ATPL-2806: SPECIAL TOPICS: INSTALLATION TECHNIQUES FOR COPPER TUBE & PIPE

Cuyahoga Community College

Viewing: ATPL-2806 : Special Topics: Installation Techniques for Copper Tube & Pipe

Board of Trustees:
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Academic Term:
Fall 2026

Subject Code
ATPL - Applied Ind Tech - Plumbers

Course Number:
2806

Title:
Special Topics: Installation Techniques for Copper Tube & Pipe

Catalog Description:
This course is designed to demonstrate and qualify the students in the multiple installation practices of copper tube and pipe. Tool use, safety practices, tube/pipe and fitting identification, drawing use and applied mathematics will all be covered in this course as it relates to the installation techniques of copper tubing and pipe.

Credit Hour(s):
2

Lecture Hour(s):
2

Requisites

Prerequisite and Corequisite
Departmental approval: admission to program.

Outcomes

Course Outcome(s):
Identify the basic and advanced tools used in the installation of copper tube and pipe, and pipe fittings and connections.

Objective(s):
1. List the various hand and power tools required for copper installation.
2. Differentiate between basic and advanced tools.
3. Identify the different tube and pipe fittings.
4. Discuss the different installation techniques used to install and connect copper pipe and tubing.
5. Compare brazing and soldering operations with mechanical connections.
6. Describe the brazing and soldering processes that are used to connect copper tube and pipe fittings and supply and waste lines installations.

Course Outcome(s):
Discuss the safety procedures as prescribed by the Occupational Safety and Health Administration (OSHA) and the Copper Development Association (CDA) for worker protection.

Objective(s):
1. Identify the hazards related to working with copper.
2. Discuss the procedures used to protect the worker during copper installations.
3. List the Personal Protection Equipment (PPE) as prescribed by OSHA, required for safe copper installations.

4. Explain how heated copper can cause severe burns.
5. Discuss the respiratory risks caused by fumes generated during soldering and brazing operations.

Course Outcome(s):

Interpret mechanical drawings and schematics and review related math concepts for material estimating, layout procedures, and pipe locations.

Objective(s):

1. Identify plumbing supply and waste line requirements on mechanical drawings.
2. Differentiate between Mechanical drawings and schematics.
3. Determine pipe locations in floors. Walls and ceilings from floor plans and specifications.
4. Estimate quantities of tubing, pipe and pipe fittings required for mechanical installations.
5. Establish different lists required for materials, tools and equipment.
6. Review trade related math concepts necessary for pipe layout and to install mechanical supply and waste lines.

Course Outcome(s):

Demonstrate the ability to install mechanical requirements for residential and commercial structures.

Objective(s):

1. Locate the work area and position the materials and tools required for mechanical installations.
2. Layout locations of respective copper supply and waste lines using applied math and geometry.
3. Select proper hand and power tools and safely operate to perform installations.
4. Follow safety precautions as prescribed by OSHA and the CDA for personal safety and for other workers.

Methods of Evaluation:

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

Course Content Outline:

1. Identify (ID)Tools
1. Hand and power tools
   a. Roll Cutters – Various sizes
   b. Auto-cutters
   c. Reamers
   d. Heating Equipment
   e. Press machines
   f. Measurement tool
2. Basic vs. advanced tools
   a. When to use basic vs. advanced
   b. What defines advanced
   c. Issues with advanced vs basic
3. Difference between tube and pipe fittings
   a. Wall thickness
   b. Connection process
   c. Different fittings for tube
   d. Different fittings for pipe
4. Different techniques to installing
   a. Threaded
   b. Solder
   c. Braze

   d. Press
   e. Mechanical
5. Brazing and soldering vs. mechanical
   a. Connections
   b. Heat transfer
   c. Fitting types
   d. Longevity of connection
6. Process of brazing and soldering
   a. Heating process
   b. Connection preparation
   c. Appling filler metal
   d. Why and when to use braze over solder

1. Safety Procedures

1. Id Hazards
   a. Fires
   b. Abrasions
   c. Burns
   d. Chemical poisoning
   e. Confined spaces
2. Procedures for protection of worker(s)
   a. Pre task safety meetings
   b. Knowing the safety procedures of job site and employer
   c. Understanding OSHA regulations
3. PPE – ID and use
   a. Fire proof/heat resistance materials
   b. Proper body, foot and hand protection
   c. Eye and Face protection
4. Respiratory Ricks
   a. Understanding the air we breathe
   b. What is added to the air by soldering/brazing
   c. Chemical reactions to the body
   d. Protection from respiratory risks

1. Material, layout and locations
   a. Id supply and waste on drawings
      i. Code requirements
      ii. Interpret water and waste lines
      iii. Understanding what drawings to look at
   b. Mechanical drawings vs. schematics
      i. What is on mechanical drawings
      ii. What is lacking on mechanical drawings
      iii. Types of schematics
      iv. Schematic use in the installation process
   c. Determine locations of pipes
      i. Understanding floor plans
      ii. Using the correct revisions
      iii. Measurements from common locations
      iv. Understanding job Specifications
   d. Estimate quantities
      i. What is estimating
      ii. How to estimate from drawings and specifications
      iii. Common procedures
   e. Making lists
      i. Tools
      ii. Safety
      iii. Equipment
      iv. Materials
   f. Review of trade related math

   i. Types of Measurements
   ii. Geometry related to the installs
   iii. Using math for quick lay outs
2. Installations for Residential and Commercial
   a. Location, tools and materials required
      i. Locate area of installation
      ii. Stage tools required
      iii. Gather materials that are needed
      iv. Check PPE
   b. Layout Locations using math
      i. Use drawings to assist in layout
      ii. Demonstrate use of advanced math
      iii. Understanding the differences between waste and water supply
   c. Selection of tools
      i. Follow proper use of hand and power tools
      ii. Select most effective tools
   d. Use of Proper safety equipment
      i. Follow proper PPE
      ii. Follow jobsite and employer safety regulations
      iii. Demonstrate safety for others

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/ Religious Accommodation Form. 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.

Other Required Instructional Policies:

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

Weekly Schedule

	Topics
Week 1	Course overview and safety orientation
Week 2	OSHA and CDA safety requirements
Week 3	Copper tube vs. pipe: identification, sizes, wall thickness
Week 4	Tube and pipe fittings: types and applications
Week 5	Hand tools for copper installation
Week 6	Power tools and advanced installation tools
Week 7	Tool selection: basic vs. advanced
Week 8	Installation techniques overview (threaded, soldered, brazed, mechanical)
Week 9	Soldering processes and applications
Week 10	Brazing processes and soldering vs. brazing
Week 11	Mechanical and press-type connections
Week 12	Safety hazards, fires, burns, and chemical exposure
Week 13	PPE and respiratory protection
Week 14	Mechanical drawings vs. schematics and pipe layout
Week 15	Estimating materials and trade-related math
Week 16	Residential and commercial copper installations and course review

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

United Association Training Department. *Soldering and Brazing Manual*. Annapolis, MD: United Association, www.ua.org/training

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United Association Training Department. *Drainage*. Annapolis, MD: United Association, www.ua.org/training

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Additional Resources for the Instructor
www.copper.org (https://catalog.tri-c.eduwww.copper.org)
www.kpsec.freeuk.com/solder.htm (https://catalog.tri-c.eduwww.kpsec.freeuk.com/solder.htm)
www.brazing.com (https://catalog.tri-c.eduwww.brazing.com)
www.ua.org (https://catalog.tri-c.eduwww.ua.org)

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