Instructional Framework

Welding Technologies
48.0508.00

Domain 1: Welding and Thermal Cutting Processes Instructional Time: 50-60 %	
STANDARD: 3.0 SET UP AND USE SHIELDED METAL ARC WELDING (SMAW) EQUIPMENT	
3.1 Perform safety inspections of SMAW equipment and accessories	● Check power connections ● Check welding leads for exposed wire ● Check ventilation system ● Check insulation on Electrode Holder/Stinger ● Check machine settings
3.2 Set up and perform SMAW operations	● Correct amperage ● Type of current for processes ● Proper Personal Protective Equipment (PPE)
3.3 Identify the use, storage, and handling of various types of electrodes	● Electrode/Rod Classifications ● Number Classifications ● Proper storage for different electrodes
3.4 Perform surfacing welds	● Build up of weld ● Electrode/Rod selection ● Welding techniques
3.5 Perform fillet and groove welds in all positions	● American Welding Society (AWS) Identifications ● Weldabilty ● Welder performance qualification ● Fillet Surface Preparation ● Groove Surface Preparation
STANDARD: 4.0 SET UP AND USE GAS METAL ARC WELDING (GMAW) EQUIPMENT (MIG)	
4.1 Perform safety inspections of GMAW equipment and accessories	● Input power cords ● Welding lead ● Torch part, nozzle,contact tip, diffuser and trigger ● Machine settings ● Ventilation system ● Gas supply
4.2 Set up and perform GMAW operations	● Correct voltage ● Correct gas selection ● Proper Personal Protective Equipment (PPE)

4.3 Identify the use, storage, and handling of various types of filler materials	• Wire Classifications • Number Classifications • Proper storage for different weld wire
4.4 Select and use proper gases	• Gas classification • Wire classification • Identification of gas labels
4.5 Perform fillet and groove welds	• American Welding Society (AWS) Identifications • Weldabilty • Welder performance qualification • Fillet Surface Preparation • Groove Surface Preparation
4.6 Perform routine maintenance on GMAW wire feed equipment	• Torch parts • Drive wheels • Welding lead liner • Ground connection • Gas supply
4.7 Explain the GMAW transfer modes (e.g., short circuit, globular, spray, pulse spray)	• Gas selection/pressure settings • Current selection • Wire selection/diameter • Weld technique • Machine settings
STANDARD: 5.0 SET UP AND USE FLUX CORED ARC WELDING (FCAW) EQUIPMENT	
5.1 Perform safety inspections of FCAW equipment and accessories	• Input power cords • Welding lead • Torch part, nozzle,contact tip, diffuser and trigger • Machine settings • Ventilation system • Gas supply
5.2 Set up and perform FCAW (gas-shielded and self-shielded) operations	• Correct voltage • Correct gas selection • Additional Personal Protective Equipment (PPE)
5.3 Identify the use, storage, and handling of various types of filler material	• Wire Classifications • Number Classifications • Proper storage for different weld wire
5.4 Perform fillet and groove welds	• American Welding Society (AWS) Identifications • Weldability

	• Welder performance qualification • Fillet Surface Preparation • Groove Surface Preparation
5.5 Explain the difference between FCAW-G and FCAW-S welding processes	• External shielding • Internal shielding • Current selection
5.6 Perform maintenance on FCAW wire feed equipment	• Torch parts • Drive wheels • Welding lead liner • Ground connection • Gas supply
STANDARD: 6.0 SET UP AND USE GAS TUNGSTEN ARC WELDING (GTAW) EQUIPMENT (TIG	
6.1 Perform safety inspections of GTAW equipment and accessories	• Input power cords • Welding torch/foot pedal • Torch parts (nozzle,collet, collet body and back cap) • Machine settings • Ventilation system • Gas supply
6.2 Set up and perform GTAW operations	• Correct current • Correct gas selection • Additional Personal Protective Equipment (PPE) • Correct tungsten, material and filler metal selection
6.3 Identify the use, storage, and handling of various types of filler material	• Filler metal Classifications • Number Classifications • Proper storage for filler metal • Tungsten identification • Gas selection and settings
6.4 Select and use proper gases	• Gas classification • Identification of gas labels
6.5 Perform welds on aluminum	• Filler metal Classifications • Tungsten identification • Gas selection and settings • Current selection
6.6 Perform welds on stainless steel	• Filler metal Classifications • Tungsten identification • Gas selection and settings

