace safety guidelines.</p> <p>K3. Explain Specific company procedures regarding workplace safety.</p> <p>K4. Explain procedure for cleaning and storing of tools and equipment at workplace.</p> | <p>Fire extinguisher, Tool box/bins, Safety covers, First aid box, welding table, fume extractor, lighting system, PPE</p> |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|--|---|--|---|
| | <p>P2. Exhibit housekeeping at workplace according to organizational guidelines</p> <p>P3. Ensure the availability of first aid box at the workplace</p> <p>P4. Display a list of emergency contact numbers at workplace</p> | | |
| <p>A3. Apply tools & equipment safety measures</p> | <p>Trainee will be able to:</p> <p>P1. Apply safety measures to the following tools and equipment</p> <ul style="list-style-type: none"> • Electric Welding machine and equipment • Gas welding/cutting equipment • Mechanical cutting and beveling machines <p>P2. Perform cleaning of tools and equipment before and after the job</p> <p>P3. Ensure safe placement of measuring and cutting tools</p> <p>P4. Follow tools and equipment safety instruction manuals</p> | <p>Trainee will be able to:</p> <p>K1. Explain the importance of tools and equipment safety and its implications.</p> <p>K2. Describe the use of cleaning tools and equipment</p> <p>K3. Describe the importance of safe handling and placement of measuring and cutting tools</p> <p>K4. Read and apply the safety manual instructions</p> <p>K5. Explain Specific company procedures regarding tools and equipment safety.</p> <p>K6. Explain procedure for cleaning and storing of tools and equipment at workplace.</p> | <p>Safety manuals, safety instruction sheets, cleaning tools and equipment</p> |
| <p>A4. Apply job/work piece safety measures</p> | <p>Trainee will be able to:</p> <p>P1. Follow the work permit for the work piece safety</p> <p>P2. Apply the following safety measures for the</p> | <p>Trainee will be able to:</p> <p>K1. Read and implement work permit according to the nature of job</p> | <p>Work permit, safety instructions, cleaning tools and equipment, cranes, lifters, hand trolleys</p> |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|--------------------|--|--|-------------------|
| | <p>work piece safety</p> <ul style="list-style-type: none"> • Workpiece/job is free from dust, oil, grease, paint and moisture • Safely cover the job/work piece after the duty • Safely place the job/work piece after the duty <p>P3. Apply safe handling of job/work piece during</p> <ol style="list-style-type: none"> I. Welding II. Loading/unloading III. Transportation <p>P4. Follow specific job/work piece safety instructions</p> | <p>K2. Describe the importance of job/work piece safety</p> <p>K3. Explain the importance of safe handling and transportation of job/ work piece</p> <p>K4. Explain specific job/ work piece safety instructions</p> | |

TITLE B: Perform Maintenance Operation

Overview: This Competency Standard identifies the competencies required to perform maintenance operations at workplace by welder in accordance with the organization’s approved guidelines and procedures. You will be expected to inspect welding equipment, replace damaged tools, clean welding equipment and accessories at the workplace. Your underpinning knowledge regarding maintenance operations will be sufficient to provide you the basis for your work.

