

Oklahoma CTE

# **Gas Metal Arc Welding (2001)**

Adopted 2001

## Gas Metal Arc Welder

### A. Demonstrate Employability Skills

18. Identify employment opportunities. A. 18
19. Identify levels of training recommended for related careers. A. 19
20. Understand salary, wages and benefits packages. A. 20

#### Safety

26. Explain the purpose for safety policies. A. 26
27. Discuss the role of OSHA and EPA
  - Locate information in MSDSA. 27
28. Participate in OSHA training, if possible
  - Lock Out/Tag Out
  - HAZCOM
  - MSDS
  - Bloodborne PathogensA. 28
29. Explain the proper steps in reporting an accident or emergency. A. 29
30. Explain the hazards associated with specific types of equipment and tools. A. 30
31. Perform machine operator safety checks of equipment and accessories, when necessary. A. 31
32. Practice tool safety. A. 32
33. Describe the types of fire hazards found in the workplace. A. 33
34. Discuss electrical hazards. A. 34
35. Demonstrate safe use of personal protective equipment. A. 35
36. Demonstrate safe material handling techniques
  - Lifting
  - Transporting
  - StoringA. 36
37. Understand established first aid procedures. A. 37
38. Practice good housekeeping. A. 38
39. Comply with company safety policies. A. 39

#### Basic Academic Skills

40. Apply mathematical operations involving whole numbers, fractions, decimals, percentages, mathematical word problems, ratios, etc., when necessary
  - Addition
  - Subtraction
  - Multiplication
  - DivisionA. 40
41. Apply advanced mathematical operations, when necessary
  - Algebra
  - Geometry
  - Trigonometry
  - Calculus
  - Statistical MethodsA. 41
42. Apply scientific principles, when necessary
  - Physics
  - ChemistryA. 42
43. Interpret charts, table, and graphs. A. 43
44. Apply reading and writing skills, when necessary. A. 44

#### Blueprint Reading

50. Identify basic elements of blueprints
  - Terms
  - Components
  - Symbols A.50
51. Discuss different types of drawings. A.51
52. Interpret drawings
  - Bill of Materials
  - Revisions
  - Tolerances A.52
53. Interpret symbols. A.53

#### Measurement Tools and Techniques

54. Identify types of measuring instruments. A.54
55. Use appropriate measurement instrument for a measurement task. A.55
56. Read measuring instruments. A.56
57. Identify the appropriate formula and units for a measurement task. A.57
58. Differentiate between English and Metric measurement systems, when necessary. A.58
59. Communicate measurements using proper symbols or words. A.59

---

### **B. Interpret Drawing and Welding Symbols and Written Welding Procedures**

01. Interpret basic elements of drawing/sketch
  - Structural members
  - Sequence of assembly
  - Dimensions and tolerances
  - Scale
  - View interpretation
  - List of materials B.01
02. Interpret welding symbol information
  - Type of weld required
  - Filler metal
  - Special details
  - Non-destructive testing requirements B.02
03. Interpret written welding procedures
  - Procedure ID number
  - crossreferencing to drawing
  - Appropriate welding process/base materials/filler materials
  - Appropriate machine settings B.03

---

#### D. Perform Gas Metal Arc Welding (GMAW)

01. Perform safety inspections of equipment and accessories
  - Protective clothing
  - Equipment, accessories, and hand tools
  - Single or mixed shielding gas supply
  - Work area
  - Communicate hazard warnings to others D.01
02. Make minor external repairs to equipment and accessories (preventative maintenance only)
  - Manufacturer's recommendations
  - Company repair policy
  - Equipment troubleshooting
  - Birdnesting
  - Porosity
  - Gas leaks D.02
03. Set up for gas metal arc welding operations on plain carbon steel plate
  - ER70S-X electrodes
  - Filler metal selection
  - Proper hand tool selection
  - Adjust voltage and polarity
  - Set wire speed
  - Proper gas flow rate
  - Parts set up and preheated as necessary
  - Review appropriate weld
  - Base metal preparation D.03
04. Operate gas metal arc welding equipment
  - Short circuit transfer (flat, single pass, multi-pass, multi-directional) fillet weld of plain carbon steel in all positions
  - Short circuit transfer (flat, single pass, multi-pass, multi-directional) groove weld of plain carbon steel in all positions
  - Spray transfer (flat, single pass, multipass, and multi-directional) fillet weld of plain carbon steel plate
  - Spray transfer (flat, single pass, multipass, and multi-directional) groove weld of plain carbon steel in 1G position D.04
05. Short Circuit Transfer: Make fillet welds, all positions, on plain carbon steel in 2F position—flat, multiple pass, multi-directional, surfacing welds. D.05
06. Short Circuit Transfer: Make groove welds, all positions, on plain carbon steel plate with backing in 1G(R) without backing. D.06
07. Spray Transfer: Make 1F-2F welds on plain carbon steel plate
  - Flat, multi-directional
  - .035 or .045 diameter E70S-X electrodes
  - Argon/2%–5% Oxygen shielding gas D.07
08. Spray Transfer: Make 1G welds on plain carbon steel plate with backing. D.08

