Introducing NIA’s Thermal Insulation Inspector Program

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Past President/Consultant
National Insulation Association
➢ Why is the program needed?
➢ What is the scope of the program?
➢ What is the value to my company?
➢ Where can I find more information?
Why is the program needed?

- Dwindling Knowledge Base
- Less Time Spent on Monitoring
- More Options and Alternatives Available
- Qualified Worker Shortage
- Compressed Construction Schedules
- Modularization
Why is the program needed?

- Commissioning
- Fewer Companies Specializing in Mechanical Insulation
- Consequences of Improper Installation or Maintenance
- Specification Compliance
- Enhancement of Current Value of QA/QC Programs
- The Industry Is Requesting It
Why is inspection needed?

To many problem areas to count

CUI

System Failure?

CUI

Destruction Testing?
What is the scope of the program?

• **Part 1: Introduction to Mechanical Insulation**
  • To serve as a thorough introduction to mechanical insulation and the inspection process for mechanical insulation systems in new construction, retrofit, and/or maintenance applications.

• **Part 2: Thermal Insulation Inspector Certification Course**
  • To prepare those individuals who are seeking professional mechanical insulation system inspection certification.
What is the scope of the program?

<table>
<thead>
<tr>
<th>Cryogenic Applications</th>
<th>Low - High Temperature Applications</th>
<th>Refractory Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50°F &amp; Below</td>
<td>Refrigeration, chilled water, and below-ambient applications</td>
<td>-49°F to +75°F</td>
</tr>
<tr>
<td></td>
<td>Medium- to high- temperature applications</td>
<td>+76°F to +1,200°F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+1,200°F &amp; Above</td>
</tr>
</tbody>
</table>
Prerequisite Learning Requirement: Success Completing of the E-Learning Series

• Module 1: Series Overview & Defining Mechanical Insulation
• Module 2: Benefits of Mechanical Insulation
• Module 3: Mechanical Insulation Science & Technology
• Module 4: Mechanical Insulation Design & Considerations
• Module 5: Mechanical Insulation Maintenance
Part 1- Introduction to Mechanical Insulation topic include:

• The need and importance of inspection
• The insulation industry market segments
• Why insulate and why is that important
• Defining mechanical insulation, protective covering and accessory materials
• Safety data sheets (SDSs)
• Codes, standards, specifications, and guidelines
• Resources available
• Review, testing, and obtaining results
Mechanical insulation is primarily used to limit heat gain or loss from surfaces operating at temperatures above or below ambient temperature. The theory of heat transfer is the core topic behind each insulation “design objective.”

**Design Objectives**
- Condensation Control
- Energy Conservation
- Fire Safety
- Freeze Protection
- Personnel Protection and/or Comfort
- Process Control
- Noise Control

**Design Considerations**
- Abuse Resistance
- Corrosion under Insulation (CUI)
- Indoor Air Quality
- Maintainability
- Regulatory Considerations
- Service and Location
- Service Life
Defining Insulation Categories & Forms

- **Sectional Pipe Covering**
  - Hinged and Half Sections
  - Quads
  - V-Groove Pipe Covering
  - Slip On

- **Additional Pipe Covering Shapes**
  - Scored Block
  - V-Groove Block
  - Curved Radius Block (CRB) and Beveled Lags
  - Flat Block and Beveled Lags

- **Insulation Material Shape Definitions**
  - Engineered Head Segment
  - Pipe & Tank Wrap
  - Board
  - Blanket or Sheet
# Class Exercise

## Categories of Insulation Materials

### Insulation Materials Specification Chart from the NIA National Insulation Training Program

This chart provides the reader with material properties typically specified in ASTM material specifications and is a guide to performance characteristics, but may not be sufficient for writing specifications. This was created by NIA for use by NIA in its training programs and for its members and may not be reproduced.

