Appendix N

MANUFACTURING
YOUTH APPRENTICESHIP

PRODUCTION PATHWAY
WELDING (UNIT 7)

Unit 7: Production Pathway
Welding

Competency

1. Read welding technical drawings and work orders

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Review technical drawing
Gather reference materials as needed
Determine type of required weld
Determine location of required weld
Determine filler metal required
Determine welding process to be used
Analyze supplementary data
Determine product or job instructions and specifications
Interpret welding symbols and procedure

Learning Objectives

Explain the need for technical drawings, also known as blueprints, schematics, part prints, or engineering drawings
Explain how technical drawings detail work piece design parameters, lay out and specifications
Explain how product design and production are related
Discuss different types of technical drawings
Identify terminology related to technical drawings
Describe how to interpret views, projections and elements from a technical drawing
Identify terms, components, revisions, symbols, assembly sequence, dimensions, tolerances, scale, and list of materials from technical drawings or work orders

Comments:

Unit 7: Production Pathway
Welding

Competency

2. Interpret welding symbols and procedures

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Interpret technical drawings accurately as needed for job task
Use appropriate terminology
Identify lines, views, symbols, and representations on the drawings
Interpret dimensions, tolerances, and scale on the drawings
Interpret the welding process plan from a technical drawing which includes tools, equipment, speeds, feeds, fixtures and holders as applicable

Learning Objectives

Define and explain the use of lines, views, symbols, dimensions, scale, and tolerances on technical drawings
Identify different lines by name, type, order of usage, and application such as object, hidden, center, section, dimension, extension, cutting plane, short break, long break, phantom
Demonstrate standard view placement practices
Compare pictorial format, orthographic projection, sectional views, and detail schedules
Compare characteristics, advantages and limitations of welding, brazing, and soldering
Identify common welding symbols and their meanings on technical drawings
Explain how weld types are indicated on technical drawings
Explain how weld positions are indicated on technical drawings
List supplementary data commonly found on welding drawings
Discuss how weld testing requirements and procedures are indicated on the technical drawing
Determine procedure number cross-references to technical drawings

Comments:

Unit 7: Production Pathway
Welding

Competency

3. Layout and plan work

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Read welding technical drawings and work orders

Interpret welding symbols and procedure

Review appropriate welding, cutting and/or fabricating procedures
Determine equipment, work pieces, and supplies needed
Determine metal type, electrode type, welding position, and metal thickness
Select jigs, holding fixtures, guides and stops if applicable
Obtain materials for work to be completed
Measure and mark weld or cut points and positions of components on work pieces, using rules, squares, templates, and scribes
Plan sequencing of work to be completed
Document measurements and layout

Learning Objectives

Describe how a work plan is developed from a technical drawing for process, equipment, tools, and holders
Explain the lay out process in metal fabrication
Describe tools used in the layout process
Covert measurements between US Standard and metric systems
Convert measurements from fractions to decimals and vice versa
Use estimation to verify reasonableness of calculated results
Explain how to measure with tape measures, rulers, and protractors
Demonstrate how to use precision measuring tools like micrometers
Discuss how parts are prepared using the principles of geometry, functions of angles and parts of a circle
Demonstrate the proper use of and interpretation of measuring devices to determine size, length, angle, and distance

Comments:

Unit 7: Production Pathway
Welding

Competency

4. Perform safety checks

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Review welding procedure to be used

Review safety requirements of procedure

Verify safety equipment and any Personal Protective Equipment (PPE) needed for welding process

Verify equipment is available for use and in working order

Verify equipment is current for preventative maintenance and/or calibration

Conduct required safety checks prior to performing procedure

- Ensure area is dry and facilitates circulation of clean air
- Ensure workspace is clear and free from paints, solvents, chemicals and other flammable materials
- Assure safety equipment is close by and operational
- Check valves, valve protection, thread type and wrenches for equipment to be used
- Check grounding, cables, voltage/current transformation components
- Check ventilation and fume reduction requirements

Handle compressed gases safely

- Ensure protector cap is secure when moving cylinder
- Secure cylinder in vertical position
- Inspect valve, regulator and gauges for damage
- Connect and adjust tank pressure according to manufacturer

Report any wear, damage or failure of safety checks to worksite professional immediately

Learning Objectives

List the various tools and equipment used in layout, cutting and welding

Outline applications of common welding tools and equipment

Describe and demonstrate the safety requirements and safeguards of common welding tools and equipment

List the types of labeling used on tools and equipment at your facility to indicate whether a tool or piece of equipment is functional and safe to use AND/OR is not operational and not safe to use.

