

Gas Tungsten Arc Welding and Plasma Arc Cutting

State of Oklahoma Welding Duty/Task Crosswalk

The following state of Oklahoma welding tasks, which are aligned to AWS standards, are covered in this publication. The first column identifies Oklahoma's task by name and number. The second column identifies the exact location by unit number and objective, assignment sheet, or job sheet in this MAVCC publication unless otherwise noted.

Occupation: Gas Tungsten Arc Welder	MAVCC Tasks
Duty A: Demonstrate Employability Skills	
A.18 Identify employment opportunities	<i>Fundamentals of Welding</i> , Unit 1, Objective 7— Job outlook for welders; Objective 9—Career opportunities for welders; Assignment Sheet 2— Compare employment opportunities in welding
A.19 Identify levels of training recommended for related careers	<i>Fundamentals of Welding</i> , Unit 1, Objective 8— What it takes to become a good welder
A.20 Understand salary, wages and benefits packages	<i>Fundamentals of Welding</i> , Unit 1, Objective 6— What welders earn
Safety	
A.26 Explain the purpose for safety policies	<i>Fundamentals of Welding</i> , Unit 2, Objective 4— Hazard communication; Assignment Sheet 1— Complete the student safety pledge form; Assignment Sheet 5—Identify and correct safety violations
A.27 Discuss the role of OSHA and EPA — Locate information in MSDS	<i>Fundamentals of Welding</i> , Unit 2, Objective 6— Purposes of material safety data sheets; Student Supplement 1—Guidelines for interpreting material safety data sheets; Assignment Sheet 2—Interpret a material safety data sheet
A.28 Participate in OSHA training, if possible — Lock Out/Tag Out — HAZCOM — MSDS	<i>Fundamentals of Welding</i> , Unit 2, Objective 8— Safety tags and their color coding; Objective 19—Instances when lockout devices should be used <i>Fundamentals of Welding</i> , Unit 2, Objective 4— Hazard communication <i>Fundamentals of Welding</i> , Unit 2, Objective 6— Purposes of MSDS; Student Supplement 1— Guidelines for interpreting MSDS; Assignment Sheet 2—Interpret a material safety data sheet

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— Bloodborne Pathogens	<i>Fundamentals of Welding</i> , Unit 3, Objective 18—Basic first-aid procedures for various emergency situations
A.29 Explain the proper steps in reporting an accident or emergency	<i>Fundamentals of Welding</i> , Unit 3, Objective 16—General steps for handling any emergency situation; Objective 17—General guidelines for first aid emergencies; Assignment Sheet 1—Determine basic first aid measures for given emergency situations
A.30 Explain the hazards associated with specific types of equipment and tools	<i>Fundamentals of Welding</i> , Unit 2, Objective 3—General job and shop safety rules; Assignment Sheet 5—Identify and correct safety violations <i>GTAW and PAC</i> , Unit 1, Objective 10—Rules for handling hollow castings and containers; Objective 11—Hazards associated with arc rays
A.31 Perform machine operator safety checks of equipment and accessories, when necessary	<i>Fundamentals of Welding</i> , Unit 2, Assignment Sheet 5—Identify and correct safety violations; Unit 4, Objective 21—Basic rules for safe use of power tools and equipment
A.32 Practice tool safety	<i>Fundamentals of Welding</i> , Unit 2, Objective 3d—Tool use, maintenance, and storage safety; Unit 3, Objective 9—Rules for handling welding cables and gas and coolant hoses; Unit 4, Objective 20—Rules for hand tool safety; Objective 21—Basic rules for safe use of power tools and equipment; Objective 22—Rules for tool and equipment maintenance
A.33 Describe the types of fire hazards found in the workplace	<i>Fundamentals of Welding</i> , Unit 2, Objective 10—Components of fire triangle; Objective 11—Types of fires and classifications; Objective 12—Types of fire extinguishers; Objective 13—Fire extinguisher markings and class of fire they represent; Objective 14—Fire extinguisher operating instructions that follow P-A-S-S; Student Supplement 2—Using Portable Fire Extinguishers; Assignment Sheet 4—Determine correct fire extinguishers to use for various situations; Job Sheet 1—Operate a fire extinguisher

