Pipeline Procedures: Polyethylene Pipe Fusion Syllabus

Time: 40 hours

Maximum Class Size: 12

Prerequisites: None

Course Description: The work of pipeline Construction Craft Laborer is varied and complex. A well-trained, skilled Laborer is a asset for any contractor performing Mechanical Pipe work. Water treatment facilities, power plants and gas mains are some of the areas where a Laborer who is skilled in pipe fusion is needed. This course addresses fusion theory and types of fusion such as butt fusion, saddle fusion, and socket fusion. Various types and uses of composite wrap are presented. Laborers learn to calculate fusion pressure, use a Data Logger and construct pipe that is square, faced, clean and free of any gaps. Students are given ample time to practice proper technique using the Mini MC, 2LC, and 14-4. They will also perform hands-on hot taps using the Mueller B100or Simtap machine.

Goals/Objectives/Student Learning Outcomes:

- Butt fuse ½", ¾" and 1" MDPE and HDPE with the Mini Mc per Industry standards PPITR-33
- Butt fuse with the 2LC ½", ¾", 1", 1 ½", and 2" MDPE and HDPE per industry standards PPITR-33
- Butt fuse with No. 14 1", 1 ½", 2" and 4" MDPE and HDPE per Industry standards PPI TR-33.
- Butt fuse with the 412 8" or 10" HDPE per Industry Standards.
- Saddle fuse taping tees or tapping saddles with the Side winder per Industry Standards PPI TR-41
- Socket fuse of ½", 1" & 2" IPS MDPE & HDPE couplers to pipe per Industry Standards covered on the CFR49 Part 192, 192.283(a).
- Describe Standard Dimensional Ratios
- Calculate fusion pressures with slide ruler and online with the M Calculator.
- Maintain heating temperatures on solid state and thermos-switch heaters on specific types of fusion parameters using pyrometers of various types.
- Use facers from Mini Mc up to 412 MF and construct a pipe that is square, faced and free of any gaps using proper cleaning cloth and agents.
- Cool pipe to proper specifications per pipe diameter.
- Identify various types of composite wraps for pipe.

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- Perform a Hot Tap on pressurized main using Mueller and/or Simtap
- Demonstrate correct shift sequence on Hydraulic Machine 412.
- Demonstrate how to use Data Logger depending on SDR & DIA.

Standards

- All McElroy butt fusion machines meet or exceed
    - ISO-12176-1: Equipment for fusion jointing polyethylene systems-Part 1: Butt fusion
- Plastic Pipe Institute (PPI)
    - PPI Technical Reports TR-33
    - Generic Butt Fusion Parameters & Procedures TR-41
    - General Saddle Fusion parameters & Procedures
- ASTM International Worldwide
    - ASTM F2620 Standard Procedure for Heat Fusion Joining of Polyethylene Pipe and Fittings
    - ASTM D2657 Fusion in cold weather
    - ASTM D2774 Protection under shear & bending loads, branch connections
- Department of Transportation (DOT) Operator Qualifications
- OSHA 49 CFR 192.283-5
- OSHA 49 CFR 192.273 Gas Pipe Joining
- OSHA 49 CFR 192.283(a) Socket, Saddle & Butt Fusion
- OSHA 49 CFR 92.627 Hot Taps under pressure
- OHSA 29 CFR 1926.650-2 Subpart P for Trench and Excavation Safety
- OHSA 29 CFR 1910.146 Confined Space Entry
- OHSA 29 CFR 1926.300 Subpart I Power Tools.
- OHSA 29 CFR 1926.702 Requirements for Equipment & Tools
- Cal/OSHA Subchapter 7:
    - Group 2 Article 7- Safe Practices Pipe Lines
    - Group 6 Article 47- Machine and Machine Parts
    - Group 20 Article 146 Piping, Valves, Fittings

Classroom Rules and Procedures

- All classes begin at 6:30 am and end at 3:00 pm
- Upon entering classroom, all participants must sign in and be seated by 6:30 am
- Class will consist of a combination of lecture, video, demonstration, coached group exercises, individual exercises and assessment.
- Students are required to report to class ready to work and maintain the provided PPE

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Textbooks/Readings/Materials:

- *Performance Pipe Heat Fusion Joining Procedures and Qualification* Guide
- *DVD: Performance Pipe for Fusion*
- LIUNA *Chain-Saw Operation, Maintenance and PPE IG*/PG
- DVD: *Simtap*
- Handout: *Simtap*
- Mueller Hot Tap DVD
- DVD: *Chainsaw*
- Plastics Pipe Institute *Polyethylene Joining Procedures*

Tools/Equipment/Other Materials

- Mini Mc-2 with set of ½" cts-1" ips inserts
- Ratchet Facer-2
- Assorted Bushings-2 ½" cts-1" ips with small screws
- P.V.C. Cutter-2
- Pyrometer-2: 1 manual & 1 laser
- Allen Wrench Set-2
- Heater (Thermo Switch)-2
- Heater Sling-2
- Small Flathead Screwdriver-2
- Heater (Solid State)
- Heater Stand with bag
- Tubing Cutter
- Machine Stand
- Electric Facer
- Heater Stand with bag
- Bolster
- Heater Blanket
- Medium Stands-2
- Ratchet Straps

Personal Protective Equipment

- 12 pairs of gloves
- 12 pairs of Safety Glasses
- 20 pairs of Ear plugs
- 12 hard hats

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Course Requirements

To receive credit for the course, participants must:

- Be present for full forty hours
- Participate in all classroom exercises
- Pass a written exam
- Pass 5 hands-on exams

Course Policies

- Participants must be on-time and ready to work.
- Participants must return from breaks on-time.
- Participants must participate in each exercise and assignment
- Participants who are on “light duty” are not allowed to take this course due to the physically demanding requirements.

Assessment and Grading

Participants will be assessed on the following:

- All written exams must be passed with a score of 80% or above.
- All five hands-on exercises are graded on performance and participation. They are pass/fail and must be passed with a score of 80% or above.

Safety

Failure to maintain and use PPE may result in dismissal from the course.