List the situations which require you to obtain help to resolve problems with equipment or production

Describe the common types of shielding for welding processes

Discuss smoke/fume, light/radiation and other hazards associated with common welding processes

Discuss electrical hazards and how to avoid electric shock

Demonstrate proper inspection and use of ventilation equipment to avoid welding fumes

Explain specific eye and face hazards associated with welding
List precautions necessary when welding different types of metals
List precautions necessary when welding in different positions
Compare safety precautions necessary when using different welding processes

Comments:

Unit 7: Production Pathway
Welding

Competency

5. Prepare base metal

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Review procedures
Determine base metal or work piece preparation requirements
Obtain correct base metal type and thickness
Prepare base metal surfaces as required
Use cleaning solutions if needed
Examine edges of prepared base metal parts
Grind base carbon steel metal to bevel and/or remove surface irregularities
Check uniformity, proper fit-up, and base metal preparation
Pre-heat as applicable
Parts fit up and are preheated as needed

Learning Objectives

Explain the importance of materials meeting specifications prior to processing
Discuss common metallurgic principles that make metals ideal for welding
Compare types of metals and their qualities
Define alloy
Discuss common sources of metals
Compare common metal working processes used in welding
Explain the factors that limit or enhance the weldability of materials
Compare and contrast different metal preparation requirements
Explain use and safety restrictions for use of grinders to prepare base metal
Discuss cleaning solutions used to prepare commonly welded metals such as carbon steel, stainless steel and aluminum
Explain any safety restrictions of cleaning solutions for metals to be fabricated
Describe the fit-up process
Explain the need for pre-heating in some procedures

Comments:

Unit 7: Production Pathway
Welding

Competency
6. Set up to fabricate base metal

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

GENERAL SET UP

Layout and plan work

Perform safety checks

Assemble tools and equipment as required

Place parts and assemblies into fixtures

Set up equipment for fabrication

Document set up procedure if required

FIXTURE SET UP

Locate parts or subassemblies needed

Determine the order for the part or subassembly placement

Position, align, and bolt jigs, holding fixtures, guides, and stops onto machines

Position, align and/or clamp work pieces into jigs and/or holding fixtures

Tighten all holding and positioning clamps

Inspect assembly

CUTTING SET UP

Select torch tips, alloys, flux, coil, tubing, and wire, according to metal types and thicknesses

Dress electrodes with tip dressers, files, emery cloths, or dressing wheels

Move switch to correct polarity OR change electrode and ground cable positions

Adjust voltage and/or amperage per procedure

Select appropriate program if required

Set wire feed rate OR shielding gas flow/pressure at correct value

Sawing

- Adjust safety guards
- Adjust holding device as needed
- Place material in holding device
- Adjust blade velocity

Manual Oxy-fuel Cutting

- Select correct tip size and type
- Set regulator for tip, fuel gas and material
- Adjust pressures for steel thickness

Machine Oxy-fuel Cutting

- Select correct tip size and type
- Set regulator for tip, fuel gas and material
- Measure corner and align track mechanism
- Set appropriate travel speed

Air Carbon Arc Cutting
- Choose adequate power source selection
- Choose correct carbon electrode diameter
- Turn on air line and check air flow direction
- Adjust air pressure for material thickness
- Adjust amperage and current type for electrode diameter and material thickness

Manual Plasma Arc Cutting
- Select appropriate tip
- Set regulator for appropriate plasma gas
- Adjust amperage for material thickness

WELDING SET UP

Select torch tips, alloys, flux, coil, tubing, and wire, according to metal types and thicknesses, data charts, and records

Dress electrodes with tip dressers, files, emery cloths, or dressing wheels

Move switch to correct polarity OR change electrode and ground cable positions

Adjust voltage and/or amperage per procedure

Select appropriate program if required

Set wire feed rate OR shielding gas flow/pressure at correct value

Fill hoppers and position spouts to direct flow of flux or complete manually

Review technique and weld bead sequence

Determine joint requirements

Determine pre-heat and post-heat requirements

Shielded metal arc welding (SMAW)
- Select appropriate base and filler metal
- Adjust amperage and polarity