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|-----------------------------------|--|--|--|
| B1. Inspect the welding equipment | <p>Trainee will be able to:</p> <p>P1. Carry out following visual inspection of welding equipment before starting the work</p> <ul style="list-style-type: none"> • Check electrical/gas connections • Check the working of torch coolant system • Check the working of handy tools (grinding, cutting and cleaning tools) <p>P2. Follow the organizational instructions during regular inspection of welding equipment</p> <p>P3. Apply specific safety precautions associated with welding equipment usage</p> | <p>Trainee will be able to:</p> <p>K1. Describe the importance of regular and periodic inspection of welding equipment</p> <p>K2. Read and implement organizational instructions regarding regular equipment inspection</p> <p>K3. Describe specific safety precautions associated with welding equipment usage</p> | Instruction sheets, safety manuals, Personal Protective Equipment (PPE) |
| B2. Replace damaged tools | <p>Trainee will be able to:</p> <p>P1. Arrange tools and equipment required for the job</p> <p>P2. Identify the damaged tools by checking their working</p> <p>P3. Replace the damaged tools, if required</p> <p>P4. . Apply specific safety precautions associated with equipment usage</p> | <p>Trainee will be able to:</p> <p>K1. Describe the use of tools and equipment required for the job</p> <p>K2. Identify the hazards related to the usage of damaged tools</p> <p>K3. Describe the procedure of tools repair and replacement</p> | Star set, screw driver set, adjustable wrench, pliers, socket set, Allen key set, ring spanner, multi-meter, PPE |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|---|--|--|---|
| | | K4. Describe specific safety precautions associated with equipment usage | |
| B3. Clean welding equipment and accessories | <p>Trainee will be able to:</p> <p>P1. Arrange cleaning tools and material required for the welding equipment</p> <p>P2. Apply cleaning procedure to clean the welding equipment and accessories</p> <p>P3. Apply specific safety precautions associated with welding equipment</p> | <p>Trainee will be able to:</p> <p>K1. Describe the usage of tools required for the welding equipment</p> <p>K2. Explain the hazards associated with the usage of dirty equipment</p> <p>K3. Describe specific safety precautions associated with welding equipment usage</p> | Blower, dusters, liquid cleaner, luster, tip cleaner, anti spatter spray, PPE |

TITLE C. Perform Shielded Metal Arc Welding (SMAW) Operations

Overview: This Competency Standard identifies the competencies required to perform Shielded Metal Arc Welding (SMAW) Operations at workplace by welder in accordance with the organization’s approved guidelines and procedures. You will be expected to organize the workplace for welding, prepare the base metal for welding, perform operations related to Shielded Metal Arc Welding (SMAW) and perform post welding operations at the workplace. Your underpinning knowledge regarding Shielded Metal Arc Welding (SMAW) operations will be sufficient to provide you the basis for your work.