---

#### K. Perform Welding Inspection and Testing

01. Examine cut surfaces and edges of prepared base metal parts
  - Appearance
  - Uniformity
  - Proper fit-up
  - Base metal preparation K.01
02. Examine tack, intermediate layers, and completed welds
  - Visual check for weld discontinuity and defects to an acceptable criteria
  - Destructive or non-destructive examination K.02

---

#### Flux-Cored Arc Welder

- A. Demonstrate Employability Skills
  - Safety
  - Basic Academic Skills
  - Blueprint Reading
  - Measurement Tools and Techniques

---

## **B. Interpret Drawing and Welding Symbols and Written Welding Procedures**

01. Interpret basic elements of drawing/sketch
    - <li>Structural members</li>    - <li>Sequence of assembly</li>    - <li>Dimensions and tolerances</li>    - <li>Scale</li>    - <li>View interpretation</li>    - <li>List of materials</li></ul> B . 01
02. Interpret welding symbol information
    - <li>Type of weld required</li>    - <li>Filler metal</li>    - <li>Special details</li>    - <li>Non-destructive testing requirements</li></ul> B . 02
03. Interpret written welding procedures
    - <li>Procedure ID number crossreferencing to drawing</li>    - <li>Appropriate welding process/base materials/filler materials</li>    - <li>Appropriate machine settings</li></ul> B . 03

---

## **E. Perform Flux-Cored Arc Welding**

01. Perform safety inspections of equipment and accessories
    - <li>Protective clothing</li>    - <li>Equipment and hand tools</li>    - <li>Equipment and accessories</li>    - <li>Shielding gas equipment and accessories</li>    - <li>Work area</li></ul> E . 01
02. Make minor external repairs to equipment & accessories (preventative maintenance only)
    - <li>Manufacturer's recommendations</li>    - <li>Company repair policy</li>    - <li>Equipment troubleshooting</li>    - <li>Birdnesting</li>    - <li>Worm-holing</li>    - <li>Porosity</li>    - <li>Gas leaks</li></ul> E . 02
03. Set up for flux cored arc welding operations on plain carbon steel plate
    - <li>Mixed (75% argon/25% CO2) or single (CO2) shielding gas supply</li>    - <li>E71T-X (gas-shielded) and E71T-X (self-shielded) electrodes (.045 minimum)</li>    - <li>Review appropriate weld procedures</li>    - <li>Base metal preparation</li>    - <li>Filler metal selection</li>    - <li>Proper hand tool selection</li>    - <li>Adjust voltage</li>    - <li>Set wire speed</li>    - <li>Proper gas flow rate</li>    - <li>Parts set up and preheated as necessary</li></ul> E . 03
04. Operate flux cored arc welding equipment
    - <li>Flat single pass surfacing welds</li>    - <li>Flat multiple pass, multi-directional, surfacing welds</li>    - <li>Workmanship</li></ul> E . 04
05. Make fillet welds, 1F, 2F, 3F, on plain carbon steel plate. E . 05
06. Make groove weld, 1G, 2G, and 3G positions, on plain carbon steel plate with backing. E . 06

---

## **K. Perform Welding Inspection and Testing**

01. Examine cut surfaces and edges of prepared base metal parts
    - <li>Appearance</li>    - <li>Uniformity</li>    - <li>Proper fit-up</li>    - <li>Base metal preparation</li></ul> K . 01
02. Examine tack, intermediate layers, and completed welds
    - <li>Visual check for weld discontinuity and defects to an acceptable criteria</li>    - <li>Destructive or non-destructive examination</li></ul> K . 02