Gas metal arc welding (GMAW) and Flux-cored arc welding (FCAW)
- Select and install appropriate filler wire
- Set voltage
- Set wire speed (amperage)
- Set proper gas flow rate

Gas tungsten arc welding (GTAW)
- Select appropriate filler wire
- Select appropriate electrode and gas
- Set amperage and polarity
- Set proper gas flow rate

Learning Objectives

List the types of labeling used on tools and equipment at your facility to indicate whether a tool or piece of equipment is functional and safe to use

Explain the purpose of holding devices and subassemblies in welding

List typical work holding devices for each equipment type you use

Compare basic holding devices

List cutting processes such as shearing, sawing, Oxy-fuel, Arc, Plasma, and Laser and when each is used

List welding processes such as SMAW, GMAW, GTAW, FCAW, and Submerged arc welding (SAW), and when each is used

Identify the major components of equipment used in your welding and cutting processes and their functions

List common metals and materials used with each type of cutting and welding process

Compare cutting and welding techniques to complete fabrication
Identify variables that impact cutting and welding equipment settings
Define how variables such as current, voltage, polarity, arc length, speed, flux, flow rates, material, piece thickness, etc., affect a weld
Discuss the fundamental use of polarity with respect to equipment set up for process used
Define repeatability
Describe the importance of repeatability in manufacturing

Comments:

Unit 7: Production Pathway
Welding

Competency

7. Fabricate base metal

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Prepare base metal

Set up to fabricate base metal

Add or adjust safety guards

Verify machine settings for material

Verify blades, shears, dies, etc., appropriate for metal fabrication to be completed

Perform equipment pre-check

Make test cuts

Adjust holding devices, blade speeds, and metal positions safely as needed

Operate tools and equipment safely

Fabricate base metal

- Use hand tools such as brakes and hammers
- Use equipment such as such as grinders, saws, drills, drill presses, or brakes

Complete cuts

Inspect, measure, or test completed metal pieces

Shut down and secure equipment

Clean up

Report any discrepancies or equipment concerns to worksite professional immediately

Document cutting process if required

Learning Objectives

Compare and contrast different metal preparation and mechanical cutting methods

Outline applications and use for common hand tool and shearing, shaping and sawing equipment

Identify hand tools used in welding operations

Describe and demonstrate the safety requirements and safeguards for common hand tools and shearing, shaping and sawing equipment

Comments:

Unit 7: Production Pathway
Welding

Competency
8. Thermally/chemically cut metal

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Prepare base metal

Set up to fabricate base metal

Adjust voltage and/or amperage per procedure

Select appropriate program if required

Set wire feed rate OR shielding gas flow/pressure at correct value

Make test cuts

Adjust pressures, amperage, voltage, flow rates, torch angles, flame sizes, travel speed, etc. safely as needed

Operate tools and equipment safely

Manual Oxy-fuel Cutting

- Light and adjust flame to correct size
- Adjust pressures and torch angles as needed
- Cuts- straight/square edge and shape/square edge and straight/bevel edge in flat position; scarfing and gouging in flat and horizontal position
- On carbon steel

Machine Oxy-fuel Cutting

- Control gas flow and flame size
- Monitor travel speed
- Cuts- straight/square edge and straight/bevel edge in flat position
- On carbon steel

Manual Plasma Arc Cutting

- Adjust amperage for material thickness
- Adjust amperage and torch angles as needed
- Protect surroundings from spray
- Cuts- straight/square edge and shape/square edge in flat position
- On carbon steel, aluminum, and stainless steel

Air Carbon Arc Cutting

- Adjust amperage and torch angles as needed
- Cuts- Scarfing and gouging in flat and horizontal position
- On carbon steel

Complete cuts

Remove any slag or residue

Inspect, measure, or test completed metal pieces

Shut down and secure equipment

Clean up

Report any discrepancies or equipment concerns to worksite professional immediately

Document cutting process if required

Learning Objectives

Compare and contrast different metal preparation and thermal/chemical cutting methods
Discuss the advantages and disadvantages of one type of thermal/chemical cutting method over another
Outline applications and use of common thermal/chemical cutting equipment
Describe and demonstrate the safety requirements and safeguards of common thermal/cutting equipment

