

# ATPF-1810: SPECIAL TOPICS: P/F PLATE GROUP WELD

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## Cuyahoga Community College

**Viewing: ATPF-1810 : Special Topics: P/F Plate Group Weld**

**Academic Term:**

Fall 2026

**Subject Code**

ATPF - Applied Ind Tech - Pipefitters

**Course Number:**

1810

**Title:**

Special Topics: P/F Plate Group Weld

**Catalog Description:**

Course covers the purpose and processes of plate groove welding including proper joint design and specifications. Included are welding applications and techniques required for proper material preparation, welding machine set up and welding operations.

**Credit Hour(s):**

2

**Lecture Hour(s):**

2

## Requisites

**Prerequisite and Corequisite**

Departmental approval: Admission to Pipefitter's Apprenticeship program.

## Outcomes

**Course Outcome(s):**

Discuss the purpose of plate groove welds, explain the process of plate beveling, physical properties of the materials and various types of groove welds.

**Objective(s):**

1. Discuss the purpose of plate groove welds in the pipefitting industry and identify respective applications.
2. List and define the terms related to plate groove welding.
3. List the different methods used bevel carbon steel plate.
4. Explain the purpose of beveling plate material prior to welding.
5. Identify the physical properties of the plate material.
6. Identify the various types of groove welds.
7. Differentiate between fillet and plate groove welds.

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**Course Outcome(s):**

Discuss the joint design required for plate groove welding, including engineered specifications, bevel angle, and the effects of land and root gap dimensions and the weld process.

**Objective(s):**

1. Explain the parameters of plate groove welding with respect to engineering specifications and function.
  2. Explain the importance of adhering to the prescribed tolerances.
  3. Explain how bevel angle, land thickness and joint design directly affect the quality of the open root.
  4. Explain how the plate weld process affects the joint design.
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**Course Outcome(s):**

Demonstrate the ability to plate groove weld and properly prepare the coupons, correctly adjust the machine settings, and perform welding operations with respect to rod selection and technique.

**Objective(s):**

1. Apply the proper safety procedures to prepare the materials and perform the welding operation.
  2. Safely operate the power equipment and use hand tools to prepare the materials and perform the weld and interpass cleaning.
  3. Prepare welding materials with respect to correct land and bevel in accordance with prescribed tolerances.
  4. Apply standard practices for machine setup.
  5. Select proper electrodes for open root weld balance.
  6. Assemble weld coupons and tack to establish proper root gap.
  7. Verify the fit-up of welding coupons to achieve the prescribed results.
  8. Apply proper welding techniques to perform open root plate groove welds.
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**Methods of Evaluation:**

1. Attendance
2. Participation
3. Assignments
4. Quizzes/Exams

**Course Content Outline:**

1. Plate groove welding
  1. Purpose
    - a. Field application
      - i. Support hangers
      - ii. Tank applications
    - b. Fabrications
    - c. Industrial applications
      - i. Strength
      - ii. Industrial standard design
2. Terminology
  1. Root opening
  2. Groove weld
  3. Bevel angle
  4. Root gap
  5. Root penetration
  6. Burn through
  7. Outside diameter reinforcement
  8. Inside diameter reinforcement
  9. Single V groove
10. Heat Affected Zone HAZ
  1. Bevel methods
    1. Oxygen /acetylene
    2. Hand/mechanical
    3. Machine
    4. Grind
  1. Purpose
    1. Configuration
    2. Joint specifications
    3. Strength
  1. Plate properties
    1. Size
    2. Thickness
    3. Material type

1. Groove weld types
  1. Single bevel
  2. Single J
  3. Single V
  4. Single U
  5. Double bevel
  6. Double bevel J
  7. Double bevel V
  8. Double bevel U
  9. Square
10. Fillet versus plate groove
  1. Joint design
    1. Parameters
      - a. Weld Procedure Specifications WPS
    2. Minimum gaps, land and bevel angle
    3. Maximums
      - a. Engineered specifications
      - b. American Society of Mechanical Engineers ASME
    4. Prescribed tolerances
      - a. Adherence
      - b. Failure
        - i. Weld crack
        - ii. Degradation of base material
        - iii. Failure
  5. Open root quality
    1. Bevel angle
    2. Complete penetration
    3. Complete fusion
    4. Root thickness/reinforcement
      1. Weld process
        1. Shielded Metal Arc Welding SMAW
        2. Gas tungsten Metal Arc Welding TIG
        3. Gas Machine Welding MIG
      1. Welding operations
    1. Safety procedure
      - a. PPE
        - i. Safety glasses
        - ii. Gloves
        - iii. Fire retardant jacket
        - iv. Helmet and lens
        - v. Footwear
      - b. Electrical
        - i. Grounding
        - ii. Nicks and ABRASIONS
        - iii. Polarity
      - c. Jobsite hazards
        - i. Fire
        - ii. Water
        - iii. Falls
        - iv. Pinch points
      - d. Physical hazards
        - i. Burns
        - ii. Weld flash
        - iii. Electrical shock
        - iv. Respiratory
        - v. Hearing
    2. Hand and power tools