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A.34 Discuss electrical hazards	<i>Fundamentals of Welding</i> , Unit 2, Objective 3f—Electrical safety; Unit 3, Objective 19—Treating a victim of electrical shock <i>GTAW and PAC</i> , Unit 1, Objective 7—Electrical safety guidelines for GTAW
A.35 Demonstrate safe use of personal protective equipment	<i>Fundamentals of Welding</i> , Unit 2, Objective 20—Fall protection systems; Objective 21—Confined space entry; Objective 22—Environmental contaminants that would require you to use a respirator <i>GTAW and PAC</i> —Unit 1, Objective 11—Hazards associated with arc rays; Objective 12—Types of welding hoods; Objective 13—Guidelines for selecting a safe lens shade for GTAW; Objective 14—Protective clothing required for arc welding; Objective 15—Environmental safety requirements
A.36 Demonstrate safe material handling techniques — Lifting — Transporting — Storing	<i>Fundamentals of Welding</i> , Unit 2, Objective 15—Causes of back injuries; Objective 16—Guidelines for lifting and moving items safely; Job Sheet 2—Lift a heavy object properly
A.37 Understand established first aid procedures	<i>Fundamentals of Welding</i> , Unit 3, Objective 16—General steps for handling any emergency situation; Objective 17—General guidelines for first aid emergencies; Objective 18—Basic first-aid procedures for various emergency situations; Student Supplement 2—A Systematic Look at First Aid; Assignment Sheet 1—Determine basic first aid measures for given emergency situations
A.38 Practice good housekeeping	<i>GTAW and PAC</i> —All job sheets require students to clean up their work areas and return tools and equipment to proper storage.
A.39 Comply with company safety policies	<i>Fundamentals of Welding</i> , Unit 2, Assignment Sheet 1—Complete the student safety pledge form

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Basic Academic Skills	
<p>A.40 Apply mathematical operations involving whole numbers, fractions, decimals, percentages, mathematical word problems, ratios, etc., when necessary</p> <ul style="list-style-type: none"> — Addition — Subtraction — Multiplication — Division 	<p><i>Fundamentals of Welding</i>, Unit 6, Assignment Sheet 1—Add, subtract, multiply, and divide fractions; Assignment Sheet 2—Add, subtract, multiply, and divide decimal equivalents; Assignment Sheet 3—Convert fractions to decimal form, change fractions to a common denominator, and reduce fractions to lowest terms; Assignment Sheet 4—Write fractions as decimals and percents; Assignment Sheet 6—Write decimals as fractions and percents; Assignment Sheet 8—Make conversions with an inches-to-decimal conversion chart</p>
<p>A.41 Apply advanced mathematical operations, when necessary</p> <ul style="list-style-type: none"> — Algebra — Geometry — Trigonometry — Calculus — Statistical Methods 	<p><i>Fundamentals of Welding</i>, Unit 6, Objective 8, Terms used in geometry; Objective 9—Types of geometric figures; Objective 12—Area of geometric figures; Assignment Sheet 14—Calculate area of geometric figures; Job Sheet 1—Adjust a bevel square to a 45° angle using a framing square, a combination square, and a protractor; Job Sheet 2—Form 90° and 45° angles with a combination square and draw parallel lines on metal stock</p>
<p>A.42 Apply scientific principles, when necessary</p> <ul style="list-style-type: none"> — Physics — Chemistry 	<p><i>Fundamentals of Welding</i>, Unit 5, Objective 4—Metal identification tests; Objective 5—Mechanical properties of metals; Objective 6—Types of mechanical strengths; Objective 7—Physical properties of metals; Job Sheet 1—Conduct magnet tests to identify common metals used for welding; Job Sheet 2—Conduct chisel tests to identify common metals used for welding; Job Sheet 3—Conduct spark tests to identify common metals used for welding</p>
<p>A.43 Interpret charts, table, and graphs</p>	<p><i>Fundamentals of Welding</i>, Unit 6, Assignment Sheet 7—Make conversions with a decimal equivalent chart; Assignment Sheet 8—Make conversions with an inches-to-decimal conversion chart</p>
<p>A.44 Apply reading and writing skills, when necessary</p>	<p>Most assignment sheets require the student to read and write.</p>

