# Agriculture Welding II Course No. 18407 Credit: 1.0

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

Pathways and CIP Codes:Power, Structural and Technical 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.

## Benchmark 1: Safety & Health of Welders

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 1.1 | Identify common hazards in welding.  |  |
| 1.2 | Identify common causes of job-site accidents.  |  |
| 1.3 | Explain and identify proper personal protection used in welding.  |  |
| 1.4 | Demonstrates proper use and inspection of ventilation equipment.  |  |
| 1.5 | Demonstrates knowledge of the fire triangle and its importance in controlling a fire.  |  |
| 1.6 | React effectively in case of fire, or other emergency.  |  |
| 1.7 | Interpret safety color codes and importance to personal safety.  |  |
| 1.8 | Demonstrates safety techniques for storing and handling cylinders.  |  |
| 1.9 | Utilizes proper hand tool safety procedures.  |  |
| 1.10 | Utilizes proper portable power tool safety procedures.  |  |
| 1.11 | Utilizes proper stationary power tool safety procedures.  |  |
| 1.12 | Explains how to avoid electrical shock when welding.  |  |
| 1.13 | Understands proper use of precautionary labeling and MSDS information.  |  |
| 1.14 | Demonstrates proper material handling methods.  |  |
| 1.15 | Complete a Shop Safety Contract / Release form. |  |
| 1.16 | Demonstrate knowledge of basic shop safety by satisfactorily completing Safety Exam. |  |
| 1.17 | Demonstrates proper inspection and operation of equipment for each welding or thermal cutting process used.  |  |

## Benchmark 2: Base Metal Preparation

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 2.1 | Identify the types of metal contamination.  |  |
| 2.2 | Identify defects caused by metal contamination.  |  |
| 2.3 | Identify equipment used for cleaning base metal.  |  |
| 2.4 | Clean base metal utilizing the proper equipment and procedures.  |  |
| 2.5 | Identify and explain joint design.  |  |
| 2.6 | Explain joint design considerations.  |  |
| 2.7 | Select and demonstrate the methods of joint preparation.  |  |
| 2.8 | Identify metals using nondestructive methods.  |  |
| 2.9 | Identify structural steel as to shape and size.  |  |
| 2.10 | Utilize measurement instruments to measure steel length, width, depth, and weight.  |  |
| 2.11 | Familiarized with English and Metric measurement and conversion techniques. |  |

## Benchmark 3: Welding Symbols

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 3.1 | Identify and explain the various parts of a welding symbol.  |  |
| 3.2 | Identify and explain fillet and groove weld symbols.  |  |
| 3.3 | Read welding symbols on drawings, specifications, and welding procedure specifications.  |  |
| 3.4 | Interpret welding symbols from a print.  |  |
| 3.5 | Draw welding symbols based on the observation of actual welds.  |  |

## Benchmark 4: Reading Detail Drawings

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 4.1 | Identify and explain a welding detail drawing.  |  |
| 4.2 | Identify and explain lines, material fills, and sections.  |  |
| 4.3 | Identify and explain object views.  |  |
| 4.4 | Identify and explain dimensioning.  |  |
| 4.5 | Identify and explain notes and bill of materials.  |  |
| 4.6 | Interpret basic elements of a welding detail drawing.  |  |
| 4.7 | Develop basic welding drawings.  |  |

## Benchmark 5: Plasma Arc Cutting (PAC)

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 5.1 | Identify and understand plasma arc cutting processes.  |  |
| 5.2 | Identify plasma arc cutting equipment.  |  |
| 5.3 | Prepare and set up plasma arc cutting equipment.  |  |
| 5.4 | Use plasma arc cutting equipment to make various types of cuts  |  |
| 5.5 | Properly store equipment and clean the work area after use.  |  |

## Benchmark 6: Weld Quality

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 6.1 | Identify and explain codes governing welding.  |  |
| 6.2 | Explain the basic elements of welding codes.  |  |
| 6.3 | Identify and explain weld imperfections and their causes.  |  |
| 6.4 | Identify and explain nondestructive weld examination practices.  |  |
| 6.5 | Identify and explain destructive weld testing practices.  |  |
| 6.6 | Identify and explain welder qualification tests.  |  |
| 6.7 | Explain the importance of quality workmanship.  |  |