1. Selection
2. Application
3. Operation
1. Material preparation
1. Land
2. Bevel
  - a. Angle
  - b. Application
3. Length
1. Machine set up
1. Power
2. Electrode holder and ground
3. Grounding
4. Settings
  - a. Amperage
  - b. Arc control
1. Electrode
1. Number
2. Size
3. Amperage setting
1. Coupon assembly
1. Root gap
2. Fit up
3. Gap
4. Fixture adjustment
1. Verification
1. Machine adjustment
2. Set up
3. Gap gage
1. Welding technique
1. Rod angle
2. Rod selection
3. Arc length
4. Travel speed
5. Keyhole

### **Religious Accommodation**

Before reviewing the course schedule, students should carefully review the following religious accommodation policy and other required instructional policies:

#### **Religious Accommodation:**

Students seeking an accommodation for absences permitted under Ohio's Testing Your Faith Act must provide the instructor with written notice of the specific dates for which the student requires an accommodation and must do so not later than fourteen (14) days after the first day of instruction. Please submit requests for accommodations at this link: <https://portal2.tri-c.edu/ReligiousAccommodation/ReligiousAccommodationForm>. Students with questions about their religious accommodations under Ohio's Testing Your Faith Act may contact the College's Office of General Counsel and Legal Services by phone at 216.987.4856 or via email at [legal@tri-c.edu](mailto:legal@tri-c.edu).

#### **Other Required Instructional Policies:**

<https://www.tri-c.edu/student-resources/curriculum/documents/syllabus-part-b.pdf>

**Weekly Schedule**

<b>Topics</b>	
Week 1	Welding Safety and Pipe Groove Welding * Personal Protective Equipment * Purpose of Pipe Groove Welding * Pipe Groove Welding Progression * Shop
Week 2	Welding Safety and Pipe Groove Welding * Personal Protective Equipment * Purpose of Pipe Groove Welding * Pipe Groove Welding Progression * Shop
Week 3	o Coupon Preparation * Prepare Bevel and Land * Adjusting Weld Booth Set-up * Cutting Machine * Shop
Week 4	o Coupon Preparation * Prepare Bevel and Land * Adjusting Weld Booth Set-up * Cutting Machine * Shop
Week 5	o National Certified Pipe Welding Bureau Guidelines * Weld Procedure Specifications * Minimum and Maximum Gap * Electrode Identification a) Number b) Size c) Amperage Setting * Shop
Week 6	o National Certified Pipe Welding Bureau Guidelines * Weld Procedure Specifications * Minimum and Maximum Gap * Electrode Identification a) Number b) Size c) Amperage Setting * Shop
Week 7	o Weld Progression * Initial Root Pass a) Rod Angle b) Rod Selection c) Arc Length d) Travel Speed e) Key Hole * Welding Bead Characteristics * Uphill Welding Process * Shop
Week 8	o Weld Progression * Initial Root Pass a) Rod Angle b) Rod Selection c) Arc Length d) Travel Speed e) Key Hole * Welding Bead Characteristics * Uphill Welding Process * Shop
Week 9	o Weld Progression (continued) * Fill Pass * Proper Electrodes * Shop

Week 10	o Weld Progression (continued) * Fill Pass * Proper Electrodes * Shop
Week 11	o Weld Progression (continued) * Cover Pass * Height and Width of Cap * Shop
Week 12	o Weld Progression (continued) * Cover Pass * Height and Width of Cap * Shop
Week 13	o Practice Proper Body Position * Weld Booth Techniques * Shop
Week 14	o Practice Proper Body Position * Weld Booth Techniques * Shop
Week 15	Review
Week 16	Assessment

The Course Schedule is subject to change due to pedagogical needs, instructor discretion, parts of term, and unexpected events.

**Required/Recommended Readings**

Instructor-provided materials

**Resources for the Instructor**

Frankland, Thomas W. *Pipe Trades Manual*. McGraw-Hill, 1969.

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United Association Training Department. *Welding Skills Manual* . Annapolis, MD: United Association , [www.ua.org/training](http://www.ua.org/training)

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**Additional Resources for the Instructor**

[www.ua.org](http://www.ua.org) (<https://catalog.tri-c.edu>[www.ua.org](http://www.ua.org))

<http://www.thefabricator.com/article/arcwelding/stick-welding-tips-for-top-performance> (<http://www.thefabricator.com/article/arcwelding/stick-welding-tips-for-top-performance/>)

<http://www.millerwelds.com/resources/articles/stick-electrode-selection/>

<http://www.millerwelds.com/resources/articles/smaw-stick-arc-welding-tips-techniques/>

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