New Pipeline Coating Products & Applications

Presented By:  Wally Armstrong
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Wally Armstrong – Biography

- Liberty Sales and Distribution 2004 –
  - Owner, Partner
  - Outside Sales & Technical Support

- UPSCO Inc. 1997 – 2004
  - Regional Sales Manager

- Colonial Gas Company 1984 – 1997

- NEGA GOS – Vice Chair Corrosion Committee
- NECC Corrosion Conference – Chair
- NACE – Chair of New England Section
NEW Pipeline Coating Advances

Modern Ancient History

What’ NEW:

- Products/Materials
- Applications Methods
- Regulatory Requirements
- QA/QC & Documentation
Types of Field Applied Coatings

- Cold Applied Tapes
- Heat Shrink Sleeves
- Wax & Petrolatum Tapes
- Visco–Elastic Adhesives
- Liquid Epoxies
- Mechanical Outerwraps
- HDD Coatings
- Internal Linings
- Composite Repair Wraps
Regulatory Changes

- PHMSA/DOT/State Requirements:
- OQ – Covered Tasks:
  - # 11 – Install or Repair Pipe Coatings in the Field
  - # 12 – Cleaning and Jacketing Pipe for Atmospheric Corrosion
  - # 17 – Repair Coating on a Steel Pipeline
- Training & Certifications at START of Project
  - Demonstration of “Knowledge, Skill & Ability”
  - Documentation throughout Project
- Non-Shielding Coatings
Basics of a Good Coating System:

- Surface Preparation
- Selection of Materials
- Meets NACE and Industry Standards
- Proper Application Procedures
- Ability to Protect Substrate Under Abnormal Operating & Environmental Conditions
Good Coatings Characteristics
Per: NACE SP-0169

- Sufficient Dielectric Strength to be an Effective Electrical Insulator
- Effective Moisture Barrier
- Good Adhesive and Cohesive values, to the Substrate (pipe surface) and coating itself.
- Ability to Maintain these Qualities over the Service Life of the Pipe

Material coating selection is a critical step in protecting against external corrosion
Material Selection Considerations

- Surface Preparation Limitations
- Operating Temperatures (Hot & Cold)
- UV Exposure
- Damp or Wet Surfaces
- Irregular Shaped Pipe Configurations
- Size and Weight of Pipe
- Extraordinary Application Conditions
Material Selection Considerations

- Surface Preparation Limitations
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## Material Selection Chart

<table>
<thead>
<tr>
<th>Coating</th>
<th>Application Type</th>
<th>Use</th>
<th>Backfill / Cure Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal Tar - Heat Kettle</td>
<td>Hot Applied Coating</td>
<td>Below Grade</td>
<td>When Cool</td>
</tr>
<tr>
<td>Coal Tar - Propane Torch</td>
<td>Hot Applied Coating</td>
<td>Below Grade</td>
<td>When Cool</td>
</tr>
<tr>
<td>Shrink Sleeves - Propane Torch</td>
<td>Hot Applied Coating</td>
<td>Above &amp; Below Grade *</td>
<td>When Cool</td>
</tr>
<tr>
<td>Wax (Hot) - Heat Kettle</td>
<td>Hot Applied Coating</td>
<td>Below Grade</td>
<td>When Cool</td>
</tr>
<tr>
<td>Pressure Sensitive</td>
<td>Cold Applied Coating</td>
<td>Above &amp; Below Grade</td>
<td>Immediate</td>
</tr>
<tr>
<td>Wax or Petrolatum (Cold)</td>
<td>Cold Applied Coating</td>
<td>Above &amp; Below Grade</td>
<td>Immediate</td>
</tr>
<tr>
<td>Epoxy - Two Part</td>
<td>Liquids</td>
<td>Above &amp; Below Grade</td>
<td>1-6 Hours **</td>
</tr>
<tr>
<td>Epoxy - One Part</td>
<td>Liquids</td>
<td>Above &amp; Below Grade</td>
<td>1-6 Hours **</td>
</tr>
<tr>
<td>Paints - Multi-Layered</td>
<td>Liquids</td>
<td>Usually Above Grade</td>
<td>1-6 Hours **</td>
</tr>
<tr>
<td>Mastics - Single Layered</td>
<td>Liquids</td>
<td>Usually Below Grade</td>
<td>1-6 Hours **</td>
</tr>
</tbody>
</table>

* Not all coatings in this classification are "UV Resistant". Only those "UV Resistant" designated can be above grade.

** Liquid coating Cure Time (drying time) depends on application temperature, dew point and mil thickness.
Surface Preparation

- Corrosion Protection starts from the surface of the pipe out.
- All substances that could interfere or prevent the coating from bonding to the substrate must be removed prior to the coating.

**Remove:**
- All loose Rust, Dirt and Dust
- Moisture, Grease, Oil, Mill Lacquer & Shop Coating
- Sharp Edges, Burrs, Weld Slag, Mill Scale

**Clean:** to NACE/SSPC–SP standard for desired coating

**Pre-Heat:** (when applicable) substrate to Mfg’s specifications

**Refer:** to Manufacturers Installation Guides to determine the appropriate surface preparation procedures for the coating you are using.

