

ATPF-2470: OXY/ACETYLENE CUTTING AND BASIC WELDING II

Cuyahoga Community College

Viewing: ATPF-2470 : Oxy/Acetylene Cutting and Basic Welding II

Board of Trustees:

1/30/2025

Academic Term:

Fall 2025

Subject Code

ATPF - Applied Ind Tech - Pipefitters

Course Number:

2470

Title:

Oxy/Acetylene Cutting and Basic Welding II

Catalog Description:

Review of Oxyacetylene cutting and basic welding and includes applied math concepts required for determining various fabrication angles using shielded metal arc welding (SMAW). Terminology and specific rod selection used in plate and pipe welding processes will also be covered.

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 required machine set-up and settings including respective polarity, and identify and describe the safety requirements for welding operations.

Objective(s):

1. List and define the terms related to branch connection welding.
2. Identify the specific tools used for branch connection welding and explain the use of each.
3. Discuss the different polarities used and differentiate between each.
4. Explain the various weld machine settings and describe proper welding machine configurations.
5. Discuss the shop safety practices for welding operations

Course Outcome(s):

Demonstrate the ability to select the proper tools and materials to establish the template on the branch line and cut to receive header pipe within accepted tolerances.

Objective(s):

1. Select proper tools and materials required to intersect a header and branch line pipe.
 2. Prepare the branch line pipe to receive template.
 3. Transfer paper template to branch employing measurement and base line(s).
 4. Employ proper safety procedures to operate cutting equipment to cut and burn the saddle on tee.
 5. Layout and burn header hole in header pipe to receive branch line pipe.
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Course Outcome(s):

Discuss the application of a saddle on tee template including purpose and function and describe the layout methods used to develop the template.

Objective(s):

1. Apply the mathematical progression to properly develop correct pipe template.
2. Compute respective pipe circumferences to establish base line template.
3. Refer to the pipe fabrication manual to select correct formula and pipe sizes.
4. Plot pipe intersection coordinates on paper template.
5. Compare pipe template with actual pipe branch and header to maintain acceptable tolerances.

Course Outcome(s):

Demonstrate the ability to properly adjust the welding machine and select the correct electrode to join two pipes using fit and tack and weld out procedures.

Objective(s):

1. Select the correct electrodes required to weld specific pipe.
2. Apply the fit and tack procedures to establish check points for welding operations.
3. Perform pipe welding operations required to connect two pipes using the saddle on tee technique.
4. Adjust the welding machine setting to properly perform pipe welding operations.

Methods of Evaluation:

1. Tests
2. Quizzes
3. Class participation

Course Content Outline:

1. Welding machine: setup and safety
 - a. Terminology
 - i. Pipe quartering
 - ii. Branch line
 - iii. Header pipe
 - iv. Saddle
 - v. Circumference
 - vi. Centerline
 - vii. Hack saw cuts
 - viii. Template
 - b. Tools
 - i. Wrap around
 - ii. Framing square
 - iii. Center punch
 - iv. Tape measure
 - v. Plasma cut
 - vi. Oxyacetylene cut
 - vii. Level
 - c. Polarities
 - i. Reverse
 1. DC electrode positive
 2. Primary
 - ii. Straight
 1. DC electrode negative
 2. Gas tungsten arc welding (GTAW)
 - d. Machine setup
 - i. Amperage selection
 - ii. Rod compatibility
 - iii. Grounding

1. Contact
 2. Closed circuit
 3. Clamping
- e. Shop safety
 - i. Personal protective equipment (PPE)
 1. Eye protection
 2. Jacket
 3. Gloves
 4. Hood
 5. Face shield
 6. Masks
 - ii. Fire protection
 - iii. Hot work permit
2. Template
 - a. Pipe fabrication manual
 - i. Formulas
 - ii. pipe capacity
 - iii. Pipe weight
 - iv. Size of pipe
 - v. Pipe schedule
 - vi. Fabrication methods
 - b. Math formulas
 - i. Circumference
 - ii. Pipe quartering
 - iii. Pipe finish size
 - iv. Conversion
 - c. Circumference
 - i. Branch line
 - ii. Header pipe
 - iii. Base line
 - iv. Centerline
 - d. Intersecting coordinates
 - i. Accurate
 - ii. Spacing
 - iii. Variance by pipe size
 - e. Template versus physical
 - i. Compatibility
 - ii. Tolerances
 - iii. Template clarity
3. Template transfer and pipe weld preparation
 - a. Tools and materials
 - i. Tools
 1. Pipe stand
 2. Burning equipment
 3. Hoists
 - ii. Materials
 1. Pipe
 2. Template material
 - b. Pipe preparation
 - i. Leveling
 - ii. Baseline
 - iii. Quartering
 - iv. Orientation of lines
 - c. Template transfer
 - i. Measurement
 - ii. Alignment
 - iii. Marking
 - iv. Center punch
 - v. Baseline

- d. Pipe cutting
 - i. Safety
 - 1. Hot work permit
 - 2. Combustible material
 - 3. Ventilation
 - ii. Tolerance check
 - iii. Equipment operation
 - 1. Plasma
 - a. Compressed air setting
 - b. Voltage selection
 - 2. Oxyacetylene
 - a. Gauge setting
 - b. Tip selection
 - iv. Pipe cutting
 - e. Header hole
 - i. Layout
 - ii. Tracing
 - iii. Pipe hole cutting
 - iv. Hole preparation for weld
4. Pipe welding
 - a. Machine setting
 - i. Amperage
 - ii. Polarity
 - iii. Grounding
 - b. Electrode
 - i. Root pass
 - ii. File and cap
 - iii. Size
 - c. Fit and tack
 - i. Gap
 - ii. Bevel
 - iii. Prescribed angle
 - iv. Size verification
 - d. Pipe welding/weld out
 - i. Root bead
 - ii. Fill pass
 - iii. Travel speed
 - iv. Rod angle
 - v. Multiple bead cap
 - vi. Inspection

Resources

United Association. *Oxy-Acetylene Cutting / Shielded Metal Arc Welding*. existing. United Association Annapolis, Md., 2005.

Lincoln Electric. *Procedure handbook of arc welding, design and practice*. current. Lincoln Electric Cleveland, Ohio, 2011.

United Association. *Oxy-Fuel Practices* . existing. United Association Annapolis, MD, 2016.

Robert A. Lee. "IPT's Pipe Trades Handbook" IPT Publishing Edmonton, Alberta, Canada , 2018. July.

Resources Other

<https://www.millerwelds.com/resources> (<https://www.millerwelds.com/resources/>). 2024.

www. (<http://www.weldingengineer.com/>)**weldingengineer.com/**

www.esabna.com/EUWeb/AWTC/Lesson1_1.htm -

Safety Datasheet for Acetylene (2021) <https://www.airgas.com/msds/001001.pdf> (<https://www.airgas.com/msds/001001.pdf>)

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