# Agriculture Welding II Course No. 18407 Credit: 1.0

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| **Student name:** |  | **Graduation Date:** |  |

Pathways and CIP Codes: Agricultural Technology and Mechanical Systems (01.0201); Manufacturing (48.0000)

Course Description: **Application Level**: Courses provide students with the skills & knowledge that are specifically applicable to the welding industry with advance blueprint reading and welding in the OH, V and H position along with pipe welding and TIG welding that could result in welding certification

Directions:The following competencies are required for full approval of this course. Check the appropriate number to indicate the level of competency reached for learner evaluation.

**RATING SCALE:**

4. Exemplary Achievement: Student possesses outstanding knowledge, skills or professional attitude.

3. Proficient Achievement:Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.

2. Limited Achievement:Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.

1. Inadequate Achievement:Student lacks knowledge, skills or professional attitude.

0. No Instruction/Training:Student has not received instruction or training in this area.

**Prerequisite: 18404 – Agriculture Welding I and either 18001 – Introduction to Agricultural Science or 18002 - Agriscience**

Benchmark 1: SAFETY & HEALTH OF WELDERS

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 1.1 | Demonstrate knowledge of basic shop safety and Personal Protective Equipment (PPE) by satisfactorily completing the safety exam with a 100% completion score. |  |
| 1.2 | Complete a Shop Safety Contract / Release form. |  |
| 1.3 | Demonstrate the proper inspection and operation of equipment for each welding or thermal cutting process used. |  |
| 1.4 | Identify common hazards in welding. |  |
| 1.5 | Identify common causes of job-site accidents. |  |
| 1.6 | Demonstrates knowledge of the fire triangle and react effectively in case of a fire or emergency. |  |
| 1.7 | Demonstrates safety techniques for storing and handling cylinders. |  |
| 1.8 | Utilizes proper hand tool safety procedures. |  |
| 1.9 | Utilizes proper portable and stationary power tool safety procedures. |  |
| 1.10 | Explain how to avoid electrical shock when welding. |  |
| 1.11 | Understand the proper use of precautionary labeling and SDS information. |  |

Benchmark 2: BASE METAL PREPARATION

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 2.1 | Identify the types and defects of metal contamination. |  |
| 2.2 | Clean base metal utilizing the proper equipment and procedures. |  |
| 2.3 | Select and demonstrate the methods of joint preparation. |  |
| 2.4 | Identify common metals such as carbon steel, stainless steel, aluminum, and cast iron. |  |
| 2.5 | Utilize measurement instruments to measure steel length, width, depth, and weight to the 1/16” of an inch. |  |
| 2.6 | Demonstrate Imperial/US and Metric measurement and conversion techniques. |  |

Benchmark 3: BLUEPRINTS: READING AND WELDING SYMBOLS

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 3.1 | Identify, explain, and interpret a welding detail drawing to include lines, object views, dimensions, material fills and sections. |  |
| 3.2 | Identify and explain notes and bill of materials. |  |
| 3.3 | Develop basic welding drawings. |  |
| 3.4 | Read and interpret welding symbols on drawings, specifications, and welding procedure specifications. |  |
| 3.5 | Draw welding symbols based on the observation of actual welds. |  |

Benchmark 4: OXY-FUEL (OFC): MANUAL

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 4.1 | Performs safety inspections and make minor repairs of manual OFC equipment and accessories. |  |
| 4.2 | Sets up and operates for manual OFC operations on carbon steel. |  |
| 4.3 | Performs straight and shape cutting operations in the flat and horizontal positions on carbon steel. |  |

Benchmark 5: PLASMA ARC CUTTING (PAC): MANUAL

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 5.1 | Identify and understand plasma arc cutting processes and associated equipment. |  |
| 5.2 | Prepare and set up plasma arc cutting equipment. |  |
| 5.3 | Use plasma arc cutting equipment to make various types of cuts. |  |
| 5.4 | Safely store equipment and clean the work area after use. |  |

Benchmark 6: WELD QUALITY & JOINT FIT-UP

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 6.1 | Describe the differences between welding flaws, defects, discontinuities, and their causes. |  |
| 6.2 | Identify and explain nondestructive weld examination practices. |  |
| 6.3 | Identify and explain destructive weld testing practices. |  |
| 6.4 | Identify and explain welder qualification tests. |  |
| 6.5 | Explain the importance of quality workmanship. |  |
| 6.6 | Identify and explain basic code requirements as they apply to welder qualification testing. |  |
| 6.7 | Check weld joints for proper fit and alignment using gauges and measuring tools prior to welding. |  |
| 6.8 | Identify and explain material distortion and how it is controlled. |  |

