

ATPF-2490: PIPEFITTERS WELDING III

Cuyahoga Community College

Viewing: ATPF-2490 : Pipefitters Welding III

Academic Term:

Spring 2019

Subject Code

ATPF - Applied Ind Tech - Pipefitters

Course Number:

2490

Title:

Pipefitters Welding III

Catalog Description:

Course covers the welding standards as prescribed by American Society of Mechanical Engineers and discusses weld quality, appearance and tolerances for acceptance. Included will be an introduction to template making and welding exercises designed to develop techniques for welding elbows and angles.

Credit Hour(s):

2

Lecture Hour(s):

2

Requisites

Prerequisite and Corequisite

Departmental approval: addmission to Pipefitter's apprenticeship program.

Outcomes

Course Outcome(s):

Discuss the American Society of Mechanical Engineers, ASME, pipe codes and explain the relationship to workers safety and pipe installation.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. List the applicable ASME codes used in the pipefitting industry.
2. Differentiate between process pipe, power piping, and American Petroleum Institute codes as related to pipe welding.
3. Explain the purpose of industry oversight to ensure worker safety and quality installation.
4. Explain the variables related to weld quality and installation costs.

Course Outcome(s):

Evaluate pipe welds for quality, appearance, and tolerances using different techniques and equipment including radiography.

Objective(s):

1. List and define the terms related to weld inspection and acceptance.
2. Explain the difference between weld quality, appearance, and tolerances.
3. Inspect welds visually and in accordance with Weld Procedure Sheet, WPS, for acceptable tolerance and criterion.
4. Differentiate between destructive and non-destructive testing.
5. Explain how radiography is used to determine weld quality and discuss related cost factors.

Methods of Evaluation:

1. Quizzes
2. Tests
3. Class participation

Course Content Outline:

1. ASME pipe codes
 - a. Pipe code
 - i. Process pipe code ASME 31.1
 - ii. Power pipe code ASME 31.3
 - iii. Underground piping; American Petroleum Institute #1104
 - b. Process
 - i. Closed loop system
 - ii. Heating water
 - iii. Chilled water
 - c. Power
 - i. Hydraulics
 - ii. Steam
 - iii. Coal
 - d. Underground piping
 - i. Natural gas
 - ii. Fuel
 - iii. Chemical
 - e. Purpose
 - i. Worker safety
 1. Safe working pressure
 2. Explosion
 3. Chemical exposure
 - ii. Weld quality
 - iii. Industry standards
 - f. Weld quality
 - i. Third party inspection
 - ii. WPS inspection
 - iii. Visual inspection
 - iv. Testing
 - g. Installation cost
 - i. Labor
 - ii. Materials
 - iii. Weld process
 - iv. Deposition rate
 - v. Code selection
2. Weld evaluation
 - a. Terminology
 - i. Mag particle
 - ii. Discontinuity
 - iii. Convex
 - iv. Concave
 - v. Deposition rate
 - vi. WPS
 - vii. Grove weld
 - viii. Undercut
 - ix. Under fill
 - x. Bead width
 - b. Quality, appearance, and tolerance
 - i. Quality
 1. Filler material
 2. Strength
 3. Third party acceptance
 - ii. Appearance

1. Visual
2. Weld contour
3. Surface preparation
4. Weld bead profile
- iii. Tolerance
 1. WPS
 2. Physical measurement
 3. Industry standard
 4. Failure
- c. Visual inspection
 - i. Self-evaluation
 - ii. Tolerance acceptance
 - iii. Discontinuation
 1. Under cut
 2. Under fix
 3. Penetration
- d. Destructive versus non-destructive testing
 - i. Destructive
 1. Tensile pull
 2. Weld strap bend
 3. Nick-break test
 - ii. Non-destructive
 1. Liquid dye penetrant
 2. Mag particle
 3. Phase array
- e. Dye penetrant, mag particle, and phase array
 - i. Dye penetrant
 1. Surface limitation
 2. Temperature sensitive
 3. Time intensive
 - ii. Mag particle
 1. Limitation
 2. Flatness
 3. Weld crack failure
 - iii. Phase array
 1. Weld geometry limitation
 2. Cost effective
 3. Time efficient

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