

# 2025 WELDING

## Program Standards

### CONTENT STANDARD 1.0: PROFESSIONAL ORGANIZATIONS AND LEADERSHIP

#### Performance Standard 1.1: Student Leadership in Career Technical Student Organizations (CTSO) and Professional Associations

- 1.1.1 Explore the role of professional organizations and/or associations in the Welding Industry.
- 1.1.2 Define the value, role, and opportunities provided through career technical student organizations.
- 1.1.3 Engage in career exploration and leadership development.

### CONTENT STANDARD 2.0: LAB ORGANIZATION AND SAFETY PROCEDURES

#### Performance Standard 2.1: General Lab Safety Rules and Procedures

- 2.1.1 Describe general shop safety rules and procedures (i.e., pass a safety test).
- 2.1.2 Describe the Occupational Safety and Health Administration's (OSHA's) role in ensuring workplace safety.
- 2.1.3 Describe and comply with the required use of safety glasses, ear protection, gloves, and shoes (i.e., personal protection equipment [PPE]) during lab/shop activities.
- 2.1.4 Operate equipment according to manufacturer and general safety guidelines.
- 2.1.5 Operate lifting equipment to manufacturer specifications.
- 2.1.6 Describe work area ventilation requirements and best practices.
- 2.1.7 Identify safety markings and what they indicate.
- 2.1.8 Identify types of fire extinguishers and fire safety equipment.
- 2.1.9 Describe classes of fire extinguishers and procedures for using fire extinguishers and fire safety equipment.
- 2.1.10 Describe procedures for using eye wash stations.
- 2.1.11 Describe and wear appropriate clothing for shop activities.
- 2.1.12 Describe safe working procedures when working with high-voltage circuits.
- 2.1.13 Describe and follow lockout/tagout procedures.
- 2.1.14 Describe information contained on safety data sheets (SDS) and where they are kept.
- 2.1.15 Maintain a safe, clean, and organized work area.
- 2.1.16 Describe the components of a Hot Work Permit.
- 2.1.17 Define a confined space.

#### Performance Standard 2.2: Hand Tools

- 2.2.1 Identify hand tools and their functions.
- 2.2.2 Demonstrate appropriate use of hand tools.
- 2.2.3 Demonstrate appropriate cleaning, storage, and maintenance of hand tools.

#### Performance Standard 2.3: Power Tools and Equipment

- 2.3.1 Describe power tools and their functions.
- 2.3.2 Describe shop equipment and its functions.
- 2.3.3 Demonstrate procedures for using power tools and equipment.
- 2.3.4 Demonstrate procedures for cleaning, storing, and maintaining power tools and equipment.

### CONTENT STANDARD 3.0: FUNDAMENTAL PRINT READING, MEASUREMENT TECHNIQUES

#### Performance Standard 3.1: Print Reading and Sketching/Drawing Practices

- 3.1.1 Interpret elements (e.g., title block information, dimensions, line types) of a technical drawing.
- 3.1.2 Interpret industry standard welding symbols.

- 3.1.3 Prepare a materials/cut list from a technical drawing (i.e., bill of material).
- 3.1.4 Apply dimensioning techniques to drawings.
- 3.1.5 Sketch or draw a welding project.

**Performance Standard 3.2: Measuring Techniques**

- 3.2.1 Identify industry standard units of measure.
- 3.2.2 Convert between customary standard and metric systems.
- 3.2.3 Calculate size, area, and volume.
- 3.2.4 Convert between fractions and decimals.
- 3.2.5 Measure objects, using measurement tools common to welding.

**CONTENT STANDARD 4.0: PROPERTIES OF METALS**

**Performance Standard 4.1: Material Types and Properties**

- 4.1.1 Compare ferrous and non-ferrous metals.
- 4.1.2 Identify forms and shapes of structural metals.

**Performance Standard 4.2: Filler Metals**

- 4.2.1 Describe the American Welding Society (AWS) filler metal classification systems.
- 4.2.2 Identify types of filler metals.
- 4.2.3 Describe storage procedures for filler metals.

**CONTENT STANDARD 5.0: SHIELDED METAL ARC WELDING (SMAW) TECHNIQUES**

**Performance Standard 5.1: Safety Procedures for SMAW**

- 5.1.1 Describe types of welding current and polarity.
- 5.1.2 Perform safety inspections of SMAW equipment and accessories.
- 5.1.3 Maintain SMAW equipment and accessories.

**Performance Standard 5.2: SMAW on Carbon Steel**

- 5.2.1 Set up for SMAW operations.
- 5.2.2 Perform welds by operating SMAW equipment.
- 5.2.3 Perform welds in the 1F position.
- 5.2.4 Perform welds in the 2F position.
- 5.2.5 Perform welds in the 3F position.
- 5.2.6 Perform welds in the 1G position.
- 5.2.7 Perform welds in the 2G position.
- 5.2.8 Perform welds in the 3G position.
- 5.2.9 Describe welds made in the 4F and 4G plate position.
- 5.2.10 Identify 2G, 5G, and 6G pipe welding positions.