<table>
<thead>
<tr>
<th>Physical Property</th>
<th>Material Type</th>
<th>R-value</th>
<th>U-factor</th>
<th>C-value</th>
<th>Plate Factor</th>
<th>Density</th>
<th>Surface Resistivity</th>
<th>Solar Reflectance</th>
<th>Average Flame Spread</th>
<th>Char Length</th>
<th>Surface Flammability</th>
<th>Corrosion Resistance</th>
<th>Contact Heat Transfer</th>
<th>Moisture Absorption</th>
<th>Mold Growth</th>
<th>Fire Resistance</th>
<th>Environmental Factor</th>
<th>Durability</th>
<th>Installation Difficulty</th>
<th>Type of Material</th>
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<td><strong>ASTM Standard</strong></td>
<td><strong>C</strong></td>
<td><strong>D</strong></td>
<td><strong>E</strong></td>
<td><strong>F</strong></td>
<td><strong>G</strong></td>
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<td><strong>I</strong></td>
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<td><strong>R</strong></td>
<td><strong>S</strong></td>
<td><strong>T</strong></td>
<td><strong>U</strong></td>
<td><strong>V</strong></td>
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<td>Type of Material</td>
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<td><strong>Type B</strong></td>
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<td><strong>Type S</strong></td>
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**Note:** All properties are subject to change and should be confirmed with the manufacturer. This chart is an overview and should not be used for detailed design.

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**Certified Thermal Insulation Inspector**

**NIA**

**National Insulation Association**

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The primary reason for protective coverings is to protect the insulation from damage. Protective coverings are typically broken down into these categories:

- **Weather Barriers** — protects the system from weather
- **Vapor Retarders** — protects from passage of water vapor
- **Mechanical Abuse** — protects the system from mechanical abuse
- **Condensate Barriers** — protects from water vapor condensation
- **Appearance Coverings** — provides for aesthetic or identification purposes
- **Hygienic Coverings** — provides hygienic protection

**Covering – Barrier – Retarder – Finish Materials**

- Metal Rolls or Sheets
- Polymeric (Plastic) Rolls or Sheets
- PVC Jackets
- PVDC Film
- Laminates
- Fabrics
- Mastics, Coatings, Adhesives
- Glass-Reinforced Plastic (GRP) or Fiber Glass–Reinforced Plastic (FRP)
What is a Safety Data Sheet (SDS)?
Who is responsible for providing SDS’s?
How to read an SDS?
What information is found in the SDS?
Why are SDS’s valuable to an inspector?

Actual SDS examples are reviewed and discussed in the class.

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They can all be interconnected into a specification. Which one governs?

(*) Denotes representative – actual documents reviewed and discussed in class.
What is the scope of the program?
-- Certification Level --

Part 2 - Topics in Thermal Insulation Inspector Certification Course include:

• Roles and responsibilities of an inspector
• Basis of inspection—what are you inspecting to?
• The inspection process (new construction and maintenance)
• Importance of pre-inspection conference
• Inspection tools and techniques
• Common occurrences—problem areas
• Inspection documentation and reporting
• Certification process, procedures, and recertification
• Review, testing, and obtaining results
What is the controlling document – what am I inspecting to?

- Specification
  - Engineering Firms
  - Design/Build Firms
  - Facility Owners

- Building Codes
  - Building Codes
  - Model Codes
  - Energy Codes
  - Fire Codes

- Manufacturer Specifications
  - Insulation
  - Protective Barriers
  - Protective Coverings
  - Attachments

- Guides or Guidelines
  - MIDG
  - MICA
  - MasterSpec
  - NAIMA
  - NIA

They can all be interconnected into a specification. Which one governs?

- Standards
  - Voluntary Standards
  - ASTM Standards
  - Organizations
  - Company Standards

- Regulations
  - EPA
  - FDA

- Area Practices

- Insulation Contractor Recommendation

Listing may be all inclusive
New Construction
Initial Insulation Application

Material Verification

Application Verification

Specific Systems or Total Project Inspection/Verification
Determining Installation Procedures

Installation Procedures—How Are They determined?