## Benchmark 7: Equipment & Setup; SMAW

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 7.1 | Explain the physical processes of SMAW.  |  |
| 7.2 | Identify and explain SMAW safety.  |  |
| 7.3 | Identify and explain types of welding current.  |  |
| 7.4 | Explain the characteristics of welding current.  |  |
| 7.5 | Classify SMAW machines by type of welding current produced.  |  |
| 7.6 | Identify and explain SMAW machine types.  |  |
| 7.7 | Explain SMAW machine ratings.  |  |
| 7.8 | Identify and explain the parts and importance of welding cable (leads).  |  |
| 7.9 | Demonstrate and explain the setup of a SMAW machine.  |  |
| 7.10 | Makes minor external repairs to SMAW equipment and accessories.  |  |
| 7.11 | Identify and demonstrate the use of tools for weld cleaning.  |  |
| 7.12 | Makes minor external repairs to SMAW equipment and accessories.  |  |

## Benchmark 8: Electrodes & Selection: SMAW

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 8.1 | Identify the function of the electrode flux.  |  |
| 8.2 | Explain the A.W.S. and A.S.M.E. filler metal classification system.  |  |
| 8.3 | Identify different types of filler metals.  |  |
| 8.4 | Determine size of electrode by wire core.  |  |
| 8.5 | Identify and explain factors that affect electrode selection.  |  |
| 8.6 | Explain the storage and control of filler metals.  |  |
| 8.7 | Explain filler metal traceability requirements and how to use applicable code requirements.  |  |
| 8.8 | Identify and select the proper electrode for an identified welding task.  |  |

## Benchmark 9: Beads & Fillet Welds: SMAW

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 9.1 | Review safety considerations for welding.  |  |
| 9.2 | Set up the area and SMAW equipment.  |  |
| 9.3 | Describe the methods of striking and arc.  |  |
| 9.4 | Properly strike and extinguish an arc.  |  |
| 9.5 | Describe arc blow and wander  |  |
| 9.6 | Practice horizontal (2F) fillet welds with E60XX and E70XX.  |  |
| 9.7 | Practice vertical (3F) fillet welds with E60XX and E70XX.  |  |
| 9.8 | Practice overhead (4F) fillet welds with E60XX and E70XX.  |  |

## Benchmark 10: Groove Welds with Backing: SMAW

### Competencies

| **#** | **Description** | **rating** |
| --- | --- | --- |
| 10.1 | Identify the typical groove weld styles.  |  |
| 10.2 | Explain the terms and parts describing a groove weld.  |  |
| 10.3 | Explain the benefit of groove welds with backing.  |  |
| 10.4 | Setup: review safety practices.  |  |
| 10.5 | Setup: preparing the work area.  |  |
| 106 | Setup: preparing weld coupons.  |  |
| 10.7 | Setup: preparing the welding machine.  |  |
| 10.8 | Practice horizontal (2G) V-groove welds with backing, using E60XX and E70XX.  |  |
| 10.9 | Practice vertical (3G) V-groove welds with backing, using E60XX and E70XX.  |  |
| 10.10 | Practice overhead (4G) V-groove welds with backing, using E60XX and E70XX.  |  |

## Benchmark 11: Joint Fit-Up & Alignment

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 11.1 | Identify and explain job-code requirements.  |  |
| 11.2 | Check joint for proper fit and alignment using gauges and measuring tools.  |  |
| 11.3 | Identify and utilize plate and pipe fit-up tools for proper joint alignment.  |  |
| 11.4 | Identify and explain distortion and how it is controlled.  |  |
| 11.5 | Check for joint misalignment and poor fit-up before and after welding.  |  |

## Benchmark 12: Open V-Groove Welds: SMAW

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 12.1 | Prepare SMAW equipment and materials for open V-groove welds.  |  |
| 12.2 | Identify the components, features and practices for an open V-groove weld.  |  |
| 12.3 | Practice horizontal (2G) open V-groove welds, using E60XX and E70XX.  |  |
| 12.4 | Practice vertical (3G) open V-groove welds, using E60XX and E70XX.  |  |
| 12.5 | Practice overhead (4G) open V-groove welds, using E60XX and E70XX.  |  |

