

ATLB-2801: SPECIAL TOPICS IN PLASTIC PIPE FUSION

Cuyahoga Community College

Viewing: ATLB-2801 : Special Topics in Plastic Pipe Fusion

Board of Trustees:

JUNE 2026

Academic Term:

Fall 2026

Subject Code

ATLB - AIT-Construct/Hazard Material

Course Number:

2801

Title:

Special Topics in Plastic Pipe Fusion

Catalog Description:

Advanced US Department of Transportation (USDOT) qualification course covering polyethylene pipe, types, uses and installation techniques. Included are various pipe connections using heat and electro fusion.

Credit Hour(s):

2

Lecture Hour(s):

2

Requisites

Prerequisite and Corequisite

Departmental approval: admission to Laborer's apprenticeship program.

Outcomes

Course Outcome(s):

Discuss the various types of plastic pipe and pipe fittings and joints that are used, and the industry standards required for 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):

Review the USDOT standards for installation of plastic pipe and explain requirements for worker qualification.

List the different types of plastic pipe including grade, size and different fittings.

Differentiate between high and medium density pipe.

Identify the different methods used to join plastic pipe and pipe fittings.

List the different uses for plastic pipe.

Identify the different equipment used for plastic pipe fusion.

Course Outcome(s):

Discuss the operation of the Hydraulic Butt Fusion Machine including the different models available, the pre-operational checks, and respective clamping inserts with respect to pipe diameters

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):

- List the different Hydraulic Butt Fusion Machines and state the application of each.
- Identify the components of the Butt Fusion Machine and explain the function of each.
- Describe the operation of the machine and explain the importance of matching the correct clamping inserts with the respective pipe diameter.
- Differentiate between the Hydraulic Butt Fusion Machine and the Manual Butt Fusion Machine.
- Explain the importance of pre-operational checks and list the different inspection points.
- Discuss maintenance procedures for the Butt Fusion Machine and identify wear points.

Course Outcome(s):

Demonstrate the ability to join plastic pipe using different fusion techniques and equipment.

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):

- Differentiate between butt and electro fusion joining procedures.
- Discuss the set up and operation of the respective equipment.
- List the procedural steps required for each technique.
- Identify the different clamping techniques and equipment that are used.
- Discuss fusion preparation procedures including pipe cleaning, alignment and positioning.
- Discuss the safety hazards related to pipe fusion including heat and electrical dangers and physical concerns.

Methods of Evaluation:

- Quizzes
- Tests
- Class participation
- Demonstration of proficiency in fusing plastic pipe in accordance with current industry standards.

Course Content Outline:

COURSE OUTLINE

1. Plastic pipe and USDOT standards
 - a. USDOT standards
 - i. Qualifying joining procedures
 - ii. Qualified worker
 - iii. Joint inspection
 1. Bend test
 2. Visual
 - iv. Test conditions
 1. Pressures
 2. Pipe type
 3. Hazardous leaks
 4. Thermoplastic temperature
 - v. Qualified person
 1. Training and experience
 2. Testing
 3. Requalification's
 - b. Types of plastic pipe
 - i. Grade
 1. High density
 2. Medium density
 - ii. Size

1. Diameter
 2. Wall thickness
 3. Coiled
 4. Stick
1. Fittings
 - a. Couplings
 - b. Saddle
 - c. Tees
 2. Pipe density
 - a. High
 - i. Temperature
 - ii. Pressure
 - b. Medium
 - i. Uses
 - ii. Limitations
 3. Joining methods
 - a. Butt fusion
 - b. Adhesives
 - c. Electro fusion
 - d. Mechanical fittings
 4. Plastic pipe transmissions
 - a. Gas
 - b. Liquids
 - c. Storm and waste water
 5. Equipment
 - a. Clamping
 - b. Pipe preparation
 - c. Alignment
 - d. Heater plates
 - e. Electro fusion unit
 - f. Pyrometer
1. Butt Fusion Machine
 - a. Models
 - i. McElroy 28
 1. Pipe diameter range 2" to 8"
 2. High or low force cylinder
 - ii. McElroy 412
 1. Pipe diameter range 4" to 12"
 2. High, medium or low force cylinder
 - iii. Trasstac 28
 1. Track travel
 2. 2" to 8" diameter
 - b. Components
 - i. Clamp inserts
 - ii. Facer
 - iii. Heater plate
 - iv. Hydraulic selector valves
 - v. Carriage control
 - c. Machine operation
 - i. Pipe installation to assembly
 - ii. Secure pipe
 - iii. Pipe facing
 - iv. Heating operation
 - v. Join pipe with required force
 - vi. Maintain pipe position per manufacturer specification
 - d. Hydraulic vs. manual
 - i. Hydraulic
 1. Carriage unit –automatic
 2. Permanent attachment of facing component