Comments:

Unit 7: Production Pathway
Welding

Competency

9. Tack work pieces

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Position the work pieces
Tack-weld them together lightly
Weld just enough to pin the work pieces together
Adjust and re-align assemblies as needed to keep pieces positioned
Remove slag or other material
Check that all required work pieces are tacked before attempting full welds
Check the pieces for appropriate geometry by measuring

Learning Objectives

Define tack
Explain the purpose of a tack
Compare welding techniques to bond pieces versus welding techniques to tack pieces
Explain how to measure with tape measures, rulers, and protractors
Demonstrate how to use precision measuring tools like micrometers
Discuss how parts are prepared using the principles of geometry, functions of angles and parts of a circle
Demonstrate the proper use of and interpretation of measuring devices to determine size, length, angle, and distance

Comments:

Unit 7: Production Pathway
Welding

Competency
10. Weld metal

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Prepare base metal

Set up to fabricate base metal

Verify and adjust settings for required process

Select appropriate program if required

Make test welds

Adjust pressures, amperage, voltage, flow rates, torch angles, flame sizes, travel speed, etc. safely as needed

Hold the welding gun appropriately to prevent weld wandering

Operate tools and equipment safely

Make fillet welds on plain carbon steel, stainless steel or aluminum in required positions

Make groove welds on plain carbon steel, stainless steel or aluminum in required positions

Monitor metal for appropriate welds

Flux-cored arc welding (FCAW)-gas

- Fillet welds in all positions on carbon steel
- Groove welds in all positions on carbon steel

FCAW- self-shielded

- Fillet welds in all positions on carbon steel
- Groove welds in all positions on carbon steel

Gas metal arc welding (GMAW)-S

- Fillet welds in all positions on carbon steel
- Groove welds in all positions on carbon steel

GMAW-Spray

- Fillet welds in 1F and 2F position on carbon steel
- Groove welds in 1G position on carbon steel
- Fillet welds in all positions on aluminum
- Groove welds in all positions on aluminum

GMAW-P (pulse)

- Fillet welds in all positions on carbon steel
- Groove welds in all positions on carbon steel

Gas tungsten arc welding (GTAW)- Carbon Steel

- Fillet welds in all positions
- Groove welds in all positions

GTAW- Stainless Steel

- Fillet welds in all positions
- Groove welds in all positions

GTAW- Aluminum
- Fillet welds in all positions
- Groove welds in all positions

Shielded metal arc welding (SMAW)
- Fillet weld all positions on carbon steel
- Groove weld in all positions on carbon steel

MECHANIZED WELDING
- Adjust pressures, amperage, voltage, flow rates, travel speed, etc. safely as needed
- Load or feed work pieces into welding machines to join or bond components if applicable
- Observe meters, gauges, and machine operations to ensure that processes meet specifications
- Monitor metal for appropriate welds
- Adjust equipment to correct for problems
- Turn and press knobs and buttons or enter operating instructions into computers to start and adjust welding machines
- Monitor, and adjust robotic welding production lines if applicable
- Remove completed work pieces and parts from machinery
- Add chemicals or materials to machine to cool or facilitate bonding OR immerse completed work pieces into water or acid baths to cool and clean components as required by procedure

Complete welds

Remove any slag or residue

Inspect, measure, or test completed metal pieces

Shut down and secure equipment

Clean up

Report any discrepancies or equipment concerns to worksite professional immediately

Document welding process if required

Learning Objectives

Identify how the welding process is used in production to make pieces and products

Compare and contrast common welding processes such as FCAW, GMAW, GTAW and SMAW

Discuss the advantages and disadvantages of one type of welding process over another

Compare different types of welding joints such as fillet, groove, T, Lap, Butt, etc.

