

Wel 204 FCAW: Plate Instructor's Guide

Module Overview

This module explains how to make fillet and open V-groove welds on carbon steel plate using flux cored arc welding (FCAW) process in all positions.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed

Core Curriculum;

wel 100

wel 101

wel 162

wel 203

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Objectives

Upon completion of this course, Students shall be able to do the following:

1. Perform F multiple-pass fillet welds on carbon steel plate coupons in multiple positions, using tubular wire with out shielding gas.
2. Perform FCAW gas shielded wire multiple-pass V-groove welds on carbon steel plate coupons in all positions (with backing), using tubular wire with 75/25 shielding gas.
3. Perform FCAW V-groove welds on carbon steel plate coupons in multiple positions (without backing), using tubular wire with 75/25 shielding gas

Performance Tasks

Under the supervision of the instructor, the student should be able to do the following:

1. Make multiple-pass FCAW (E71T-1) fillet welds on 1/4 in A36 carbon steel plate coupons in the following positions, using tubular wire with 75/25 shielding gas:

- 1F
- 2F
- 3F
- 4F

2. Make multiple-pass FCAW (E71T-1) V-groove welds on 3/8 A36 carbon steel plate coupons in the following positions (with and without backing), using tubular wire with 75/25 shielding gas:

- 1G
- 2G
- 3G
- 4G

Additional Resources

AWS B1.10:1999 Guide for the Nondestructive Examination of Welds.
Miami, FL: American Welding Society.

AWS B1.11:2000 Guide for the Visual Examination of Welds.
Miami, FL: American Welding Society

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AWS C5.6-89 Recommended Practices for Flux Cored Arc Welding.
Miami, FL: American Welding Society, 1989.

AWS D3.5-93R Guide for Steel Hull Welding.
Miami, FL: American Welding Society, 1993.

E1.10 2009 Product Catalog.
Cleveland, OH: The Lincoln Electric Company.
GMAW Welding Guide.

Cleveland, OH: The Lincoln Electric Company, 2006.
Lincoln Electric offers sources for products and training. Website:
<http://www.lincolnelectric.com>.

OSHA 1910.269, Appendix C, Protection from Step and Touch Potentials.
Current edition. Washington, DC:
Occupational Safety & Health Administration (OSHA).

Safety Considerations

Ensure that the students are equipped with appropriate personal protective equipment and know how to use it properly. Students will be required to make fillet and open V-groove welds on carbon steel plate coupons using FCAW. Ensure that students are properly briefed on the safe use of arc welding equipment and are familiar with all appropriate safety precautions and procedures. Check to be sure that all labs are equipped with charged fire extinguishers.

Materials and Equipment List

- [Steve the welder video FCAW](#)
- Markers/chalk
- Pencils and scratch paper
- Whiteboard/chalkboard
- Desktop or laptop computer
- Appropriate personal protective equipment
- FCAW welding equipment
- Shielding gas
- Flux-cored wire
- Backing materials
- Plate steel for coupons, 1/4 and 3/8 steel plate
- Welding bench with arm for position work
- Portable angle-head grinders with extra grinding discs
- Anti-splatter material
- MSDS for each cleaning agent used
- Bevel gauge(s)
- Framing square
- Soapstone
- Tape measure
- Pliers
- Half-round bastard file
- Wire brush
- Chipping hammer
- Ground clamps
- Examples of the following:
 - Beads created with different travel speed settings
 - Good and bad weld beads
 - Stringer beads
 - Weave beads
 - Properly and improperly terminated welds
 - Proper and improper overlapping beads
 - Pads made using stringer and weave beads
 - Fillet welds from all four welding positions
 - Fillet welds that have been sawed to expose their profiles
 - Ground and unground root passes
 - Broken apart open V-groove root pass weld

Teaching Time for this Module

An outline for use in developing your lesson is presented below. Each Roman numeral in the outline equates to one session of instruction. Approximately 80 hours or 4 credits are needed to cover FCAW Plate welding.

Session I. Introduction; FCAW Welding Safety; Equipment Setup

A. Introduction

1. The FCAW Process
2. FCAW Equipment

B. Welding Safety

1. Protective Clothing and Equipment
2. Fire/Explosion Prevention
3. Work Area Ventilation

C. Welding Equipment Setup

1. Preparing the Welding Area
2. Preparing the Practice Coupons
3. Welding Machine
4. Welding Voltage, Amperage, and Travel Speed
5. Gun Position
6. Electrode Extension, Stick out, and Standoff Distance
7. Contact tip cleaning and maintenance

D. Have students set up the welding area and prepare plate coupons for FCAW fillet and groove welds.

Sessions II–III. Bead Types; Lab

A. Bead Types

1. Stringer Beads
2. Weave Beads
3. Weld Restarts
4. Weld Terminations
5. Overlapping Beads

B. Have students set up FCAW equipment and practice starting, restarting, and terminating welds; altering gun angles to see the effects on stringer and weave beads; and overlapping beads to build a pad.

Sessions IV–XV. Fillet Welds

A. Flat (1F) Position Welds

1. Have students practice FCAW using tubular wire with 75/25 shielding gas to make multiple-pass fillet welds on carbon steel plate coupons in the 1F position. This lab corresponds to Performance Tasks 1,

B. Horizontal (2F) Position Welds

1. Have students practice FCAW using tubular wire with 75/25 shielding gas to make multiple-pass fillet welds on carbon steel plate coupons in the 2F position. This lab corresponds to Performance Tasks 1,

C. Vertical (3F) Position Welds

1. Have students practice FCAW using tubular wire without shielding gas to make multiple-pass fillet welds on carbon steel plate coupons in the 3F position. This lab corresponds to Performance Tasks 1

D. Overhead (4F) Position Welds

1. Have students practice using FCAW using tubular wire with 75/25 shielding gas to make multiple-pass fillet welds on carbon steel plate coupons in the 4F position. This lab corresponds to Performance Tasks 1

Sessions XVI–XXVII. Open V-Groove Welds

A. Open V-Groove Welds

1. Root Pass
2. Groove Weld Positions
3. Acceptable and Unacceptable Groove Weld Profiles

B. Practicing 1G, 2G, 3G, and 4G V-Groove Welds

1. Have students practice using FCAW using tubular wire with 75/25 shielding gas to make multiple-pass V-groove welds on carbon steel plate coupons (with or without backing) in the 1G position. This lab corresponds to Performance Tasks 2

2. Have students practice using FCAW using tubular wire with 75/25 shielding gas to make multiple-pass V-groove welds on carbon steel plate coupons (with or without backing) in the 2G position. This laboratory corresponds to Performance Task 2

3. Have students practice using FCAW using tubular wire with 75/25 shielding gas to make multiple-pass V-groove welds on carbon steel plate coupons (with or without backing) in the 3G position. This lab corresponds to Performance Task 2

4. Have students practice using FCAW using tubular wire with 75/25 shielding gas to make multiple-pass V-groove welds on carbon steel plate coupons (with or without backing) in the 4G position. This laboratory corresponds to Performance Task 2

Session XXVIII. Review and Testing

A. Review

B. Module Examination AWS since Module 6, Flux Cored Arc

1. Students must score 72% or higher to receive recognition from AWS.
2. Record the testing results

C. Performance Testing _

1. Students must perform each task to the satisfaction of the instructor to receive recognition. Proficiency of student welds noted during lab exercises can be used to satisfy the performance testing requirements.
2. Record the testing results on AWS log form these tasks correspond to AWS EG2.0, Module 6, Flux Cored Arc