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|--|---|---|--|
| C1. Organize the workplace for welding | <p>Trainee will be able to:</p> <p>P1. Arrange the workplace according to the requirement of the job</p> <ul style="list-style-type: none"> • Welding booth/fire blanket • Welding machine and accessories • Electric supply • Scaffolding • Jigs and fixtures • Lighting <p>P2. apply the safety measures as per work permit</p> <ul style="list-style-type: none"> • Ventilation • Fire extinguishers • First Aid box • Emergency alarm/light • Ambulance • Personal protective equipment <p>P3. Prepare the required welding machine as per job requirement</p> <ul style="list-style-type: none"> • Type of current (AC/DC) • Current polarity | <p>Trainee will be able to:</p> <p>K1. Describe the requirements of a workplace for welding the specific job</p> <p>K2. Describe the organizational safety rules and guidelines</p> <p>K3. Describe the preparation of welding machine including</p> <ul style="list-style-type: none"> • Type of current (AC/DC) • Current polarity | Welding machine, grinder, chipping hammer, wire brush, electrode oven, desiccators, jigs and fixtures, lights, exhaust fans, fire blankets, fire extinguishers, first aid box, PPE |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|---|---|---|--|
| C2. Prepare the base metal for welding | <p>Trainee will be able to:</p> <p>P1. Arrange tools and cleaning chemicals required for the job</p> <p>P2. Prepare joint as per drawing</p> <ul style="list-style-type: none"> • Joint preparation • Joint cleaning • Tacking of joint as per welding procedure specification (WPS) / instruction sheet <p>P3. Follow the welding procedure specification (WPS) / instruction sheet for welding</p> <p>P4. Apply specific safety precautions associated with welding job</p> | <p>Trainee will be able to:</p> <p>K1. Describe the usage of tools required for the job</p> <p>K2. Describe the importance of joint preparation, cleaning and tacking</p> <p>K3. Define welding procedure specification (WPS) / instruction sheet</p> <p>K4. Apply specific safety precautions associated with welding job</p> | Grinders, cutters, beveling machine, file, measuring tools, acetone, welding equipment, desiccators, electrodes, WPS/ instruction sheet, PPE |
| C3. Perform operations related to Shielded Metal Arc Welding (SMAW) | <p>Trainee will be able to:</p> <p>P1. Arrange the electrode as per welding procedure specification (WPS) / instruction sheet</p> <p>P2. Arrange pre-heating equipment as per welding procedure specification (WPS) / instruction sheet</p> <p>P3. Adjust electrical parameters as per welding procedure specification (WPS) / instruction sheet</p> <p>P4. Perform welding as per welding procedure</p> | <p>Trainee will be able to:</p> <p>K1. Determine the specifications/ classification of electrode required for the job</p> <p>K2. Read and interpret instructions of WPS</p> <p>K3. State the importance of pre heating</p> <p>K4. Describe how to adjust electrical parameters and their effects on weld</p> <p>K5. Demonstrate welding operation as per</p> | Welding machine, electrodes, pre-heating equipment, grinders, wire brush, chipping hammer, temple sticks, desiccators, PPE, WPS/ instruction sheet |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|-------------------------------------|--|---|--|
| | specification (WPS) / instruction sheet <ul style="list-style-type: none"> • Pre heat the job, if required • Perform welding operation • Inter-pass cleaning • Inter-pass inspection • Maintain inter-pass temperature P5. Apply specific safety precautions associated with welding job/process | WPS/instruction sheet K6. Apply specific safety precautions associated with welding job/process | |
| C4. Perform post welding operations | Trainee will be able to: P1. Apply post weld cleaning of the job following the process <ul style="list-style-type: none"> • Removal of slag • Removal of jigs and fixtures • Removal of spatters P2. Perform visual inspection and rectify any visual imperfections of weld area P3. Perform post-heating of the job as per WPS/ instruction sheet, if required P4. Apply specific safety precautions associated with welding job/process | Trainee will be able to: K1. State the importance of post weld cleaning of the job K2. Identify visually, imperfections of weld K3. Describe the purpose of post-heating K4. Apply specific safety precautions associated with welding job/process | Welding machine, electrodes, post-heating equipment, grinders, wire brush, chipping hammer, desiccators, PPE, WPS/ instruction sheet |

TITLE D. Perform Gas Metal Arc Welding (GMAW) Operations

Overview: This Competency Standard identifies the competencies required to perform Gas Metal Arc Welding (GMAW) operations at workplace by welder in accordance with the organization’s approved guidelines and procedures. You will be expected to organize the workplace for welding, prepare the base metal for welding, perform operations related to Gas Metal Arc Welding (GMAW) and perform post welding operations at the workplace. Your underpinning knowledge regarding Gas Metal Arc Welding (GMAW) operations will be sufficient to provide you the basis for your work.