	• Current selection
6.7 Perform welds on carbon steel	• Filler metal Classifications • Tungsten identification • Gas selection and settings • Current selection
STANDARD: 7.0 SET UP AND USE THERMAL CUTTING EQUIPMENT	
7.1 Perform safety inspections of OFC/PAC/CAG equipment and accessories	OFC • Gas cylinder secured safely • Regulators attach and secured safely • Check gas hoses and torch for damage and leaks PAC • Input power • Torch leads • Torch parts, tips and nozzles • Machine settings • Dry air supply CAG • Input power • Welding lead and torch • Electrode • Machine settings • Dry air supply
7.2 Set up and perform oxyfuel gas/cutting (OFC) operations	• Open gas cylinder values correctly • Set correct pressure on regulators • Remove fire hazards • Proper PPE
7.3 Set up and perform plasma arc cutting (PAC) operations	• Set machine for correct material thickness • Set air pressure for correct material thickness • Proper torch and ground for cutting • Remove fire hazards • Proper PPE
7.4 Set up and perform air carbon arc gouging (CAG) operations	• Set machine & amps to correct material thickness • Set air pressure • Set ground and torch correctly

	• Select correct size of carbon arc rod • Remove fire hazard • Proper PPE
7.5 Set up and perform semi-automatic cutting (track torch) operations	• Open gas cylinder values correctly • Set correct pressure on regulators • Remove fire hazards • Proper PPE

Domain 2: Auxiliary Tools and Equipment **Instructional Time: 10-20 %**	
STANDARD: 9.0 USE AUXILIARY EQUIPMENT AND TOOLS	
9.1 Perform safety inspections of equipment and accessories	• Input power cords and connections • Insure all guards are in place and operational
9.2 Use mechanical/abrasive cutting equipment	• Proper techniques • Insure all guards are in place and operational • Follow manufacturer recommendations for RPM and material rating
9.3 Use power equipment to wire brush metal	• Proper operational techniques
9.4 Use multi-purpose shear and punch (ironworker)	• Follow proper manufacture operation • Use of proper PPE
9.5 Identify and describe the use of metal forming equipment (i.e., metal rollers, metal brakes)	• Follow proper techniques for setup and operations • Pinch points and guards
9.6 Use drilling equipment	• Setting and operations as per the manufacturer's recommendations • Drill size and speed
9.7 Use welding-related hand tools	• Working knowledge of the proper TOOLS

Domain 3: Blueprint and Weld Testing **Instructional Time: 10-20 %**	
STANDARD: 2.0 LAY OUT AND FIT UP A PROJECT FROM A BLUEPRINT	
2.1 Identify basic elements of a welding drawing	• Proper selection and use of the reference line, tail and arrow components of the drawing

2.2 Interpret welding symbols and specifications for welding procedure	● Proper identification and location of symbols
2.3 Use measuring devices	● Math techniques, use of various tools for layout and measuring.
2.4 Fabricate parts from a drawing or sketch	● Must display knowledge and proper identification of symbols of the manufacturing process.
STANDARD: 8.0 PERFORM WELDMENT TESTING	
8.1 Describe non destructive testing methods	● Visual, radiographic,dye inspection
8.2 Perform destructive testing methods	● Guided bend test ● Tensile strength
8.3 Perform a visual inspection on a weld	● Visual inspection based on weld defects

Domain 4: Health and Safety **Instructional Time: 10-20 %**	
STANDARD: 1.0 MAINTAIN THE SAFETY AND HEALTH OF WELDERS	
1.1 Use appropriate personal protective equipment (PPE) (e.g., helmets, gloves, safety glasses)	● Recognize and evaluate the proper use of safety equipment
1.2 Explain safe operations for work in confined spaces	● Knowledge of OSHA guidelines
1.3 Identify types and safe use of respiratory equipment	● OSHA guidelines on particulates, vapors, and gases
1.4 Describe the management of welding and cutting fumes and gases	● Fume extraction awareness
1.5 Explain Hot Work operations	● Per OSHA guidelines
1.6 Identify handling methods and storage of compressed gas cylinders	● Per OSHA guidelines
1.7 Follow job safety regulations and procedures according to OSHA guidelines	● Per OSHA guidelines
1.8 Locate and refer to information found on Safety Data Sheets (SDSs)	● Per OSHA guidelines