Benchmark 7: SMAW: EQUIPMENT, SETUP & ELECTRODES

Competencies

| # | Description | RATING |
| --- | --- | --- |
| 7.1 | Explain the duty cycle and output current related to machine ratings. |  |
| 7.2 | Identify and explain the parts and importance of welding cable (leads). |  |
| 7.3 | Makes minor external repairs to SMAW equipment and accessories. |  |
| 7.4 | Identify the function of the electrode coating, flux, and proper storage of electrodes. |  |
| 7.5 | Explain the AWS electrode and filler metal classification system. |  |
| 7.6 | Determine the size of the electrode by the core wire diameter. |  |
| 7.7 | Identify and select the proper electrode for an identified welding task. |  |
| 7.8 | Describe what causes arc blow and how the welder can combat or alleviate it. |  |

Benchmark 8: SMAW: FILLET AND GROOVE WELDS

Competencies

| # | Description | RATING |
| --- | --- | --- |
| 8.1 | Identify the components, features, and parts of typical fillet and groove welds. |  |
| 8.2 | Demonstrate horizontal (2F) fillet welds with E60XX and E70XX. |  |
| 8.3 | Demonstrate vertical (3F) fillet welds with E60XX and E70XX. |  |
| 8.4 | Demonstrate overhead (4F) fillet welds with E60XX and E70XX. |  |
| 8.5 | Demonstrate the proper preparation of weld coupons for groove welds. |  |
| 8.6 | Practice Flat (1G) V-groove welds with backing using E60XX or E70XX. |  |

Benchmark 9: GMAW/FCAW: EQUIPMENT, SETUP & ELECTRODES

Competencies

| # | Description | Rating |
| --- | --- | --- |
| 9.1 | Explain the physical processes of GMAW and FCAW. |  |
| 9.2 | Identify GMAW/FCAW machines, parts of wire feeder, GMAW gun, equipment, and components. |  |
| 9.3 | Identify GMAW/FCAW electrode classifications and selection. |  |
| 9.4 | Demonstrate and explain the setup of a GMAW/FCAW machine, including how to change the wire-based electrodes. |  |
| 9.5 | Identify, describe, and identify base gas mixtures needed for short circuit, globular, axial spray, and pulse spray transfer methods. |  |

Benchmark 10: GMAW/FCAW: FILLET AND GROOVE WELDS

Competencies

| # | Description | rating |
| --- | --- | --- |
| 10.1 | Demonstrate the correct method of starting a weld, terminating a weld, and properly restarting a weld using the GMAW and FCAW process. |  |
| 10.2 | Demonstrate horizontal (2F) fillet welds. |  |
| 10.3 | Demonstrate vertical (3F) fillet welds. |  |
| 10.4 | Demonstrate overhead (4F) fillet welds. |  |

Benchmark 11: GTAW: EQUIPMENT, SETUP, ELECTRODES AND FILLER METALS

Competencies

| # | Description | Rating |
| --- | --- | --- |
| 11.1 | Explain the physical processes of GTAW. |  |
| 11.2 | Identify and explain GTAW safety, including particular emphasis on high-frequency safety. |  |
| 11.3 | Identify GTAW machines, parts of GTAW torch, peripheral equipment, and components. |  |
| 11.4 | Identify GTAW electrode color code classifications, selection, and end preparation. |  |
| 11.5 | Explain the duty cycle and output current related to machine ratings. |  |
| 11.6 | Explain the usage of AC, DCEN, and DCEP polarities and the materials that these polarities are used for. |  |

Benchmark 12: GTAW: CARBON STEEL FILLET WELDS

Competencies

| # | Description | Rating |
| --- | --- | --- |
| 12.1 | Perform safety inspections of GTAW equipment and accessories. |  |
| 12.2 | Makes minor external repairs to GTAW equipment and accessories. |  |
| 12.3 | Sets up for GTAW operations on carbon steel. |  |
| 12.4 | Operate GTAW equipment on carbon steel. |  |
| 12.5 | Demonstrate start, termination, and restart of beads. |  |
| 12.6 | Make stringer beads on carbon steel in the flat position. |  |
| 12.7 | Make fillet welds on carbon steel in the horizontal position. |  |

I certify that the student has received training in the areas indicated.

Instructor Signature:

For more information, contact:

CTE Pathways Help Desk

(785) 296-4908

[pathwayshelpdesk@ksde.org](mailto:pathwayshelpdesk@ksde.org)



900 S.W. Jackson Street, Suite 102

Topeka, Kansas 66612-1212

[https://www.ksde.org](https://www.ksde.org/)

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