**CONTENT STANDARD 6.0: WIRE-FEED PROCESSES**

**Performance Standard 6.1: Safety Procedures for GMAW/Wire-Feed**

- 6.1.1 Describe the use of GMAW equipment.
- 6.1.2 Describe GMAW transfer modes (e.g., spray transfer, globular, short circuit, pulse).
- 6.1.3 Perform safety inspections of GMAW equipment and accessories.
- 6.1.4 Maintain GMAW equipment and accessories.
- 6.1.5 Demonstrate safe startup, shutdown, disassembly, and cylinder exchange procedures for GMAW equipment.

**Performance Standard 6.2: GMAW-S/Wire-Feed on Carbon Steel**

- 6.2.1 Set up for GMAW-S operations.
- 6.2.2 Perform welds by operating GMAW-S equipment.
- 6.2.3 Perform welds in the 1F position.
- 6.2.4 Perform welds in the 2F position.
- 6.2.5 Perform welds in the 3F position.
- 6.2.6 Perform welds in the 1G position.
- 6.2.7 Perform welds in the 2G position.
- 6.2.8 Perform welds in the 3G position.

**Performance Standard 6.3: Flux-Cored Arc Welding**

- 6.3.1 Describe the FCAW-G/dual shield process.
- 6.3.2 Describe the FCAW-S/inner shield process.

## CONTENT STANDARD 7.0: GAS TUNGSTEN ARC WELDING (GTAW) TECHNIQUES

### Performance Standard 7.1: Safety Procedures

- 7.1.1 Perform safety inspections of GTAW equipment and accessories.
- 7.1.2 Maintain GTAW equipment and accessories.
- 7.1.3 Demonstrate safe startup, shutdown, disassembly, and cylinder exchange procedures of GTAW equipment.

### Performance Standard 7.2: Welds Using GTAW on Carbon Steel

- 7.2.1 Set up for GTAW operations.
- 7.2.2 Operate GTAW equipment.
- 7.2.3 Perform welds in the 1F position.
- 7.2.4 Perform welds in the 2F position.
- 7.2.5 Perform welds in the 1G position.

### Performance Standard 7.3: Welds Using GTAW on Aluminum

- 7.3.1 Describe setup requirements for GTAW welding aluminum.
- 7.3.2 Describe operation requirements for GTAW welding aluminum.

## CONTENT STANDARD 8.0: THERMAL CUTTING PROCESSES

### Performance Standard 8.1: Oxy-Fuel Gas Cutting (OFC)

- 8.1.1 Perform safety inspections of OFC equipment and accessories.
- 8.1.2 Maintain OFC equipment and accessories.
- 8.1.3 Demonstrate safe startup, shutdown, disassembly, and cylinder exchange procedures of OFC equipment.
- 8.1.4 Set up for OFC operations.
- 8.1.5 Perform cutting by operating OFC equipment.
- 8.1.6 Perform straight, square-edge cutting operations in the flat position.
- 8.1.7 Perform shape, square-edge cutting operations in the flat position.
- 8.1.8 Perform straight, bevel-edge cutting operations in the flat position.

### Performance Standard 8.2: Plasma Arc Cutting (PAC) on Carbon Steel and Aluminum

- 8.2.1 Describe the PAC/plasma process.
- 8.2.2 Determine the appropriate PAC/plasma settings for various types of metals.
- 8.2.3 Perform safety inspections of PAC/plasma equipment and accessories.
- 8.2.4 Maintain PAC/plasma equipment and accessories.
- 8.2.5 Set up for PAC/plasma operations.
- 8.2.6 Perform cutting by operating PAC/plasma equipment.
- 8.2.7 Perform straight, square-edge cutting operations in the flat position.
- 8.2.8 Perform shape, square-edge cutting operations in the flat position.

## CONTENT STANDARD 9.0: WELDING CODES, INSPECTIONS, AND TESTING PRINCIPLES

### Performance Standard 9.1: Welding Codes, Qualifications, and Certifications

- 9.1.1 Describe the role of welding inspection/inspector and testing in the industry.
- 9.1.2 Identify weld imperfections (i.e., discontinuities, defects) and their causes.
- 9.1.3 Describe welder qualification tests.
- 9.1.4 Describe common destructive-testing methods.
- 9.1.5 Describe common non-destructive-testing methods.
- 9.1.6 Perform a visual inspection of welds.

## CONTENT STANDARD 10.0: FABRICATION FUNDAMENTALS

### Performance Standard 10.1: Base Metal Preparation Fundamentals

- 10.1.1 Clean base metal for welding or cutting.
- 10.1.2 Select the proper joint design based on welding procedure specifications (WPS) or instructor's direction.
- 10.1.3 Mechanically bevel the edge of a mild steel plate, using a hand beveller and grinder.