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|--|--|--|---|
| D1. Organize the workplace | <p>Trainee will be able to:</p> <p>P1. Arrange the workplace according to the requirement of the job</p> <ul style="list-style-type: none"> • Welding booth/fire blanket • Welding machine and accessories • Gas cylinders (CO₂, Argon) with accessories • Electric supply • Scaffolding • Jigs and fixtures • Lighting <p>P2. apply the safety measures as per work permit</p> <ul style="list-style-type: none"> • Ventilation • Fire extinguishers • First Aid box • Emergency alarm/light • Ambulance • Personal protective equipment <p>P3. Prepare the required welding machine as per job requirement</p> <ul style="list-style-type: none"> • Type of current (AC/DC) • Current polarity • Gas flow rate | <p>Trainee will be able to:</p> <p>K1. Describe the requirements of a workplace for welding the specific job</p> <p>K2. Describe the organizational safety rules and guidelines</p> <p>K3. Describe the preparation of welding machine including</p> <ul style="list-style-type: none"> • Type of current (AC/DC) • Current polarity • Gas flow rate | Welding machine and gas cylinders (CO ₂ , Argon) with accessories, grinder, chipping hammer, wire brush, wire cutter, anti spatter spray, wire spool, jigs and fixtures, lights, exhaust fans, fire blankets, fire extinguishers, first aid box, PPE |
| D2. Prepare the base metal for welding | <p>Trainee will be able to:</p> <p>P1. Arrange tools and cleaning chemicals required for the job</p> | <p>Trainee will be able to:</p> <p>K1. Describe the usage of tools required for the job</p> | Grinders, cutters, beveling machine, file, measuring tools, acetone, welding equipment, wire spool, WPS/ instruction sheet, PPE |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|---|---|---|---|
| | <p>P2. Prepare joint as per drawing</p> <ul style="list-style-type: none"> • Joint preparation • Joint cleaning • Tacking of joint as per welding procedure specification (WPS) / instruction sheet <p>P3. Follow the welding procedure specification (WPS) / instruction sheet for welding</p> <p>P3. Apply specific safety precautions associated with welding job</p> | <p>K2. Describe the importance of joint preparation, cleaning and tacking</p> <p>K3. Define welding procedure specification (WPS) / instruction sheet</p> <p>K4. Apply specific safety precautions associated with welding job</p> | |
| <p>D3. Perform operations related to Gas Metal Arc Welding (GMAW)</p> | <p>Trainee will be able to:</p> <p>P1. Arrange the wire spool as per welding procedure specification (WPS) / instruction sheet</p> <p>P2. Arrange pre-heating equipment as per welding procedure specification (WPS) / instruction sheet</p> <p>P3. Adjust welding parameters as per welding procedure specification (WPS) / instruction sheet</p> <ul style="list-style-type: none"> • Voltage • Amperes • Wire feed speed • Gas flow rate • Stick out <p>P4. Perform welding as per welding procedure specification (WPS) / instruction sheet</p> | <p>Trainee will be able to:</p> <p>K1. Determine the specifications/ classification of electrode wire required for the job</p> <p>K2. Read and interpret instructions of WPS/ instruction sheet</p> <p>K3. State the importance of pre heating</p> <p>K4. Describe how to adjust welding parameters and their effects on weld</p> <p>K5. Demonstrate welding operation as per WPS/instruction sheet</p> <p>K6. Apply specific safety precautions associated with welding job/process</p> | <p>Welding machine and gas cylinders (CO2, Argon) with accessories, grinder, chipping hammer, wire brush, wire cutter, anti spatter spray, wire spool, jigs and fixtures, lights, exhaust fans, fire blankets, fire extinguishers, first aid box, PPE, WPS/ instruction sheet</p> |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|-------------------------------------|--|--|---|
| | <ul style="list-style-type: none"> • Pre heat the job, if required • Perform welding operation • Inter-pass cleaning • Inter-pass inspection • Maintain inter-pass temperature <p>P5. Apply specific safety precautions associated with welding job/process</p> | | |
| D4. Perform post welding operations | <p>Trainee will be able to:</p> <p>P1. Apply post weld cleaning of the job following the process</p> <ul style="list-style-type: none"> • Removal of slag • Removal of jigs and fixtures • Removal of spatters <p>P2. Perform visual inspection and rectify any visual imperfections of weld area</p> <p>P3. Perform post-heating of the job as per WPS/ instruction sheet, if required</p> <p>P4. Apply specific safety precautions associated with welding job/process</p> | <p>Trainee will be able to:</p> <p>K1. State the importance of post weld cleaning of the job</p> <p>K2. Identify visually, imperfections of weld</p> <p>K3. Describe the purpose of post-heating</p> <p>K4. Apply specific safety precautions associated with welding job/process</p> | Welding machine and gas cylinders (CO ₂ , Argon) with accessories , anti spatter spray, electrode wire, post-heating equipment, grinders, wire brush, chipping hammer, PPE, WPS/ instruction sheet |

TITLEE. Perform Gas Tungsten Arc Welding (GTAW) Operations

Overview: This Competency Standard identifies the competencies required to perform Gas Tungsten Arc Welding (GTAW) operations at workplace by welder in accordance with the organization's approved guidelines and procedures. You will be expected to organize the workplace for welding, prepare the base metal for welding, perform operations related to Gas Tungsten Arc Welding (GTAW) and perform post welding operations at the workplace. Your underpinning knowledge regarding Gas Tungsten Arc Welding (GTAW) operations will be sufficient to provide you the basis for your work.