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Blueprint Reading	
A.50. Identify basic elements of blueprints <ul style="list-style-type: none"> — Terms — Components — Symbols 	<i>Fundamentals of Welding</i> , Unit 7, “Welding Print Reading” <i>Fundamentals of Welding</i> , Unit 7, Objective 1—Terms related to print reading; Objective 2—Basic lines; Objective 13—Symbols
A.51 Discuss different types of drawings	<i>Fundamentals of Welding</i> , Unit 7, Objective 4—Isometric and oblique drawings
A.52 Interpret drawings <ul style="list-style-type: none"> — Bill of Materials — Revisions — Tolerances 	<i>Fundamentals of Welding</i> , Unit 7, Objective 4—Isometric and oblique drawings; Objective 6—Tolerancing; Objective 15—Requirements for a formal bill of material; Objective 16—Requirements for an informal bill of material; Assignment Sheet 5—Interpret tolerance dimensions in decimals, fractions, and degrees; Unit 8, Assignment Sheet 5—Interpret a welding print and welding procedure specifications
A.53 Interpret symbols	<i>Fundamentals of Welding</i> , Unit 7, Objective 13—Symbols
Measurement Tools and Techniques	
A.54 Identify types of measuring instruments	<i>Fundamentals of Welding</i> , Unit 6, Objective 6—Types of rules and examples of their graduations
A.55 Use appropriate measurement instrument for a measurement task	<i>Fundamentals of Welding</i> , Unit 6, Job Sheet 2—Form 90° and 45° angles with a combination square and draw parallel lines on metal stock
A.56 Read measuring instruments	<i>Fundamentals of Welding</i> , Unit 6, Objective 7—Steps in reading a rule; Assignment Sheet 9—Measure distances with 1”, 1/2” and 1/4” graduations; Assignment Sheet 10—Measure distances with 1/4” and 1/8” graduations; Assignment Sheet 12—Measure distances with 1/16” graduations; Job Sheet 1—Adjust a bevel square to a 45° angle using a framing square, a combination square, and a protractor; Job Sheet 2—Form 90° and 45° angles with a combination square and draw parallel lines on metal stock

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A.57 Identify the appropriate formula and units for a measurement task	<i>Fundamentals of Welding</i> , Unit 6, Objective 11—Squares, rectangles, and triangles and their formulas for calculating their perimeters; Objective 12—Area of geometric figures
A.58 Differentiate between English and Metric measurement systems, when necessary	<i>Fundamentals of Welding</i> , Unit 6, Objective 13—English-metric conversion charts and how to use them; Assignment Sheet 13—Make conversions with an English-metric conversion chart
A.59 Communicate measurements using proper symbols or words	<i>Fundamentals of Welding</i> , Unit 6, Objective 10—Units of measure and their equivalents
Duty B: Interpret Drawing and Welding Symbols and Written Welding Procedures	
<p>B.01 Interpret basic elements of drawing/sketch</p> <ul style="list-style-type: none"> — Structural members — Sequence of assembly — Dimensions and tolerances — Scale — View interpretation 	<p><i>Fundamentals of Welding</i>, Unit 7—Welding Print Reading (entire unit) <i>GTAW and PAC</i>—Unit 2, Job Sheets 5 through 16, 20 through 31</p> <p><i>Fundamentals of Welding</i>, Unit 7, Objective 14—Structural shapes</p> <p><i>Fundamentals of Welding</i>, Unit 7, Assignment Sheet 8—Construct adjacent parts in an assembly section</p> <p><i>Fundamentals of Welding</i>, Unit 7, Objective 5—Dimensioning; Objective 7—Methods of dimensioning; Assignment Sheet 5—Interpret tolerance dimensions in decimals, fractions, and degrees</p> <p><i>Fundamentals of Welding</i>, Unit 7, Objective 9—Reduction and enlargement scales</p> <p><i>Fundamentals of Welding</i>, Unit 7, Objective 3—Basic views; Objective 12—Types of section views; Student Supplement 2—Orthographic projection; Assignment Sheet 1—Construct a top view; Assignment Sheet 2—Construct a front view; Assignment Sheet 3—Construct a right side view; Assignment Sheet 7—Make a three-view sketch</p>