- 3. Hydraulic force
 - 4. Expensive
 - 5. Pre-designated pressure
 - 6. Quality pipe joint
 - ii. Manual
 - 1. Economical
 - 2. Electrically operated
 - 3. Time intensive
- e. Pre-operational check
 - i. Electrical supply
 - 1. Adequate voltage/amperage
 - 2. Grounded
 - ii. Machine set-up
 - 1. Safe location
 - 2. Free from environmental danger
 - iii. Clean
 - 1. Free of contaminates
 - 2. Operational efficiency
 - iv. Clamping inserts
 - 1. Proper size
 - 2. Secured position
- f. Maintenance
 - i. Wear points
 - 1. Hydraulics
 - 2. Braking
 - 3. Tires
 - 4. Clamping
 - ii. Hydraulics
 - 1. Hose
 - 2. Fittings
 - 3. Fluids
 - iii. Clamping inserts
 - 1. Size
 - 2. Free from foreign matter/contaminates
 - iv. Braking system
 - 1. Lubrication
 - 2. Locking mechanism
 - v. Tires
 - 1. Proper inflation
 - 2. Nicks, gauges, damage
 - 3. Tread quality
- 2. Plastic pipe fusion
 - a. Butt versus electro fusion
 - i. Advantages
 - ii. Costs
 - iii. Ambient temperatures
 - b. Equipment/butt fusion
 - i. Clamping jaws
 - ii. Heater plate
 - iii. Facing machine adjustments
 - iv. Maintenance
 - c. Electro fusion equipment set up
 - i. Clamping
 - ii. Power source
 - iii. Positioning
 - iv. Equipment programing
 - v. Temperature controls
 - d. Clamping equipment

- i. Positioning
- ii. Pipe diameter
- e. Pipe preparation
 - i. Cleaning
 - ii. Scraping
 - iii. Squaring
 - iv. Alignment
- f. Safety hazards
 - i. Electrocutation
 - ii. Fire
 - iii. Cuts
 - iv. Burns

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.

Other Required Instructional Policies:

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

Weekly Schedule

	Topics
Week 1	Course Introduction & USDOT Overview
Week 2	USDOT Qualification Requirements
Week 3	Joint Inspection & Testing
Week 4	Plastic Pipe Types & Characteristics
Week 5	Pipe Applications & Transmission
Week 6	Fittings & Pipe Density
Week 7	Joining Methods Overview
Week 8	Fusion Methods
Week 9	Equipment for Plastic Pipe Installation
Week 10	Butt Fusion Machines
Week 11	Machine Components & Operation
Week 12	Hydraulic vs Manual Systems
Week 13	Pre-Operation & Maintenance
Week 14	Pipe Preparation & Fusion Setup
Week 15	Fusion Operations & Safety
Week 16	Finals Week

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

Drexel J. Thrash Training Center. *Plastic Pipe Fusion Manual*. current. Howard, Ohio; Drexel J. Thrash Training Center, 2010.

Plastic Pipe Institute. *Second Edition Handbook of PE Pipe*. second . Irving, Texas; Plastic Pipe Institute, 2008.

Michael Maskrey. *The City and Guilds Textbook: Plumbing Book I*. current. London, UK; Hodder Education, 2019.

Additional Resources for the Instructor

<https://www.law.cornell.edu/cfr/text/49/192.283>

<https://www.ferguson.com/content/jobsite-solutions/pipe-fusion-training>

<https://isco-pipe.com>

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