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|-----------------------------------|--|--|--|
| <p>E1. Organize the workplace</p> | <p>Trainee will be able to:</p> <p>P1. Arrange the workplace according to the requirement of the job</p> <ul style="list-style-type: none"> • Welding booth/fire blanket • Welding machine and accessories • Gas cylinders (Argon) with accessories • Electric supply • Scaffolding • Jigs and fixtures • Lighting <p>P2. apply the safety measures as per work permit</p> <ul style="list-style-type: none"> • Ventilation • Fire extinguishers • First Aid box • Emergency alarm/light • Ambulance • Personal protective equipment <p>P3. Prepare the required welding machine as per job requirement</p> <ul style="list-style-type: none"> • Type of current (AC/DC) • Current polarity | <p>Trainee will be able to:</p> <p>K1. Describe the requirements of a workplace for welding the specific job</p> <p>K2. Describe the organizational safety rules and guidelines</p> <p>K3. Describe the preparation of welding machine including</p> <ul style="list-style-type: none"> • Type of current (AC/DC) • Current polarity • Gas flow rate | <p>Welding machine and gas cylinders (Argon) with accessories, tungsten electrode, filler rod/ wire, grinder, wire brush, jigs and fixtures, lights, exhaust fans, fire blankets, fire extinguishers, first aid box, PPE</p> |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|---|---|---|--|
| | <ul style="list-style-type: none"> Gas flow rate | | |
| E2. Prepare the base metal for welding | <p>Trainee will be able to:</p> <p>P1. Arrange tools and cleaning chemicals required for the job</p> <p>P2. Prepare joint as per drawing</p> <ul style="list-style-type: none"> Joint preparation Joint cleaning Tacking of joint as per welding procedure specification (WPS) / instruction sheet <p>P3. Follow the welding procedure specification (WPS) / instruction sheet for welding</p> <p>P3. Apply specific safety precautions associated with welding job</p> | <p>Trainee will be able to:</p> <p>K1. Describe the usage of tools required for the job</p> <p>K2. Describe the importance of joint preparation, cleaning and tacking</p> <p>K3. Define welding procedure specification (WPS) / instruction sheet</p> <p>K4. Apply specific safety precautions associated with welding job</p> | Grinders, cutters, beveling machine, file, measuring tools, acetone, welding equipment and gas cylinder (argon) with accessories , tungsten electrode, filler rod/wire, WPS/ instruction sheet, PPE |
| E3. Perform operations related to Gas Tungsten Arc Welding (GTAW) | <p>Trainee will be able to:</p> <p>P1. Arrange the filler wire/rod as per welding procedure specification (WPS) / instruction sheet</p> <p>P2. Arrange pre-heating equipment as per welding procedure specification (WPS) / instruction sheet</p> <p>P3. Adjust welding parameters as per welding procedure specification (WPS) / instruction sheet</p> | <p>Trainee will be able to:</p> <p>K1. Determine the specifications/ classification of filler wire/rod required for the job</p> <p>K2. Read and interpret instructions of WPS/ instruction sheet</p> <p>K3. State the importance of pre heating</p> <p>K4. Describe how to adjust welding parameters and their effects on weld</p> | Welding machine and gas cylinders (Argon) with accessories, tungsten electrode, grinder, wire brush, filler wire/rod, jigs and fixtures, lights, exhaust fans, fire blankets, fire extinguishers, first aid box, PPE, WPS/ instruction sheet |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|-------------------------------------|--|--|---|
| | <ul style="list-style-type: none"> • Amperes • Gas flow rate • Back purging, if required <p>P4. Perform welding as per welding procedure specification (WPS) / instruction sheet</p> <ul style="list-style-type: none"> • Pre heat the job, if required • Perform welding operation • Inter-pass cleaning • Inter-pass inspection • Maintain inter-pass temperature <p>P5. Apply specific safety precautions associated with welding job/process</p> | <p>K5. Demonstrate welding operation as per WPS/instruction sheet</p> <p>K6. Apply specific safety precautions associated with welding job/process</p> | |
| E4. Perform post welding operations | <p>Trainee will be able to:</p> <p>P1. Apply post weld cleaning of the job</p> <p>P2. Perform visual inspection and rectify any visual imperfections of weld area</p> <p>P3. Perform post-heating of the job as per WPS/ instruction sheet, if required</p> <p>P4. Apply specific safety precautions associated with welding job/process</p> | <p>Trainee will be able to:</p> <p>K1. State the importance of post weld cleaning of the job</p> <p>K2. Identify visually, imperfections of weld</p> <p>K3. Describe the purpose of post-heating</p> <p>K4. Apply specific safety precautions associated with welding job/process</p> | Welding machine and gas cylinders (Argon) with accessories, filler wire/rod , post-heating equipment, grinders, wire brush, PPE, WPS/ instruction sheet |

