FLUX CORED ARC WELDER (FCAW) SKILLS STANDARDS

OD24303

ALIGNED WITH AMERICAN WELDING SOCIETY (AWS) ENDORSED BY AWS

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COMPETENCY-BASED EDUCATION: OKLAHOMA'S RECIPE FOR SUCCESS

BY THE INDUSTRY FOR THE INDUSTRY

Oklahoma's *Career*Tech system of competency-based education uses industry professionals and certification standards to identify the knowledge and abilities needed to master an occupation. This industry input provides the foundation for development of instructional materials that help prepare the comprehensively trained, highly skilled employees demanded by our workplace partners.

TOOLS FOR SUCCESS

*Career*Tech relies on three basic instructional components to deliver competency-based instruction: skills standards, curriculum materials, and competency assessments.

Skills standards provide the foundation for competency-based instruction in Oklahoma's *Career*Tech system. The skills standards outline the knowledge, skills, and abilities needed to perform related jobs within an industry. Skills standards are aligned with national skills standards; therefore, a student trained to the skills standards possesses technical skills that make him/her employable in both state and national job markets.

Curriculum materials contain information and activities that teach students the knowledge and skills outlined in the skills standards. In addition to complementing classroom instruction, curriculum resources provide supplemental activities to enhance learning and provide hands-on training experiences.

Competency Assessments test the student over material outlined in the skills standards and taught using the curriculum materials. When used with classroom performance evaluations, written competency assessments provide a means of measuring occupational readiness.

Although each of these components satisfy a unique purpose in competency-based education, they work together to reinforce the skills and abilities students need to gain employment and succeed on the job.

MEASURING SUCCESS

Written competency assessments are used to evaluate student performance. Results reports communicate competency assessment scores to students and provide a breakdown of assessment results by duty area. The results breakdown shows how well the student has mastered skills needed to perform major job functions and identifies areas of job responsibility that may require additional instruction and/or training.

Group analysis of student results also provides feedback to instructors seeking to improve the effectiveness of career and technology training. Performance patterns in individual duties indicate opportunities to evaluate training methods and customize instruction.

TRUE TO OUR PURPOSE

"Helping Oklahomans succeed in the workplace" defines the mission of Oklahoma *Career*Tech and its competency-based system of instruction. Skills standards, curriculum, and assessments that identify and reinforce industry expectations provide accountability for programs and assure *Career*Tech's continued role in preparing skilled workers for a global job market

Printed in the United States of America by the
Oklahoma Department of Career and Technology Education
Stillwater, Oklahoma

FLUX CORED ARC WELDER (FCAW)
SKILLS STANDARDS
Frequency and Criticality Ratings

Duty A: Demonstrate Safety Skills
Duty B: Interpret and Fabricate Parts from Drawings and Welding Symbols
Duty E: Demonstrate Knowledge of Flux-Cored Arc Welding (FCAW, FCAW-G/GM) Principles and Practices
Duty K: Demonstrate Knowledge of Welding Inspection and Testing Principles and Practices
Duty L: Demonstrate Knowledge of Electrical Fundamentals
Duty M: Perform Basic Mathematical Operations

Frequency: represents how often the task is performed on the job. Frequency rating scales vary for different occupations. The rating scale used in this publication is presented below:

1 = less than once a week
2 = at least once a week
3 = once or more a day

Criticality: denotes the level of consequence associated with performing a task incorrectly. The rating scale used in this publication is presented below:

1 = slight
2 = moderate
3 = extreme

Duty A: Demonstrate Safety Skills

CODE	TASK	F/C
A.01	Understand and explain the purpose of safety policies	3/3
A.02	Explain the proper steps in reporting an accident or emergency	3/3
A.03	Describe and discuss established first aid procedures	3/3
A.04	Describe and discuss the role of the Occupational Safety and Health Act (OSHA) and the EPA (Environmental Protection Agency)	3/3
A.05	Demonstrate knowledge of OSHA requirements • Lock Out/Tag out procedures • Personal protective equipment • Precautionary labeling • Working in confined spaces • Hot work permits • HAZCOM • MSDS • Blood borne Pathogens	3/3
A.06	Demonstrate safe behavior on and around ladders and scaffolds	3/3
A.07	Explain the hazards associated with specific welding process, material, equipment and tools	3/3
A.08	Demonstrate safety techniques for storing and handling cylinders	3/3
A.09	Describe workplace fire hazards and how to properly extinguish fires	3/3
A.10	Discuss electrical hazards and how to avoid electric shock	3/3
A.12	Demonstrate proper use and inspection of equipment used for ventilation and how to avoid welding fumes	3/3
A.13	Demonstrate safe material handling techniques	3/3

