



# Non-Metallic Joining

When what's inside has to stay inside,  
it's polyethylene pipe.

**Count on it.**

# What is non-metallic pipe?

- Materials included in ASTM D 2513
  - Polyethylene
  - Polyvinyl Chloride
  - Polyamide 11
  - Polyamide 12
  - PEX – Cross-linked PE

# Non-Metallic Joining

For this workshop we will be focusing mainly on PE pipe and fittings.

95% of all plastic installed for gas is PE.

# How can plastic pipe be joined?

- Mechanical
  - Plastic and metallic fittings
- Heat Fusion
  - Butt and Saddle
- Electrofusion
  - Couplings and Saddle

# Mechanical Joining

- Plastic Fittings
  - ASTM F 1924
- Metallic Fittings
  - ASTM F 1948
- Performance requirements defined in ASTM D 2513, part 6.10

# Electrofusion

- ASTM F 1055 Standard for Electrofusion Type Polyethylene Fittings
  - Defines performance requirements for couplings and saddle fittings

# Butt Fusion

- D 2657 Standard Practice for Heat Fusion Joining PE Pipe
- D 3261 Butt Fusion Fittings
- PPI TR-33 Generic Butt Fusion Procedure
  - Defines one method that can be use for qualification
- Request by DOT to simplify the qualification process

## TR-33 Generic Butt Fusion

- Does not “qualify” anything.
  - Report details how the method was established
- Each manufacturer must qualify their pipe and fittings
- Each utility must qualify to 49 CFR Part 192.283.



## TR-33 Generic Butt Fusion

- Included in ASTM D 2513, Table 4 Pipe Category.
  - Example “C E E”
- Second “E” indicates applicability of the generic fusion procedure TR-33.

# Sidewall Fusion

- TR-41 Generic Saddle Fusion Procedure for Polyethylene Gas Pipe.
- Does same thing for saddle fusion as TR-33 does for butt fusion.

## Current Work

1. Harmonization of butt fusion procedures- ISO TC 138/ SC4 project.
2. ASTM Butt Fusion Procedure – TR-33
3. New Materials – confirm TR-33 and TR-41 apply.
4. Electrofusion Universal Box
5. Higher working pressures
6. NDT

# Current Work

## Non-Destructive Testing (NDT)

- Visual
- Operator qualification
- Ultrasonic inspection
- Procedure confirmation

## Current State

- PE Pipe can be joined by several methods.
- Mechanical and heat joining have proven to be reliable and robust.
- Joint is still a potential “weak-link” in the system.

# Forward

What can we do to bridge this gap  
and improve the reliability of a  
very successful joining process?