Plastic Pipe Issues in the Eastern Region

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The Issues

- Butt Fusions
- Electrofusion
- Mechanical Tees
- Installation by Horizontal Directional Drilling
- Improper Pipe Handling
- Exposed Plastic Pipe

Butt Fusions

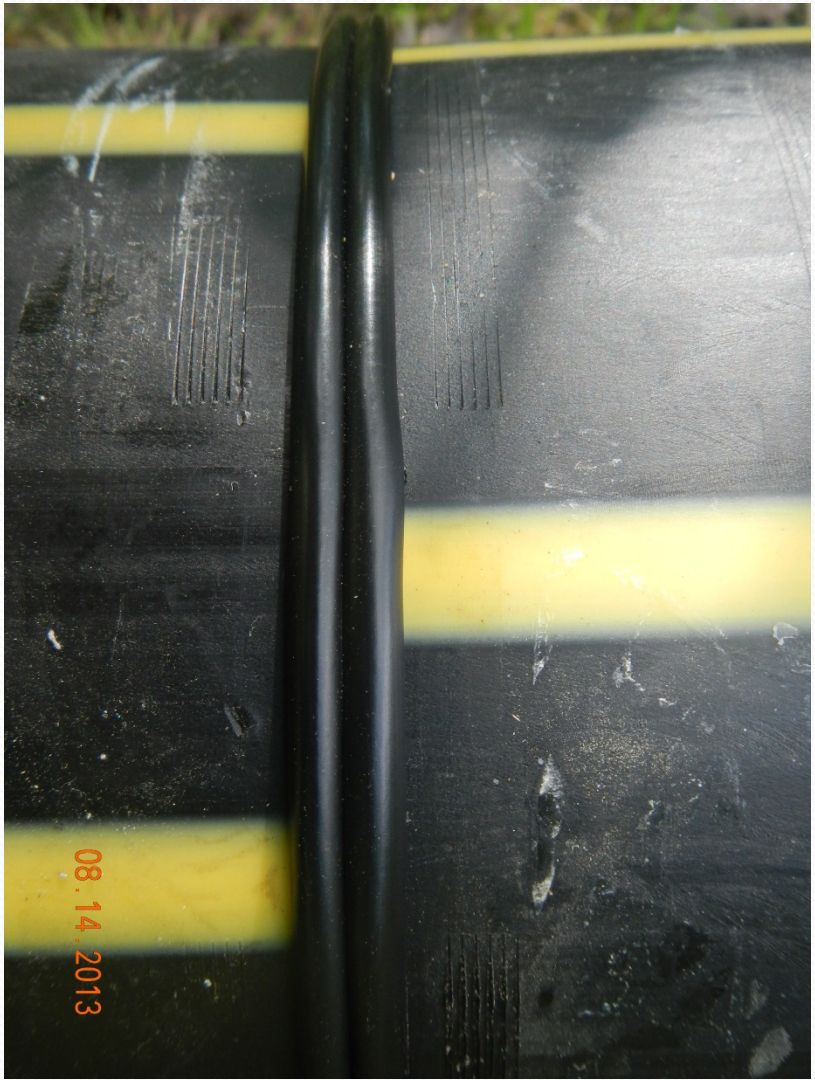
Inadequate Qualification and Resulting Poor Quality Joints

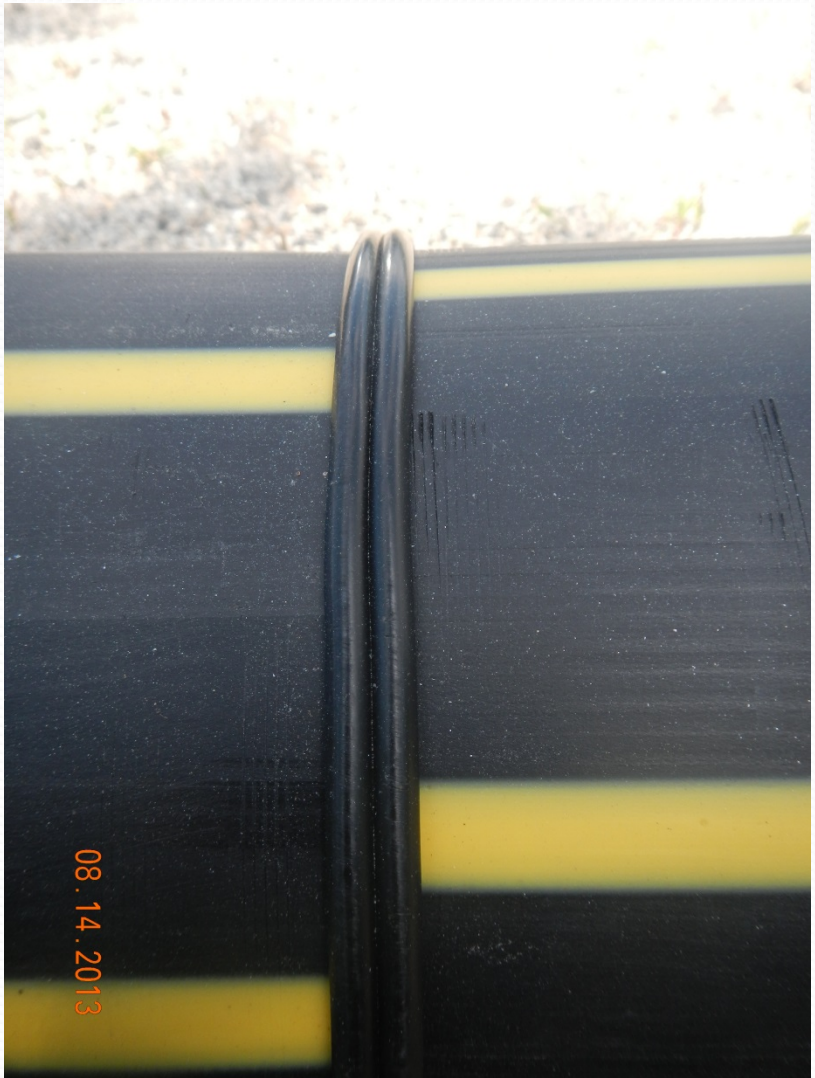
- A 2014 investigation, in New York State, revealed that six companies were not destructively testing hydraulic butt fusion samples during the qualification process [NY Rule and §192.285(b)(iii)].
- When requalified, 91 workers with one company failed the destructive testing module. This may impact over 800,000 fusions made back to 2002.

