WELDING TECHNOLOGIES 48.0508.00
TECHNICAL STANDARDS

An Industry Technical Standards Validation Committee developed and validated these standards on February 18, 2021. The Arizona Career and Technical Education Quality Commission, the validating authority for the Arizona Skills Standards Assessment System, endorsed these standards on May 19, 2021.

Note: Arizona's Professional Skills are taught as an integral part of the Welding Technologies program.

The Technical Skills Assessment for Welding Technologies is available SY2022–2023

Note: In this document i.e. explains or clarifies the content and e.g. provides examples of the content that must be taught.

STANDARD 1.0 MAINTAIN THE SAFETY AND HEALTH OF WELDERS

1.1 Use appropriate personal protective equipment (PPE) (e.g., helmets, shading, gloves, safety glasses, and hearing protection)
1.2 Explain safe operations for work in confined spaces
1.3 Identify types and safe use of respiratory equipment
1.4 Describe the best possible means of ventilation available for the management of welding, cutting, and brazing fumes and gases pre- and post-combustion
1.5 Explain Hot Work operations
1.6 Identify safe handling procedures and storage of compressed gas cylinders (i.e., label identification, cap placement, ANSI-Z- 49, etc.)
1.7 Follow job safety regulations and procedures according to OSHA guidelines
1.8 Recognize the purpose of precautionary labels as well as Safety Data Sheets (SDSs)
1.9 Follow established procedures and policies for implementing emergency action plans and for the use of safety equipment
1.10 Describe the proper use of fire safety equipment in the work area (i.e., fire extinguisher, fire blanket, etc.)

STANDARD 2.0 LAY OUT AND FIT UP A PROJECT FROM A BLUEPRINT

2.1 Identify basic elements of a fabrication drawing
2.2 Interpret welding symbols and Welding Specification Procedure (WPS)
2.3 Use measuring devices and perform conversions (i.e., standard, metric, tape measure, digital or laser measurement tool, fillet weld gauges, V-WAC, etc.)
2.4 Prepare an applicable bill of materials
2.5 Use weld symbols (i.e., weld length, location, size, grind flush, etc.) and joint design (i.e., WPS) to prepare and fabricate parts from a fabrication drawing
2.6 Prepare weld joints and perform welding operations using welding symbol information (i.e., grinding, cleaning, wire wheel, abrasives, etc.)

STANDARD 3.0 SET UP AND USE SHIELDED METAL ARC WELDING (SMAW) EQUIPMENT

3.1 Describe basic SMAW theory (i.e., DC/AC current, CC/CV voltage output, polarity, etc.)
3.2 Perform safety inspections of SMAW equipment and accessories
3.3 Set up and perform SMAW operations
3.4 Describe the use, storage, and handling of various types of electrodes (i.e., rod ovens, electrode classification, etc.)
3.5 Perform surface welding (i.e., bead on plate, pad welding, etc.)
3.6 Perform fillet and groove welds in all positions
3.7 Perform minor external repairs to equipment and accessories (i.e., change out electrode holder or work-piece clamp, etc.)
3.8 Identify and inspect repairs in welding cables and demonstrate proper welding cable repairs using approved guidelines.

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STANDARD 4.0 SET UP AND USE GAS METAL ARC WELDING (GMAW) EQUIPMENT (MIG)

4.1 Describe basic GMAW theory (e.g., transfer modes, short circuit, globular, spray transfer, and pulse)

4.2 Perform safety inspections and make minor external repairs on GMAW equipment and accessories (i.e., liners, etc.)

4.3 Set up and perform GMAW operations (i.e., change wire spools, drive rolls, etc.)

4.4 Identify the use, storage, and handling of various types of filler materials

4.5 Identify proper shielding gases and flow rates

4.6 Perform surface, fillet, and groove welds in all positions

STANDARD 5.0 SET UP AND USE FLUX CORED ARC WELDING (FCAW) EQUIPMENT

5.1 Describe basic FCAW theory (e.g., polarity, self-shielded (FCAW-S), gas-shielded (FCAW-G), and CV)

5.2 Perform safety inspections and make minor external repairs on FCAW equipment and accessories

5.3 Set up and perform FCAW (gas-shielded and self-shielded) operations (i.e., change wire spools, drive rolls, etc.)

5.4 Identify the electrode classification and the use, storage, and handling of various types of filler material

5.5 Perform surface, fillet, and groove welds in all positions

STANDARD 6.0 SET UP AND USE GAS TUNGSTEN ARC WELDING (GTAW) EQUIPMENT (TIG)

6.1 Describe basic GTAW theory (e.g., wave forms, torch parts, current, polarity, and tungsten types)

6.2 Perform safety inspections and make minor repairs on GTAW equipment and accessories

6.3 Set up and perform GTAW operations [i.e., tungsten grinding, torch set-up (collets, collet bodies, gas nozzles), etc.]

6.4 Identify the filler rod classification and the use, storage, and handling of various types of filler material

6.5 Select and use proper shielding gases and flow rates

6.6 Perform surface, fillet, and groove welds in all positions using different alloys (i.e., carbon steel, aluminum, stainless steel, etc.)

STANDARD 7.0 SET UP AND USE THERMAL CUTTING EQUIPMENT

7.1 Describe basic thermal cutting theory for OFC, PAC, CAC, and CAG

7.2 Perform safety inspections and make minor repairs on OFC, PAC, CAC, and CAG equipment and accessories

7.3 Set up and perform thermal cutting processes [i.e., OFC, PAC, CAC, CAG, semi-automatic cutting (track torch), etc.] making straight, bevel, and shape cuts (i.e., acetylene, propylene, propane, MAP gas, etc.)

7.4 Perform gouging operations and weld removal

STANDARD 8.0 PERFORM WELDMENT TESTING

8.1 Describe the theory of weld testing and inspection (i.e., destructive, non-destructive, etc.)

8.2 Inspect all welds including FIT-UP, tacks, root passes, intermediate layers, and completed welds (i.e., discontinuities, defects, size, location, quality, etc.)

8.3 Use typical inspection tools (i.e., fillet weld gauges, lighting, magnification, ruler, scale, caliper, v-wac gauge, guided bend tester, magnetic particle testing, dye penetrant testing, etc.)

8.4 Perform a visual inspection on a weld

8.5 Perform destructive testing methods

STANDARD 9.0 USE AUXILIARY EQUIPMENT AND TOOLS

9.1 Perform safety inspections and assessment for serviceability of equipment and accessories (i.e., grinders, extension cords, etc.)

9.2 Identify different abrasives and cutting equipment (i.e., cutting wheels, grinding wheels, flapper disks, wire wheels, band saw, cold saw, chop saw, etc.)

9.3 Use appropriate mechanical/abrasive cutting equipment [i.e, grinders (angle, tungsten, pedestal), belt sander, saws (chop, band, cold), etc.]

9.4 Describe the use of metal forming equipment (i.e., ironworker, multi-purpose shear and punch, metal rollers, metal brakes, etc.)

9.5 Use drilling equipment (i.e., drill press, hand drill, mag drill, etc.)

9.6 Use welding-related hand tools (i.e., layout and measuring tools, scribes, center punch, squares, vice grips, clamps, welpers, etc.)

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