TITLE F. Perform Submerged Arc Welding (SAW) Operations

Overview: This Competency Standard identifies the competencies required to perform Submerged Arc Welding (SAW) operations at workplace by welder in accordance with the organization's approved guidelines and procedures. You will be expected to organize the workplace for welding, prepare the base metal for welding, perform operations related to Submerged Arc Welding (SAW) and perform post welding operations at the workplace. Your underpinning knowledge regarding Submerged Arc Welding (SAW) operations will be sufficient to provide you the basis for your work.

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|----------------------------|--|---|---|
| F1. Organize the workplace | <p>Trainee will be able to:</p> <p>P1. Arrange the workplace according to the requirement of the job</p> <ul style="list-style-type: none"> • Welding machine and accessories • Electric supply • Jigs and fixtures • Lighting <p>P2. apply the safety measures as per work permit</p> <ul style="list-style-type: none"> • Ventilation • Fire extinguishers • First Aid box • Emergency alarm/light • Ambulance • Personal protective equipment <p>P3. Prepare the required welding machine as per job requirement</p> <ul style="list-style-type: none"> • Type of current (AC/DC) • Current polarity • Travel speed | <p>Trainee will be able to:</p> <p>K1. Describe the requirements of a workplace for welding the specific job</p> <p>K2. Describe the organizational safety rules and guidelines</p> <p>K3. Describe the preparation of welding machine including</p> <ul style="list-style-type: none"> • Type of current (AC/DC) • Current polarity • Travel speed | Welding machine with accessories, flux drying oven, grinder, chipping hammer, wire brush, jigs and fixtures, lights, exhaust fans, fire extinguishers, first aid box, PPE |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|--|---|--|---|
| F2. Prepare the base metal for welding | <p>Trainee will be able to:</p> <p>P1. Arrange tools and cleaning chemicals required for the job</p> <p>P2. Prepare joint as per drawing</p> <ul style="list-style-type: none"> • Joint preparation • Joint cleaning <p>P3. Follow the welding procedure specification (WPS) / instruction sheet for welding</p> <p>P3. Apply specific safety precautions associated with welding job</p> | <p>Trainee will be able to:</p> <p>K1. Describe the usage of tools required for the job</p> <p>K2. Describe the importance of joint preparation, cleaning and tacking</p> <p>K3. Define welding procedure specification (WPS) / instruction sheet</p> <p>K4. Apply specific safety precautions associated with welding job</p> | Grinders, cutters, beveling machine, file, measuring tools, WPS/ instruction sheet, PPE |
| F3. Perform operations related to Submerged Arc Welding (SAW) Operations | <p>Trainee will be able to:</p> <p>P1. Arrange the wire spool and flux as per welding procedure specification (WPS) / instruction sheet</p> <p>P2. Arrange pre-heating equipment as per welding procedure specification (WPS) / instruction sheet</p> <p>P3. Adjust welding parameters as per welding procedure specification (WPS) / instruction sheet</p> <ul style="list-style-type: none"> • Voltage • Amperes • Travel speed • Type of Polarity • Stickout | <p>Trainee will be able to:</p> <p>K1. Determine the specifications/ classification of wire-flux combination required for the job</p> <p>K2. Read and interpret instructions of WPS/ instruction sheet</p> <p>K3. State the importance of pre heating</p> <p>K4. Describe how to adjust welding parameters and their effects on weld</p> <p>K5. Demonstrate welding operation as per WPS/instruction sheet</p> <p>K6. Apply specific safety precautions associated with welding job/process</p> | Welding equipment with accessories, wire spool, flux, pre-heating equipment, grinders, wire brush, wire cutter, chipping hammer, temple sticks, flux drying oven, PPE, WPS/ instruction sheet |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|--|--|--|---|