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<ul style="list-style-type: none"> — List of materials 	<i>Fundamentals of Welding</i> , Unit 7, Objective 15—Requirements for a formal bill of materials; Objective 16—Requirements for an informal bill of materials
B.02 Interpret welding symbol information <ul style="list-style-type: none"> — Type of weld required — Filler metal — Special details — Non-destructive testing requirements 	<i>GTAW and PAC</i> —Unit 2, Job Sheets 5 through 16, 20 through 31 <i>Fundamentals of Welding</i> , Unit 8, Basic Welding Joints and Symbols (entire unit)
B.03 Interpret written welding procedures <ul style="list-style-type: none"> — Procedure ID number cross-referencing to drawing — Appropriate welding process/base materials/filler materials — Appropriate machine settings 	<i>GTAW and PAC</i> —Unit 2, “GTAW Equipment, Applications, and Techniques”—All job sheets
Duty F: Perform Gas Tungsten Arc Welding (GTAW)	
F.01 Perform safety inspections of equipment and accessories <ul style="list-style-type: none"> — Protective clothing and equipment — Hand tools — Welding equipment and accessories — Shielding gas equipment and accessories — Work area 	<i>GTAW and PAC</i> , Unit 2—All job sheets require students to practice safety precautions. <i>Fundamentals of Welding</i> , Unit 2, “General Safety” and Unit 3, “Welding Safety and First Aid” cover safety in detail.
F.02 Make minor external repairs to equipment and accessories (preventative maintenance only) <ul style="list-style-type: none"> — Manufacturer’s recommendations — Company repair policy — Equipment troubleshooting <ul style="list-style-type: none"> – Porosity – Gas leaks 	<i>GTAW and PAC</i> , Unit 2, Objective 24—Guidelines for troubleshooting GTAW problems; Student Supplement 3—Troubleshooting guide for GTAW
F.03 Set up for gas tungsten arc welding operations on plain carbon steel, aluminum, and stainless steel plate <ul style="list-style-type: none"> — Review appropriate weld problems — Filler metal selection — Adjust voltage — Proper gas flow rate — Parts set up and preheated as necessary — Base metal preparation 	<i>GTAW and PAC</i> , Unit 2, Job Sheet 1—Set up a flow meter regulator for GTAW shielding gases; Job Sheet 2—Set up and shut down GTAW equipment for welding mild or stainless steel; Job Sheet 17—Set up and shut down GTAW equipment for welding aluminum

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<p>F.04 Operate gas tungsten arc welding equipment</p> <ul style="list-style-type: none"> — Make fillet and groove welds on plain carbon steel plate, aluminum and stainless steel plate — Workmanship 	<p><i>GTAW and PAC</i>, Unit 2, Job Sheet 5—Strike and maintain an arc to make stringer beads on mild or stainless steel without filler metal in the flat position; Job Sheet 6—Strike and maintain an arc to make stringer beads on mild or stainless steel with filler metal in the flat position; Job Sheet 20—Strike and maintain an arc to make stringer beads on aluminum without filler metal in the flat position; Job Sheet 21—Strike and maintain an arc to make stringer beads on aluminum with filler metal in the flat position</p> <p><i>GTAW and PAC</i>, Unit 2, Job Sheets 7 through 16, Job Sheet 22 through 31</p>
<p>F.05 Make fillet welds, 2F and 3F positions, on plain carbon steel plate</p> <ul style="list-style-type: none"> — EWCe-2 electrodes 	<p><i>GTAW and PAC</i>, Unit 2, Job Sheet 10—Weld to specifications a fillet weld lap joint on mild or stainless steel in the horizontal position; Job Sheet 11—Weld to specifications a fillet weld T-joint on mild or stainless steel in the horizontal position; Job Sheet 12—Weld to specifications a fillet weld lap joint on mild or stainless steel in the vertical position; Job Sheet 13—Weld to specifications a fillet T-joint on mild or stainless steel in the vertical position</p>
<p>F.06 Make groove welds, 3G position without backing, on plain carbon steel plate EWCe-2 electrodes Note: EWTh-2 production has been curtailed due to radiation problems.</p>	<p><i>GTAW and PAC</i>, Unit 2, Job Sheet 14—Weld to specifications an open-root square-groove butt joint on mild or stainless steel in the vertical position</p>
<p>F.07 Make 1F-2F welds on aluminum plate</p> <ul style="list-style-type: none"> — EWP &/or EWZr tungsten electrodes 	<p><i>GTAW and PAC</i>, Unit 2, Job Sheet 22—Weld to specifications a fillet weld lap joint on aluminum in the flat position; Job Sheet 23—Weld to specifications a fillet weld T-joint on aluminum in the flat position; Job Sheet 25—Weld to specifications a fillet weld lap joint on aluminum in the horizontal position; Job Sheet 26—Weld to specifications a fillet weld T-joint on aluminum in the horizontal position</p>
<p>F.08 Make 1G with backing welds on aluminum plate EWP and/or EWZr tungsten electrodes</p>	<p>Not applicable</p>