Compare the different welding positions- Flat, Horizontal, Vertical, Overhead

Compare features of the common metals used in welding such as Carbon Steel, Stainless Steel and Aluminum

Define constant current (CC) and constant voltage (CV)

Demonstrate how GTAW current changes, electrode tip prep, torch angles and weld distance effect weld bead profiles and penetration

Discuss how FCAW and GMAW arc voltage changes affect weld bead profile

Explain how FCAW and GMAW tip to work distance affects amperage in CV applications

Describe and demonstrate the safety requirements and safeguards for common welding equipment

Describe methods of puddle control

Demonstrate different techniques for manual welding

Compare and contrast manual welding processes with automated welding processes

List the quality checks performed as part of the automated welding production process

Comments:

Unit 7: Production Pathway
Welding

Competency
11. Monitor product and process

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Monitor piece/product produced for specification
Recheck type of metal to be welded
Monitor the process and equipment for performance
Recheck required positioning of the weld gun or torch
Adjust the process for quality and/or productivity as needed
Take corrective actions to resolve problems as they occur
Replenish processing materials as needed
Label pieces/products for compliance or non-compliance
Document quality control checks
Pieces are fabricated to specified tolerances

Learning Objectives

List the quality checks performed as part of the welding process
Explain why products are tested for quality and function
List the situations which require you to obtain help to resolve problems with equipment or production
Explain why labeling and documentation are part of the quality check
Explain the purpose of welding procedures, procedure qualification and welder qualifications to produce a welded piece

Comments:

Unit 7: Production Pathway
Welding

Competency

12. Assist to inspect, measure, and/or test completed metal pieces

Performance Standard Condition

Competence will be demonstrated

at the worksite
while assisting a worksite professional

Performance Standard Criteria

Performance will be successful when learners:

Ensure conformance to specifications, using visual inspection, measuring and testing devices
Examine edges and geometry of cut pieces
Examine tacks, root passes, intermediate layers, and completed welds
Check for weld discontinuity and defects visually
Check for proper weld size
Perform destructive or non-destructive checks as required
Label pieces/products for compliance or non-compliance
Document inspection and testing as required

Learning Objectives

Explain why welded products are tested for quality and function
Compare different welding standards and compliance codes
Determine features of good welds versus bad welds
Discuss common causes of bad welding
Describe causes of welding problems such as crater cracks, cold cracks, pinholes, porosity in welds
Discuss preventive measures taken to avoid bad welds
Discuss problems associated with weld contaminants
Compare destructive and non-destructive testing requirements for welds
Discuss the consequences of bad welds to a product or structure
Explain why labeling and documentation are part of the quality check
Compare common metal finishing processes such as annealing, grinding, buffing, polishing, sand blasting, priming, painting, heat treating, coating, plating, anodizing and galvanizing
Describe the purpose of metal finishing

Comments:

Unit 7: Production Pathway
Welding

Competency
13. Process production documents

Performance Standard Condition
Competence will be demonstrated
at the worksite

Performance Standard Criteria
Performance will be successful when learners:
Document processing data on items such as labor, quality, quantity, and time
Verify fabrication and welding documentation is completed
Documentation is legible
Documentation is complete
Documentation is in appropriate format
Documentation is stored or forwarded as required

Learning Objectives
Describe the uses of production data
Describe the importance of documenting the production process

Comments:

Unit 7: Production Pathway
Welding

Competency
14. Clean up

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Select appropriate cleaning tools and equipment
Clean tools/equipment as required
Clean work area as required
Store tools safely in proper location
Store materials in safe manner
Identify unsafe conditions and report them promptly
Take corrective action to correct unsafe conditions
Ensure that workstation is clean and clear of safety hazards
Ensure workstation is organized for efficiency
Dispose of waste appropriately as required

Learning Objectives

Describe the cleaning procedures and materials used for the specific processes you perform
Discuss cleaning solutions used to clean welded metals such as carbon steel, stainless steel and aluminum
Explain any safety restrictions of cleaning solutions for welded metals

Comments:

Unit 7: Production Pathway
Welding

Competency
15. Monitor equipment for correct operation

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Review equipment quality measures for trends and problems as required
Compare current equipment performance to optimal equipment operations on a regular basis
Report any noted deviations from expected performance
Assist worksite professional to investigate abnormal equipment conditions in a timely manner
Assist worksite professional to follow up on repaired equipment to ensure that corrective action solved the problem
Document all monitoring activities

Learning Objectives

Identify basic approaches to maintenance
Explain how to read and review repair history records
Describe how trends for malfunctioning equipment might appear in production records
List the tools and equipment at your facility that must be monitored and maintained
Define Total Productive Maintenance (TPM)

Comments:

Unit 7: Production Pathway
Welding

Competency
16. Perform routine preventive maintenance (PM)