- Insulation Contractor
- Project Specifications
- Industry Guidelines (MICA/PIP)
- ASTM or Similar Guidelines
- Manufacturer Guidelines
Maintenance Inspection - Assessment

Proactive

• Have an ongoing inspection and insulation maintenance program

Reactive

• Implement inspection and maintenance of insulation when required and/or when budget allows
Multiple Layer Contraction Joints

1. Pipe
2. Layers of insulation (staggered joint)
3. Outer layer of insulation (staggered joint)
4. Vapor retarder jacket (optional)
5. Pack contraction joints with flexible insulation material (at intervals specified)
6. Vapor stop (dam) mastic (see Plate 11-66.2)
7. Flexible vapor-retarder sealer
8. Contraction joint cover
9. Protective jacket
10. Bands

Example

Reprinted, from the 8th edition of the National Commercial & Industrial Standards manual, and with permission from the Midwest Insulation Contractors Association (MICA)
Inspection Exercises -
Common Occurrences -
Common Sense Approach

Caulking around protrusion missing or damaged

Ambient Temperature Range 60°F-95°F with 70% RH and 8 mph Wind

Service Temperature -20°F

Uncoated Substrate

Protective Jacket over a Vapor Retarder

Example
Example
Each area has a Control Log which can be used to generate the final Inspection Report.

**Inspection Process Documentation and Reporting**

- **Non-Conformance Identified** -- Inspector Master -- Non-Conformance Report (NCR)
  - Inspector’s Master Copy

**Stop Work Order (SWO)**
- Company Performing Insulation Work
- Other Contractors Impacted (Mechanical or General)
- Engineering – Design Firm
- Facility Owner

**Corrective Action Request (CAR)**
- Company Performing Insulation Work
- Other Contractors Impacted (Mechanical or General)

**Request For Information (RFI)**
- Company Performing Insulation Work
- Other Contractors Impacted (Mechanical or General)
- Engineering – Design Firm
- Facility Owner

Not shown are Hold Point notifications and or their release.
The Thermal Insulation Inspector Program

- **Perquisite – E Learning Modules**
  - Testing upon completion
  - or proceed to Introduction Level (Certificate of Completion)

- **Introduction to Mechanical Insulation**
  - Testing upon completion
  - or proceed to Certification Course (Certificate of Completion)

- **Thermal Insulation Inspector Certification Course**
  - Testing upon completion
  - Finished the Thermal Insulation Certification Course
  - Certified Thermal Insulation Inspector

Certification valid for 3 years – recertification required

The above illustration is based upon successfully passing each test level
What is the value of the program to your company?

The answer to that question depends on your company’s strategic objectives and internal processes and procedures.

- Code/regulatory officials
- Engineering firms
- Facility owners
- Inspection – QC/QA firms
- Manufacturers
- Mechanical and other contractors
- Mechanical insulation distributors/fabricators and contractors
- QC/QA Program
  - Risk Assessment
  - Marketing/Sales
  - Differentiation
  - Craft Training
  - Liability “Support”
  - Commissioning
  - Profitability $
  - Productivity
  - Growth
  - Employee Training
  - Over Time Raises the Bar
  - Continuing Education

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The Thermal Insulation Inspector Program

Summary:

• Comprehensive – starts with the basic’s though the inspection process and reporting
• Applicable to the commercial and industrial mechanical insulation industry segments (all service temperature ranges)
• Class is product and labor generic in nature
• Contains multiple class participant exercises – participation and interaction is encouraged
• Review and discussion of actual documents
• Product samples from all basic groups are present in the class room
• Allows time for networking with fellow participants
• Not a give-me – testing is extensive but fair and balanced
• Take-aways are extensive
• Developed and reviewed by experienced industry people
• It has been requested by industry and is needed in the industry
Introducing NIA’s Thermal Insulation Inspector Program

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Thank You!

Thermal Insulation Inspector Program
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