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F.09 Make 1F-2F-3F welds on stainless steel plate EWCe-2 electrodes	<i>GTAW and PAC</i> , Unit 2, Job Sheet 7—Weld to specifications a fillet weld lap joint on mild or stainless steel in the flat position; Job Sheet 8—Weld to specifications a fillet weld T-joint on mild or stainless steel in the flat position; Job Sheet 10—Weld to specifications a fillet weld lap joint on mild or stainless steel in the horizontal position; Job Sheet 11—Weld to specifications a fillet weld T-joint on mild or stainless steel in the horizontal position; Job Sheet 12—Weld to specifications a fillet weld lap joint on mild or stainless steel in the vertical position; Job Sheet 13—Weld to specifications a fillet T-joint on mild or stainless steel in the vertical position
F.10 Make 1G-2G-3G welds on stainless steel plate EWCe-2 electrodes Note: EWTh-2 production has been curtailed due to radiation problems.	<i>GTAW and PAC</i> , Unit 2, Job Sheet 9—Weld to specifications an open-root square-groove butt joint on mild or stainless steel in the flat position; Job Sheet 14—Weld to specifications an open-root square-groove butt joint on mild or stainless steel in the vertical position
Duty G: Perform Manual Oxyfuel (OF) Cutting —Refer to <i>Oxyacetylene Welding and Cutting</i> for this duty.	
Duty I: Perform Air Carbon Arc Cutting (Gouging) —Refer to <i>Shielded Metal Arc Welding</i> for this duty.	
Duty J: Perform Plasma Arc Cutting and Gouging	
J.01 Perform safety inspections of equipment and accessories <ul style="list-style-type: none"> — Protective clothing and equipment — Plasma arc cutting equipment and accessories — Compressed gas system and accessories — Required tools — Work area — Communicate hazard warnings 	<p><i>GTAW and PAC</i>, Unit 3, Objective 4—Plasma arc electrical safety; Objective 5—Plasma arc environmental safety; Objective 6—Plasma arc workplace safety; All job sheets require students to practice safety precautions.</p> <p><i>Fundamentals of Welding</i>, Unit 2, “General Safety” and Unit 3, “Welding Safety and First Aid” cover safety in detail.</p>

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J.02 Make minor external repairs to equipment and accessories (preventative maintenance only) <ul style="list-style-type: none"> — Manufacturer’s recommendations — Company repair policy — Equipment troubleshooting (clean gas and tip) 	<i>GTAW and PAC</i> , Unit 3, Objective 13—PAC consumables, their characteristics and maintenance; Objective 22—Common cutting problems and their probable causes
J.03 Set up for manual plasma arc cutting operations on plain carbon steel, aluminum, and stainless steel plate <ul style="list-style-type: none"> — Regulator set for appropriate plasma gas — Tip selection based on gas 	<i>GTAW and PAC</i> , Unit 3, Job Sheet 1—Prepare a PAC machine for operation
J.04 Operate manual plasma arc cutting equipment	<i>GTAW and PAC</i> , Unit 3, Job Sheet 2—Complete a contact cut on selected metal; Job Sheet 3—Complete a stand-off cut on selected metal
J.05 Perform shape cutting operations on plain carbon steel, aluminum, and stainless steel plate	Not applicable
Duty K: Perform Welding Inspection and Testing	
K.01 Examine cut surfaces and edges of prepared base metal parts <ul style="list-style-type: none"> — Appearance — Uniformity — Proper fit-up — Base metal preparation 	<i>GTAW and PAC</i> , Unit 2, Job Sheets 7 through 16, Job Sheets 22 through 31
K.02 Examine tack, intermediate layers, and completed welds <ul style="list-style-type: none"> — Visual check for weld discontinuity and defects to an acceptable criteria — Destructive or non-destructive examination 	<i>GTAW and PAC</i> , Unit 2, Job Sheets 7 through 16, Job Sheets 22 through 31