| | <p>P4. Perform welding as per welding procedure specification (WPS) / instruction sheet</p> <ul style="list-style-type: none"> • Pre heat the job, if required • Perform welding operation • Inter-pass cleaning • Inter-pass inspection • Maintain inter-pass temperature <p>P5. Apply specific safety precautions associated with welding job/process</p> | | |
| <p>F4. Perform post welding operations</p> | <p>Trainee will be able to:</p> <p>P1. Apply post weld cleaning of the job following the process</p> <ul style="list-style-type: none"> • Removal of unused flux • Removal of slag • Removal of jigs and fixtures <p>P2. Perform visual inspection of weld area</p> <p>P3. Perform post-heating of the job as per WPS/ instruction sheet, if required</p> <p>P4. Apply specific safety precautions associated with welding job/process</p> | <p>Trainee will be able to:</p> <p>K1. State the importance of post weld cleaning of the job</p> <p>K2. Identify visually, imperfections of weld</p> <p>K3. Describe the purpose of post-heating</p> <p>K4. Apply specific safety precautions associated with welding job/process</p> | <p>post-heating equipment, grinders, wire brush, chipping hammer, PPE, WPS/ instruction sheet</p> |

TITLE G. Repair welding defects

Overview: This Competency Standard identifies the competencies required to perform repairing of welding defects at workplace by welder in accordance with the organization's approved guidelines and procedures. You will be expected to identify and repair defected areas of job/work pieces at the workplace. Your underpinning knowledge regarding repairing of welding defects will be sufficient to provide you the basis for your work.

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|---|--|--|---|
| G1. Identify the defected areas of job/work piece | <p>Trainee will be able to:</p> <p>P1. Arrange tools and equipment required for the job</p> <p>P2. Follow the instructions of supervisor and inspector's report to identify defected point (s)</p> <p>P3. Apply specific safety precautions associated with welding equipment</p> | <p>Trainee will be able to:</p> <p>K1. Describe the usage of tools and equipment required for the job</p> <p>K2. Read and interpret inspection report regarding inspection of defected areas</p> <p>K3. Enlist the non-destructive tests (NDT) for welding inspection</p> <ul style="list-style-type: none"> • Visual testing (VT) • Magnetic particle test (MT) • Radiographic test (RT) • Ultrasonic test (UT) • Dye penetration test (PT) <p>K4. Describe specific safety precautions associated with welding equipment usage</p> | <p>Inspection report, supervisor's instructions, measuring tools, PPE</p> |
| G2. Repair defected areas of job/work piece | <p>Trainee will be able to:</p> <p>P1. Arrange the tools and equipment required for repairing defected area(s)</p> <p>P2. Apply the following repair procedure as per inspection report</p> <ul style="list-style-type: none"> • Grinding | <p>Trainee will be able to:</p> <p>K1. Describe the usage of tools and equipment required for the job</p> <p>K2. Read and interpret inspection report regarding defects</p> | <p>Grinder, cutter, gouging equipment, welding equipment with accessories, electrodes/filler wires, gas cylinder, desiccators, electrode drying oven, (argon), WPS/ instruction</p> |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|--------------------|--|--|-------------------|
| | <ul style="list-style-type: none"> • Cutting • Gouging <p>P3. Apply repair welding to specific defected area(s) as per WPS/ instruction sheet</p> <p>P4. Apply specific safety precautions associated with welding equipment</p> | <p>K3. Describe the process and selection of defect removal methods</p> <p>K4. State the need for repair welding</p> <p>K5. Describe specific safety precautions associated with welding equipment usage</p> | <p>sheet, PPE</p> |