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Perform preventative maintenance (PM) according to facility schedule
Communicate PM to production
Assure that alternative equipment is available if needed by production
Gather supplies to perform PM
Ensure that equipment is properly labeled and pulled from production use
Follow appropriate Lock Out/Tag Out procedures prior to performing PM
Follow all safety requirements and wears appropriate Personal Protective Equipment (PPE) as required
Assist worksite professional to follow PM schedule to calibrate and maintain equipment, tools and workstations

- Inspect lines, tank valves, regulators, gauges, fittings and connections on oxy-fuel equipment
- Inspect, clean, adjust, and replace (if needed) torch tips and torch nuts on oxy-fuel torches
- Inspect, clean, adjust, and replace (if needed) electrodes, ground cables, connections, fasteners, holders, clamps, switches and knobs on shielded arc welding equipment
- Inspect, clean, adjust, and replace (if needed) wire feeder, connections, fasteners, ground cable, gun assembly, gun nozzle, gas diffuser, contact tip, coil mounting, coil break, wire de-reeler, flowmeter, wire guides, and drive rollers on gas metal arc and flux core welding equipment.
- Remove weld spatter and foreign material from guns, torches, and/or electrode holders
- Inspect hand tools, fixtures, and/or tables
- Mount wire electrode coils if applicable

Inspect and clean work areas
Report any damage, wear, or missing safety equipment to worksite professional
Re-qualify equipment for operation
Document PM and preventative actions taken

Learning Objectives

Explain the purpose and importance of preventative maintenance and calibration
Describe how diagrams schematics, equipment manuals, and equipment specifications to determine the schedule and process for PM
List the situations which require you to obtain help to resolve problems with equipment or production

Explain routine maintenance procedures for common welding equipment
Explain how to change a liner on a GTAW, GMAW and/or FCAW gun if used at your worksite

Comments:

Unit 7: Production Pathway
Welding

Competency

17. Document equipment use, PM, and/or operational problems

Performance Standard Condition

Competence will be demonstrated

at the worksite

Performance Standard Criteria

Performance will be successful when learners:

Verify all internal and external communication with appropriate parties in a timely manner
Communicate maintenance and repair needs clearly
Use the correct reporting formats for communication
Document use, maintenance, and repair activities accurately
Report back and document any maintenance and repair issues in a timely manner
Maintenance communication is timely and accurate
Maintenance communication is documented

Learning Objectives

Explain the uses of equipment data
Discuss how to schedule repair and maintenance functions with respect to production requirements and production levels
Explain how communication for repair and maintenance issues demonstrates a knowledge of customer and business needs
List the parties that need to be involved of repair and maintenance issues
Describe the importance of documenting communications

Comments:

Criteria for AWS Entry Level Welder

Welding Processes	Welds	Cutting Processes	Cuts
FCAW	FCAW-gas Fillet welds in all positions on carbon steel Groove welds in all positions on carbon steel FCAW-self-shielded Fillet welds in all positions on carbon steel Groove welds in all positions on carbon steel	Air Carbon Arc-manual	Scarfing and Gouging Flat and Horizontal position On Carbon Steel
GMAW (MIG)	GMAW-S (Short Circuit) Fillet welds in all positions on carbon steel Groove welds in all positions on carbon steel GMAW-spray Fillet welds in 1F and 2F position on carbon steel Groove welds in 1G position on carbon steel GMAW-P (Pulse) Fillet welds in all positions on carbon steel Groove welds in all positions on carbon steel GMAW-Spray Fillet welds in all positions on aluminum Groove welds in all positions on aluminum	Oxy-fuel-manual	Straight/square edge and Shape/square edge and Straight/bevel edge and Scarfing and Gouging (SandG) Flat position Horizontal position for SandG only On Carbon steel
GTAW (TIG)	Carbon Steel Fillet welds in all positions Groove welds in all positions Stainless Steel Fillet welds in all positions Groove welds in all positions Aluminum Fillet welds in all positions Groove welds in all positions	Oxy-fuel-machine	Straight/square edge and straight/bevel edge Flat position On Carbon steel
SAW	N/A for entry level certification	Plasma-manual	Straight/square edge and Shape/square edge Flat position On Carbon Steel, Stainless Steel and Aluminum
SMAW (STICK)	Fillet weld all positions on carbon steel Groove weld in all positions on carbon steel		