	• Lifting • Transporting • Storing	
A.14	Practice tool safety	3/3
A.15	Practice good housekeeping and work area operation	3/3
A.16	Perform safety inspection of equipment and accessories • Protective clothing and equipment • Hand and power tools • Work area • Communicate hazard warnings • Welding equipment and accessories	3/3

DUTY B: Interpret and Fabricate Parts From Drawings and Welding Symbols

CODE	TASK	F/C
B.01	Interpret basic elements of a drawing or sketch • Terms • Components • Revisions • Symbols • Structural members • Inspection/test requirements • Sequence of assembly • Dimensions and tolerances • Revisions • Scale • View interpretation • List of materials	3/3
B.02	Interpret welding symbol information • Type of weld required • Filler metal • Special details • Non-destructive testing requirements	1/3
B.03	Interpret written welding procedures • Procedure ID number cross-referencing to drawing • Appropriate welding process/base materials/filler materials • Appropriate machine settings	3/3
B.04	Fabricate parts from a drawing or sketch • Prepare, assemble, and tack weld parts according to drawing or sketch specifications	3/3

DUTY E: Demonstrate Knowledge of Flux-Cored Arc Welding (FCAW, FCAW-G/GM) Principles and Practices

CODE	TASK	F/C
E.01	Set up for flux cored arc welding operations on carbon steel plate and pipe • Review appropriate weld procedures • Base metal preparation • Filler metal selection • Proper hand tool selection • Adjust voltage and polarity • Set wire speed (amperage) • Proper gas flow rate • Parts fit up and preheated as necessary	3/3

E.02	Operate flux cored arc welding equipment • Flat single pass surfacing welds • Flat multiple pass surfacing welds	3/3
E.03	Make fillet welds in all positions on carbon steel plate	3/3
E.04	Make groove welds in all positions on carbon steel plate	3/3

DUTY K: Demonstrate Knowledge of Welding Inspection and Testing Principles and Practices

CODE	TASK	F/C
K.01	Examine cut surfaces and edges of prepared base metal parts • Appearance • Uniformity • Proper fit-up • Base metal preparation • Cleanliness of weld area	3/3
K.02	Examine tack, intermediate layers, and completed welds • Visual check for weld discontinuity and defects to an acceptable criteria • Destructive or non-destructive examination • Check for proper weld size • Understand types of destructive and nondestructive exams	3/3

Duty L: Demonstrate Knowledge of Electrical Fundamentals

CODE	TASK	F/C
L.01	Demonstrate the fundamental use of polarity with respect to equipment set up for process used	3/3
L.02	Perform routine electrical equipment inspections and operation system troubleshooting	3/3
L.03	Demonstrate compliance with electrical safety postings and personal shock prevention practices	3/3
L.04	Make minor external repairs to equipment and accessories • Manufacturer's recommendations • Company's and/or institution's repair policies • Equipment troubleshooting • Regulators	1/3

Duty M: Perform Basic Mathematical Operations

CODE	TASK	F/C
M.01	Demonstrate conversion between the US customer and SI metric systems	3/3
M.02	Add, subtract, multiply, divide, and convert between whole numbers, fractions, mixed numbers, and decimals	3/3
M.03	Demonstrate the proper use of and interpretation of measuring devices to determine size, length, angle, and distance	3/3
M.04	Use a calculator and demonstrate rounding of basic arithmetic operations	3/3
M.05	Prepare parts using the principles of geometry, functions of angles and parts of a circle	3/3

WELDING SKILLS STANDARDS CROSSWALKED TO AMERICAN WELDING SOCIETY (AWS) ENTRY LEVEL WELDER (LEVEL I) AND MAVCC CURRICULUM

MAVCC Curriculum

1) **Fundamental of Welding**
2) **Shielded Metal Arc Welding & Carbon Arc Cutting-Air**
3) **Gas Tungsten Arc Welding & Plasma Arc Cutting**
4) **Gas Metal Arc Welding & Flux-Cored Arc Welding**
5) **Oxyacetylene Welding and Oxyfuel Cutting**
6) **Shielded Metal Arc Pipe Welding**

