



Welding (T&I)

Criticality Survey 2025

CONTENT STANDARD 1.0: PROFESSIONAL ORGANIZATIONS AND LEADERSHIP

Performance Standard 1.1: Effective Leadership and Participation 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.	1.41
1.1.2	Define the value, role, and opportunities provided through career technical student organizations.	1.32
1.1.3	Engage in career exploration and leadership development.	1.21

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).	2.59
2.1.2	Describe the Occupational Safety and Health Administration's (OSHA's) role in ensuring workplace safety.	2.25
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.	2.66
2.1.4	Operate equipment according to manufacturer and general safety guidelines.	2.59
2.1.5	Operate lifting equipment to manufacturer specifications.	2.09
2.1.6	Describe work area ventilation requirements and best practices.	1.97
2.1.7	Identify safety markings and what they indicate.	2.22
2.1.8	Identify types of fire extinguishers and fire safety equipment.	2.00
2.1.9	Describe classes of fire extinguishers and procedures for using fire extinguishers and fire safety equipment.	1.91
2.1.10	Describe procedures for using eye wash stations.	2.13
2.2.11	Describe and wear appropriate clothing for shop activities.	2.34
2.1.12	Describe safe working procedures when working with high-voltage circuits.	2.09
2.1.13	Describe and follow lockout/tagout procedures.	2.25
2.1.14	Describe information contained on safety data sheets (SDS) and where they are kept.	2.13
2.1.15	Maintain a safe, clean, and organized work area.	2.41
2.1.16	Describe the components of a Hot Work Permit.	1.88
2.1.17	Define a confined space.	2.00

Performance Standard 2.2: Hand Tools

2.2.1	Identify hand tools and their functions.	2.28
2.2.2	Demonstrate appropriate use of hand tools.	2.38
2.2.3	Demonstrate appropriate cleaning, storage, and maintenance of hand tools.	2.03

Performance Standard 2.3: Power Tools and Equipment

2.3.1	Describe power tools and their functions.	2.16
2.3.2	Describe shop equipment and its functions.	2.10
2.3.3	Demonstrate procedures for using power tools and equipment.	2.16
2.3.4	Demonstrate procedures for cleaning, storing, and maintaining power tools and equipment.	1.97
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.	2.39
3.1.2	Interpret industry standard welding symbols.	2.45
3.1.3	Prepare a materials/cut list from a technical drawing (i.e., bill of material).	2.03
3.1.4	Apply dimensioning techniques to drawings.	1.90
3.1.5	Sketch or draw a welding project.	1.81
Performance Standard 3.2: Measuring Techniques		
3.2.1	Identify industry standard units of measure.	2.65
3.2.2	Convert between customary standard and metric systems.	1.65
3.2.3	Calculate size, area, and volume.	1.65
3.2.4	Convert between fractions and decimals.	2.23
3.2.5	Measure objects, using measurement tools common to welding.	2.68
CONTENT STANDARD 4.0: PROPERTIES OF METALS		
Performance Standard 4.1: Material Types and Properties		
4.1.1	Compare ferrous and non-ferrous metals.	2.03
4.1.2	Identify forms and shapes of structural metals.	2.19
Performance Standard 4.2: Filler Metals		
4.2.1	Describe the American Welding Society (AWS) filler metal classification systems.	1.87
4.2.2	Identify types of filler metals.	2.13
4.2.3	Describe storage procedures for filler metals.	2.00
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.	2.37
5.1.2	Perform safety inspections of SMAW equipment and accessories.	2.20
5.1.3	Maintain SMAW equipment and accessories.	2.23
Performance Standard 5.2: SMAW on Carbon Steel		
5.2.1	Set up for SMAW operations.	2.43
5.2.2	Perform welds by operating SMAW equipment.	2.43
5.2.3	Perform welds in the 1F position.	2.40
5.2.4	Perform welds in the 2F position.	2.57
5.2.5	Perform welds in the 3F position.	2.47
5.2.6	Perform welds in the 1G position.	2.57
5.2.7	Perform welds in the 2G position.	2.50
5.2.8	Perform welds in the 3G position.	2.40
5.2.9	Describe welds made in the 4F and 4G plate position.	2.10