Without PROPER surface preparation the coating will FAIL
# Surface Preparation Standards

<table>
<thead>
<tr>
<th>SSPC</th>
<th>NACE</th>
<th>Description</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP1</td>
<td></td>
<td>Solvent Cleaning</td>
<td>Removal of oil, grease, dirt, soil and contaminants by cleaning with solvent, vapor, alkali, emulsion or steam.</td>
</tr>
<tr>
<td>SP2</td>
<td></td>
<td>Hand Tool Cleaning</td>
<td>Removal of loose rust, loose mill scale and loose paint by hand chipping, scraping, sanding and wire brushing.</td>
</tr>
<tr>
<td>SP3</td>
<td></td>
<td>Power Tool Cleaning</td>
<td>Removal of loose rust, loose mill scale and loose paint by power tool chipping, descaling, sanding, wire brushing and grinding</td>
</tr>
<tr>
<td>SP10</td>
<td>2</td>
<td>Near White Blast Cleaning</td>
<td>Blast cleaning until at least 95% of each square inch is free of all visible rust, mill scale, paint and foreign matter.</td>
</tr>
</tbody>
</table>
Cold Applied Tapes

- Cold Applied Tape
- Tee Tape
- Scrum Wraps
- Assist Tools
Heat Shrink Sleeves

- **Adhesives:**
  - Butyl Rubber & Mastic Based
  - Asphalt Based (OLD)
  - Hybrid Adhesives

- **Backer Materials**
  - Polyethylene
  - Polypropylene
  - Polyolefin
Heat Shrink Sleeves

- Application Procedures:
  - Higher pre-heats
  - More Stringent Cleaning Standards
  - Greater Bonding and Abrasion Capabilities
Wax Tapes

- Uses and Application:
  - Irregular Shaped Fittings
  - Wet Environments
  - Minimal Wire Brush Cleaning
  - Ease of application

- Encapsulation v Bonded Costing
Wax Tapes

- What’s New:
  - Primer Integrated Tapes
  - Color Tapes
  - High/Cold Temperature Tapes
  - Profiling Mastic and Mastic Blankets
- External Outer Wraps
  - Poly Wraps
  - Polyethylene Wraps
  - Fiberglass Outerwraps (UV Stable)
Visco-Elastic Adhesives

- Pliable Adhesive
- Low Temperature Applications
- Minimal Surface Prep
- Mechanical Outerwrap Required
Liquid Epoxies

- Used with FBE mainline coatings
- Weld Joints & Fittings
- HDD Applications
- High Temperature – > 120F Operating Temp
- Low Temperature – < 40F Ambient Temp
- Wet Applied Applications
- ARO Coatings – NO Corrosion Inhibitors
- Surface Tolerant Epoxies
Liquid Epoxies:

- Keys to a Successful Application:
  - Proper Surface Preparation
  - Understanding Temperatures & Cure rates
  - Use of Proper Equipment
  - Trained Applicators
  - Quality Control / Quality Assurance
Surface Preparation

- SSPC, SP-10 or NACE 2
- Grit/Sand Blast to Establish 2.0 – 4.0 Anchor Profile
- Mechanical Tools Available to Establish Anchor Profile
- Use Test Strips & Micrometer to Check Anchor Profile
SURFACE PREPARATION – ABRASIVE BLAST

- Near-White Metal (SSPC-SP10, NACE 2, Sa 2 ½) or better.
- Blast profile should be 2–4 mils.
## Liquid Epoxy Cure Times

<table>
<thead>
<tr>
<th>Substrate Temp</th>
<th>Tach Free Time</th>
<th>Backfill Time</th>
<th>Substrate Temp</th>
<th>Tach Free Time</th>
<th>Backfill Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 F</td>
<td>6-8 Hours</td>
<td>18-24 Hours</td>
<td>0 F</td>
<td>2 Hours</td>
<td>8 Hours</td>
</tr>
<tr>
<td>50 F</td>
<td>2-3 Hours</td>
<td>6-9 Hours</td>
<td>10 F</td>
<td>1.5 Hours</td>
<td>6 Hours</td>
</tr>
<tr>
<td>70 F</td>
<td>30 - 35 Minutes</td>
<td>1.5 – 2 Hours</td>
<td>20 F</td>
<td>1 Hour</td>
<td>4 Hours</td>
</tr>
<tr>
<td>80 F</td>
<td>20 - 30 Minutes</td>
<td>1 - 1.5 Hours</td>
<td>30 F</td>
<td>45 Minutes</td>
<td>3 Hours</td>
</tr>
<tr>
<td>90 F</td>
<td>15-20 Minutes</td>
<td>45-60 Minutes</td>
<td>40 F</td>
<td>35 Minutes</td>
<td>2 Hours</td>
</tr>
<tr>
<td>110 F</td>
<td>12-15 Minutes</td>
<td>30-45 Minutes</td>
<td>50 F</td>
<td>25 Minutes</td>
<td>1.5 Hours</td>
</tr>
<tr>
<td>130 F</td>
<td>9-12 Minutes</td>
<td>25-30 Minutes</td>
<td>60 F</td>
<td>15 minutes</td>
<td>1 Hour</td>
</tr>
<tr>
<td>170 F</td>
<td>5-7 Minutes</td>
<td>15-20 Minutes</td>
<td>70 F</td>
<td>10 Minutes</td>
<td>40 Minutes</td>
</tr>
</tbody>
</table>
Internal Linings

- Ceramic Based
- Factory Applied

Benefits:
- Reduces Oder Fade
- Improves Flow Characteristics
- Internal Corrosion
- Inspection
Composite Wraps for Repair

- DOT Compliant Permanent Repair with up to 80% wall loss

- Material Types:
  - Fiberglass
  - Kevlar
  - Carbon Fiber

- Use in conjunction with EDCA Assessments
Northeast Corrosion Conference
NECC

January 13 – 15
Marriott Conference Center
Springfield MA

Four Tracks:
- Basics of Corrosion
- NACE Tutorial – Intermediate Corrosion
- Rectifier School
- Case Studies & New Technologies
Thank You!