Duty A: Demonstrate Safety Skills

CODE	TASK	AWS	MAVCC
A.01	Understand and explain the purpose of safety policies		1) Unit 3.2 & 3
A.02	Explain the proper steps in reporting an accident or emergency		1) Unit 3.18
A.03	Describe and discuss established first aid procedures		1) Unit 3 all
A.04	Describe and discuss the role of the Occupational Safety and Health Act (OSHA) and the EPA (Environmental Protection Agency)		1) Unit 2.1
A.05	Demonstrate knowledge of OSHA requirements		1) Unit 2.1
A.06	Demonstrate safe behavior on and around ladders and scaffolds		1) Unit 2.18, 2.20, 2.30
A.07	Explain the hazards associated with specific welding process, material, equipment and tools		1) Unit 2.3
A.08	Demonstrate safety techniques for storing and handling cylinders		1) Unit 3.14, 3.14
A.09	Describe workplace fire hazards and how to properly extinguish fires		1) Unit 2.10-14
A.10	Discuss electrical hazards and how to avoid electric shock		1) Unit 2.3f 1) Unit 3.19 4) Unit 1.7
A.12	Demonstrate proper use and inspection of equipment used for ventilation and how to avoid welding fumes		
A.13	Demonstrate safe material handling techniques		
A.14	Practice tool safety		1) Unit 2.3d, Unit 3.9, Unit 4.20-22
A.15	Practice good housekeeping and work area operation		4) All job sheets
A.16	Perform safety inspection of equipment and accessories		1) Unit 2

DUTY B: Interpret and Fabricate Parts From Drawings and Welding Symbols

CODE	TASK	AWS	MAVCC
B.01	Interpret basic elements of a drawing or sketch	Module 3	1) Unit 7.4
B.02	Interpret welding symbol information	Module 3	1) Unit 7 1) Unit 8.2; 10-14
B.03	Interpret written welding procedures	Module 3	
B.04	Fabricate parts from a drawing or sketch	Module 3	

DUTY C: Demonstrate Knowledge of Shielded Metal Arc Welding (SMAW) Principles and Practices

CODE	TASK	AWS	MAVCC
C.01	Set up for shielded metal arc welding on carbon steel plate and pipe	Module 4	3) Unit 1 & 2
C.02	Operate shielded metal arc welding equipment	Module 4	3) Unit 1 & 2
C.03	Make fillet welds in all positions, on carbon steel plate, and on pipe in the 2F position	Module 4	3) Unit 1 & 2
C.04	Make groove welds in all positions, on carbon steel plate with and without backing	Module 4	3) Unit 1 & 2

DUTY D: Demonstrate Knowledge of Gas Metal Arc Welding (GMAW) Principles and Practices

CODE	TASK	AWS	MAVCC
D.01	Set up for gas metal arc welding operations on carbon steel plate	Module 5	4) Unit 2
D.02	Operate gas metal arc welding	Module 5	4) Unit 2
D.03	**Short Circuit Transfer**	Module 5	4) Unit 2
D.04	Make fillet welds, all positions, on carbon steel plate and pipe in 2F position-flat, multiple pass, surfacing welds	Module 5	4) Unit 2
	Make groove welds, all positions, on carbon steel plate with backing and pipe in 1G	Module 5	4) Unit 2
D.05	**Spray Transfer**	Module 5	4) Unit 2
D.06	Make 1F and 2F welds on carbon steel plate	Module 5	4) Unit 2
	Make 1G welds on carbon steel plate	Module 5	4) Unit 2

DUTY E: Demonstrate Knowledge of Flux-Cored Arc Welding (FCAW, FCAW-G/GM) Principles and Practices

CODE	TASK	AWS	MAVCC
E.01	Set up for flux cored arc welding operations on carbon steel plate and pipe	Module 6	4) Unit 3
E.02	Operate flux cored arc welding equipment	Module 6	4) Unit 3
E.03	Make fillet welds in all positions on carbon steel plate	Module 6	4) Unit 3
E.04	Make groove welds in all positions on carbon steel plate	Module 6	4) Unit 3

DUTY F: Demonstrate Knowledge of Gas Tungsten Arc Welding (GTAW) Principles and Practices