## Benchmark 13: Open-Root Pipe Welds: SMAW

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 13.1 | Prepare SMAW equipment and materials for open-root pipe welds.  |  |
| 13.2 | Identify the components, features and practices for open-root pipe welds.  |  |
| 13.3 | Practice flat (1G-ROTATED) open-root V-groove pipe welds, using E60XX and E70XX.  |  |
| 13.4 | Practice horizontal (2G) open-root V-groove pipe welds, using E60XX and E70XX.  |  |
| 13.5 | Practice multiple (5G) open-root V-groove pipe welds, using E60XX and E70XX.  |  |
| 13.6 | Practice multiple inclined (6G) open-root V-groove pipe welds, using E60XX and E70XX  |  |

## Benchmark 14: GMAW: Equipment & Filler Metals

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 14.1 | Explain the physical processes of GMAW.  |  |
| 14.2 | Identify and explain GMAW safety.  |  |
| 14.3 | Demonstrate start, termination, and restart of beads.  |  |
| 14.4 | Practice stringer beads (short-circuiting transfer).  |  |
| 14.5 | Prepare GMAW equipment and materials for open V-groove welds.  |  |
| 14.6 | Identify the components, features and practices for an open V-groove weld.  |  |
| 14.7 | Practice flat (1G) open V-groove welds,.  |  |
| 14.8 | Practice horizontal (2G) open V-groove weld  |  |

## Benchmark 15: GMAW - Plate

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 15.1 | Perform GMAW multiple-pass fillet welds on plate, using solid or composite wire and shielding gas in multiple positions. E |  |
| 15.2 | Perform GMAW multiple-pass open-root V-groove welds on plate, using solid or composite wire and shielding gas, in multiple positions. E |  |
| 15.3 | Perform GMAW spray fillet and open-root V-groove welds on plate, using solid or composite wire and shielding gas, in flat and horizontal positions. E |  |

## Benchmark 16: GMAW – Open-Root V-groove pipe

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 16.1 | Prepare GMAW equipment for open-root V-groove pipe welds. E |  |
| 16.2 | Identify and explain open-root V-groove pipe weld techniques. |  |
| 16.3 | Perform open-root V-groove pipe welds using GMAW: E -1G-rotated |  |
| 16.4 | Perform open-root V-groove pipe welds using GMAW: E- 2G |  |
| 16.5 | Perform open-root V-groove pipe welds using GMAW: E- 5G |  |
| 16.6 | Perform open-root V-groove pipe welds using GMAW: E- 6G |  |

## Benchmark 17: Aluminum Plate & Pipe

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 17.1 | Explain GMAW, and set up equipment to weld aluminum. C |  |
| 17.2 | Build a pad with stringer beads and weave beads, using aluminum wire and shielding gas. E |  |
| 17.3 | Perform multiple-pass fillet welds on aluminum plate using aluminum wire and shielding gas: E- 1F (flat) |  |
| 17.4 | Perform multiple-pass fillet welds on aluminum plate using aluminum wire and shielding gas: E- 2F (horizontal) |  |
| 17.5 | Perform multiple-pass fillet welds on aluminum plate using aluminum wire and shielding gas: E-3F (vertical) |  |
| 17.6 | Perform multiple-pass fillet welds on aluminum plate using aluminum wire and shielding gas: E-4F (overhead) |  |
| 17.7 | Perform V-groove welds on aluminum plate using aluminum wire and shielding gas: E- 1G (flat) |  |
| 17.8 | Perform V-groove welds on aluminum plate using aluminum wire and shielding gas: E- 2F (horizontal) |  |
| 17.9 | Perform V-groove welds on aluminum plate using aluminum wire and shielding gas: E- 3F (vertical) |  |
| 17.10 | Perform V-groove welds on aluminum plate using aluminum wire and shielding gas: E-4F (overhead) |  |
| 17.11 | Perform V-groove welds on aluminum pipe using aluminum wire and shielding gas: E-1G-rotated (flat) |  |
| 17.12 | Perform V-groove welds on aluminum pipe using aluminum wire and shielding gas: E-2G (horizontal) |  |
| 17.13 | Perform V-groove welds on aluminum pipe using aluminum wire and shielding gas: E-5G (multiple) |  |
| 17.14 | Perform V-groove welds on aluminum pipe using aluminum wire and shielding gas: E- 6G (inclined multiple) |  |

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

Instructor Signature:

For more information, contact:

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