TITLE H. Develop Professionalism

Overview: This Competency Standard identifies the competencies required to Develop Professionalism by welder in accordance with the organization's approved guidelines and procedures. You will be expected to perform communication with others, upgrade professional skills and work in a team. Your underpinning knowledge regarding development of professionalism will be sufficient to provide you the basis for your work.

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|---------------------------------------|---|---|--|
| H1. Perform Communication with others | <p>Trainee will be able to:</p> <p>P1. Communicate with supervisor following communication procedure</p> <p>P2. Communicate with colleagues following communication procedure</p> <p>P3. Use media to communicate effectively (e.g.: email, telephone, laptop etc.)</p> | <p>Trainee will be able to:</p> <p>K1. Identify factors required to communicate effectively and precisely within organisation.</p> <p>K2. Justify the appropriate use of electronic and relative media as per need</p> | Computer/ laptop, internet, telephone |
| H2. Upgrade professional skills | <p>Trainee will be able to:</p> <p>P1. Participate in Skill test for professional development</p> <p>P2. Attend seminars/ training workshops for professional development</p> <p>P3. Adopt upcoming market trends in welding field</p> | <p>Trainee will be able to:</p> <p>K1. Describe the importance of trends and market research.</p> <p>K2. Identify the need of skill sets by getting involved in seminars, workshops and competitions.</p> | Computer, internet facility, magazines, books, codes and standards |
| H3. Work in a team | <p>Trainee will be able to:</p> <p>P1. Demonstrate good team skills including</p> <ul style="list-style-type: none"> • Cooperation/coordination • Work ethics • Etiquettes/manners | <p>Trainee will be able to:</p> <p>K1. Identify the importance of being a good team player .including</p> <ul style="list-style-type: none"> • Cooperation/coordination • Work ethics | Computer, internet facility, lectures |

| Unit of Competency | Performance Criteria | Knowledge | Tools & Equipment |
|--------------------|--|--|-------------------|
| | <p>P2. Carry an appropriate appearance.</p> <p>P3. Show comfort and tolerance.</p> | <ul style="list-style-type: none">• Etiquettes/manners | |

List of Tools and Equipment

- Star set
- Screw driver set
- Adjustable wrench
- Pliers
- Socket set
- Allen key set
- Ring spanner
- Multi-meter
- Blower
- Dusters
- Liquid cleaner
- Luster
- Tip cleaner
- Anti spatter spray
- Welding machine,
- Grinder
- Chipping hammer
- Wire brush
- Electrode drying oven
- Desiccators
- Jigs and fixtures
- Lighting system
- Exhaust fans
- Fire blankets
- Cutters
- beveling machine
- File
- Measuring tools
- Acetone
- Welding equipment
- Electrodes
- WPS/ instruction sheet

- Pre-heating equipment
- Temple sticks
- Gas cylinders (CO₂, Argon) with accessories
- Wire spool
- Tungsten electrode
- Filler rod/ wire
- Post-heating equipment
- Flux drying oven
- Gouging equipment
- Leather apron
- Safety gloves
- Safety goggles
- Welding helmet
- Safety shoes
- Ear plug
- Safety belt
- Fume mask
- Dungaree
- Fire extinguisher
- Tool box/bins
- Safety covers
- First aid box
- Welding table
- Fume extractor
- Cranes
- Lifters
- Hand trolleys



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