CODE	TASK	AWS	MAVCC
F.01	Set up for gas tungsten arc welding operations on carbon steel plate, aluminum, and stainless steel plate	Module 7	4) Unit 2
F.02	Operate gas tungsten arc welding equipment	Module 7	4) Unit 2
F.03	Make fillet welds, 2F and 3Fpositions, on carbon steel plate	Module 7	4) Unit 2
F.04	Make groove welds, 3G position without backing, on carbon steel plate	Module 7	4) Unit 2
F.05	Make 1F-2F welds on aluminum plate	Module 7	4) Unit 2
F.06	Make 1G with backing welds on aluminum plate	Module 7	4) Unit 2
F.07	Make 1F-2F-3F welds on stainless steel plate	Module 7	4) Unit 2
F.08	Make 1G-2G-3G welds on stainless steel plate	Module 7	4) Unit 2

DUTY G: Demonstrate Knowledge of Manual Oxyfuel Cutting (OFC) Principles and Practices

CODE	TASK	AWS	MAVCC
G.01	Set up for manual oxyfuel gas cutting operations on carbon steel plate	Module 8 Unit1	5) Unit 2
G.02	Operate manual oxyfuel cutting equipment	Module 8 Unit1	5) Unit 2

G.03	Perform straight cutting operations on carbon steel plate and pipe	Module 8 Unit1	5) Unit 2
G.04	Perform shape cutting operations on carbon steel plate and pipe	Module 8 Unit1	5) Unit 2
G.05	Perform bevel cutting operations on carbon steel plate and pipe	Module 8 Unit1	5) Unit 2

DUTY H: Demonstrate Knowledge of Mechanized Oxyfuel Cutting (OFC) Principles and Practices

CODE	TASK	AWS	MAVCC
H.01	Set up for oxyfuel gas cutting (track burner) operations on carbon steel plate machine	Module 8 Unit 2	5) Unit 2
H.02	Operate machine oxyfuel gas cutting (track burner) equipment	Module 8 Unit 2	5) Unit 2

DUTY I: Demonstrate Knowledge of Air Carbon Arc Cutting (CAC-A) Principles and Practices

CODE	TASK	AWS	MAVCC
I.01	Set up for manual air carbon arc gouging and cutting operations on carbon steel plate	Module 8 Unit 4	3) Unit 4
I.02	Operate manual air carbon arc cutting equipment	Module 8 Unit 4	3) Unit 4
I.03	Perform metal removal operations on carbon steel plate	Module 8 Unit 4	3) Unit 4

DUTY J: Demonstrate Knowledge of Plasma Arc Cutting (PAC) Principles and Practices

CODE	TASK	AWS	MAVCC
J.01	Set up for manual plasma arc cutting operations on carbon steel plate, aluminum, and stainless steel plate	Module 8 Unit 3	4) Unit 3
J.02	Operate manual plasma arc cutting equipment	Module 8 Unit 3	4) Unit 3
J.03	Perform shape cutting operations on carbon steel plate, aluminum, and stainless steel plate	Module 8 Unit 3	4) Unit 3

DUTY K: Demonstrate Knowledge of Welding Inspection and Testing Principles and Practices

CODE	TASK	AWS	MAVCC
K.01	Examine cut surfaces and edges of prepared base metal parts	Module 9	4) Unit 2
K.02	Examine tack, intermediate layers, and completed welds	Module 9	4) Unit 2

Duty L: Demonstrate Knowledge of Electrical Fundamentals

CODE	TASK	AWS	MAVCC
L.01	Demonstrate the fundamental use of polarity with respect to equipment set up for process used		
L.02	Perform routine electrical equipment inspections and operation system troubleshooting		
L.03	Demonstrate compliance with electrical safety postings and personal shock prevention practices		
L.04	Make minor external repairs to equipment and accessories		

Duty M: Perform Basic Mathematical Operations

CODE	TASK	AWS	MAVCC
M.01	Demonstrate conversion between the US customer and SI metric systems		1) Unit 6.13

M.02	Add, subtract, multiply, divide, and convert between whole numbers, fractions, mixed numbers, and decimals		Unit 6 all
M.03	Demonstrate the proper use of and interpretation of measuring devices to determine size, length, angle, and distance		Unit 6 all
M.04	Use a calculator and demonstrate rounding of basic arithmetic operations		
M.05	Prepare parts using the principles of geometry, functions of angles and parts of a circle		Unit 6 all