5.2.10	Identify 2G, 5G, and 6G pipe welding positions.	2.13
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.	2.38
6.1.2	Describe GMAW transfer modes (e.g., spray transfer, globular, short circuit, pulse).	2.10
6.1.3	Perform safety inspections of GMAW equipment and accessories.	2.28
6.1.4	Maintain GMAW equipment and accessories.	2.28
6.1.5	Demonstrate safe startup, shutdown, disassembly, and cylinder exchange procedures for GMAW equipment.	2.55
Performance Standard 6.2: GMAW-S/Wire-Feed on Carbon Steel		
6.2.1	Set up for GMAW-S operations.	2.39
6.2.2	Perform welds by operating GMAW-S equipment.	2.39
6.2.3	Perform welds in the 1F position.	2.25
6.2.4	Perform welds in the 2F position.	2.39
6.2.5	Perform welds in the 3F position.	2.32
6.2.6	Perform welds in the 1G position.	2.43
6.2.7	Perform welds in the 2G position.	2.36
6.2.8	Perform welds in the 3G position.	2.32
Performance Standard 6.3: Flux-Cored Arc Welding		
6.3.1	Describe the FCAW-G/dual shield process.	2.14
6.3.2	Describe the FCAW-S/inner shield process.	1.96
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.	2.14
7.1.2	Maintain GTAW equipment and accessories.	2.18
7.1.3	Demonstrate safe startup, shutdown, disassembly, and cylinder exchange procedures of GTAW equipment.	2.29
Performance Standard 7.2: Welds Using GTAW on Carbon Steel		
7.2.1	Set up for GTAW operations.	2.11
7.2.2	Operate GTAW equipment.	2.14
7.2.3	Perform welds in the 1F position.	2.00
7.2.4	Perform welds in the 2F position.	2.04
7.2.5	Perform welds in the 1G position.	2.11
Performance Standard 7.3: Welds Using GTAW on Aluminum		
7.3.1	Describe setup requirements for GTAW welding aluminum.	1.71
7.3.2	Describe operation requirements for GTAW welding aluminum.	1.68
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.	2.30
8.1.2	Maintain OFC equipment and accessories.	2.26
8.1.3	Demonstrate safe startup, shutdown, disassembly, and cylinder exchange procedures of OFC equipment.	2.30

8.1.4	Set up for OFC operations.	2.30
8.1.5	Perform cutting by operating OFC equipment.	2.30
8.1.6	Perform straight, square-edge cutting operations in the flat position.	2.19
8.1.7	Perform shape, square-edge cutting operations in the flat position.	2.19
8.1.8	Perform straight, bevel-edge cutting operations in the flat position.	2.07
Performance Standard 8.2: Plasma Arc Cutting (PAC) on Carbon Steel and Aluminum		
8.2.1	Describe the PAC/plasma process.	2.07
8.2.2	Determine the appropriate PAC/plasma settings for various types of metals.	2.04
8.2.3	Perform safety inspections of PAC/plasma equipment and accessories.	2.11
8.2.4	Maintain PAC/plasma equipment and accessories.	2.04
8.2.5	Set up for PAC/plasma operations.	2.07
8.2.6	Perform cutting by operating PAC/plasma equipment.	2.11
8.2.7	Perform straight, square-edge cutting operations in the flat position.	2.07
8.2.8	Perform shape, square-edge cutting operations in the flat position.	2.07
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.	1.85
9.1.2	Identify weld imperfections (i.e., discontinuities, defects) and their causes.	2.33
9.1.3	Describe welder qualification tests.	2.04
9.1.4	Describe common destructive-testing methods.	1.67
9.1.5	Describe common nondestructive-testing methods.	1.70
9.1.6	Perform a visual inspection of welds.	2.52
CONTENT STANDARD 10.0: FABRICATION FUNDAMENTALS		
Performance Standard 10.1: Base Metal Preparation Fundamentals		
10.1.1	Clean base metal for welding or cutting.	2.59
10.1.2	Select the proper joint design based on welding procedure specifications (WPS) or instructor's direction.	2.52
10.1.3	Mechanically bevel the edge of a mild steel plate, using a hand beveller and grinder.	2.33
Performance Standard 10.2: Fabrication Techniques		
10.2.1	Construct projects in proper sequence.	2.48
10.2.2	Demonstrate setup of fabrication area, equipment, and materials.	2.44
10.2.3	Lay out projects from welding prints, using appropriate tools.	2.30
10.2.4	Check for joint misalignment and poor fit-up before and after welding.	2.56
10.2.5	Check work for accuracy according to project plans.	2.59
10.2.6	Describe distortion and methods for controlling it.	2.33