Butt Fusions (Continued)

- As of May 2015, 173 in-service fusions, of that company, were examined. Of those, 72 failed visual inspections. Of those, 63 were destructively tested and eight failed.
- When all companies are considered, there may be nearly one million in-service fusions impacted.
- In May 2015 the NY PSC Ordered an extensive remediation program.

Questionable Beads





Butt Fusions (Continued)

- Lack of Understanding of Interfacial Fusion Pressure (IFP)
  - IFP is the allowable range of pressure that's required between the faces of the pipes being joined, during the fusion process, to result in an adequate fusion;
  - IFP is constant for all sizes and wall thicknesses of pipes of the same type; and
  - The gauge pressure on hydraulic fusion machines varies with:
    - The pipe diameter and wall thickness;
    - The hydraulic piston area; and
    - The hydraulic pressure (drag) required to move the pipe being joined.

Hand Pump Hydraulic Fusion Machine

Hydraulic Pressure Gauge

Butt Fusions

- Inadequate Cooling Time for Rough Handling

  This is a problem noted with all types of fusion. It's sometimes not recognized by field personnel:

  - That Rough Handling requires additional cooling time after the pipe may be removed from the clamps; and
  - What constitutes Rough Handling?
    - Pulling, Installation in Trench, Etc.

Electrofusion

- Couplings
  - Inadequate Preparation
    - Conventional
    - Tie-In Applications
  - Inadequate Cooling Time for Rough Handling
  - Alignment – If you need to use the backhoe bucket to align the pipes, the electrofusion will likely fail.

Coupling – Left End

Coupling – Right End

Fusion Failed After Equipment Used to Align Pipes

Coupling Preparation at Tie-Ins

- Where the coupling is slid entirely over the end of one pipe;
- That pipe must be prepared over the entire length of the coupling.

Electrofusion Couplings

Is the pipe adequately prepared for this coupling?

It Depends!

Electrofusion

- Tees
  - Improper Clamps
  - Inadequate Preparation
  - Inadequate Cooling Time for Rough Handling

A Tee that Failed During Pressure Testing

Location of Tee Failure

Sidewinder – Not Approved for Electrofusion Tees

Mechanical Tee - Installation

Depend on the threads of the cutter's sleeve to hold them on the main

Horizontal Directional Drilling

- Cross Bores
- Inadequate Weak Links
- Lack of Pull Through to Inspect for Damage
- Not Knowing What Else is Underground

Cross Bore of a Sewer Lateral

Cross Bore of a Culvert

Damage from a Mechanical Snake

Weak Link (Breakaway)

Pipe in a Casing?

No, a Gas Main Installed by HDD in a Drain Line

Improper Pipe Handling

- Dragging Pipe
- Lack of Care when Placing Pipe in Ditch

Damaged Beads Are an Indication to Look Closer

This is What You May Find

Pipe Was Dragged After Fusion

Exposed Plastic Pipe

- Most Often Found on Propane Systems
  - In tank domes
- Plastic Pipe Used for Regulator Vent Piping
  - Must be PVC that's rated for UV exposure – gray electrical conduit

Exposed PE Pipe in a Tank Dome

How Do These Issues Occur?

The Cause of Plastic Pipe Issues is _____.

a. lack of an adequate qualification process
b. lack of adequate training for operator and contractor personnel
c. failure to follow procedures
d. lack of adequate inspection
e. rogue employees
f. All of the above

What Can Be Done To Prevent These Issues?

- Better Training
  - Mandatory for all, not just for those that fail the OQ test.
  - Minimum experience levels for trainers.
- Third Party (Independent) Qualification Examiners
  - Proctoring of written and/or on-line tests.
  - Individual hands-on testing.
- More Thorough Inspection by Operators

Distribution Integrity Management Program (DIMP)

- If there is a potential that the threat of inferior pipe joining may exist, it must be included as a threat in the DIMP written plan; however

- The inclusion of inferior pipe joining in the DIMP plan IS NOT an alternative to removing all known defects from new construction!

Suggested References

- Keynote speech given by MPUC Chairman, Mark Vannoy, at the October 8, 2015 conference, *Natural Gas: Energy for Maine's Future?!*
- May 15, 2015 NY PSC Order Requiring Local Distribution Companies to Follow and Complete Remediation Plans as Modified by this Order and to Implement New Inspection Protocols

Questions

Thank You!