

SECTION 22 07 16 - PLUMBING EQUIPMENT INSULATION

PART I - GENERAL

1.1 SECTION INCLUDES

- A. Plumbing Equipment Insulation
- B. Plumbing Equipment Insulation Jackets
- C. Plumbing Equipment Insulation Finishes
- D. Plumbing Equipment Insulation Lagging

1.2 RELATED SECTIONS

- A. *Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment*
- B. *Section 22 07 19 – Plumbing Piping Insulation*

1.3 REFERENCES

- A. *National Commercial and Industrial Insulation Standards Manual, maintained by the Midwest Insulation Contractors Association (MICA)*

[Note to PSC: Any experienced insulation contractor should be familiar with this manual. It provides a comprehensive guide of installation practices for the mechanical insulation industry. By referencing this standard it becomes unnecessary to identify exhaustive and detailed installation procedures. These standards are to insulation what SMACNA standards are to ductwork.]

- B. *ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials*
- C. *IMC - International Plumbing Code*
- D. *Illinois Plumbing Code*

1.4 QUALITY ASSURANCE

- A. Products and execution shall be in compliance with applicable codes and standards including those referenced above in paragraph entitled *REFERENCES*.
- B. Installation shall be in compliance with Manufacturer's recommendations and installation instructions.

PART 2 - PRODUCTS

2.1 INSULATION

- A. Type R: Rigid Fiberglass Board, 3.0 lb./cu. ft., ASTM C612 Type IA
- B. Type E: **EPDM** Cellular Flexible Elastomeric Foam Tube and Sheet, 300 deg. F maximum service temperature, ASTM C534 Grade 1
 - 1. **Not allowed: NBR/PVC blend**
 - 2. Approved Products
 - a. Aeroflex Aerocel
 - b. Armacell
 - (a) AP Armaflex FS
 - (b) UT Solaflex

[Note to PSC: The University has experienced widespread failure of NBR/PVC blend insulation in recent years. This problem has been addressed by specifying EPDM elastomeric material exclusively in lieu of NBR/PVC blend. NBR/PVC blend is disallowed for all applications including plumbing piping and equipment.]

[Note to PSC: Aeroflex and Armacell, the primary manufacturers of elastomeric insulation, both offer complete lines of EPDM elastomeric insulation products. However, standard AP Armaflex, given that it is NBR/PVC blend, is not allowed.]

2.2 JACKETS, FACTORY APPLIED

- A. ASJ: (All Service Jacket): White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil vapor barrier backing
- B. FSK: Aluminum-foil vapor barrier, fiberglass-reinforced scrim with kraft-paper backing

2.3 FINISHES, FIELD APPLIED

- A. FM: Woven glass fabric with two coats of mastic approved for insulation type

2.4 TAPES, ADHESIVES, COATINGS, FASTENERS

- A. Provide in accordance with insulation manufacturer's specifications and requirements.
- B. Sheet metal screws installed outdoors shall be stainless steel with rubber washers. Galvanized screws shall not be used outdoors.

2.5 LAGGING, FIELD INSTALLED

- A. ALUM: Aluminum, .016" thick, stucco embossed finish.
 - 1. For protecting or securing insulation only, not for vapor barrier
- B. FMAS (Flexible Metallic Adhesive System): Self-adhesive embossed aluminum foil sheet, 6.0 mil minimum total thickness. Basis of design: VentureClad 1577CWE

[Note to PSC: FMAS appears to be a proven product in the industry. The University now approves it although the jury is still out to some degree. If it proves to be problematic in any manner its approval will be revisited.]

2.6 REMOVABLE COVERS, CUSTOM MANUFACTURED

- A. Standard Applications, Less than 450 Degrees F.
 - 1. Jacket and liner: 17oz Silicone Impregnated Fiberglass Fabric
 - 2. Insulation: 2" Type E Glass Mat
 - a. 1" allowed for constructability if approved by PSC
 - 3. Fastenings:
 - a. 2" Nomex Velcro and/or Lace Hooks with Braided Kevlar Drawstrings
 - b. Stainless Steel Lace Hooks and Quilt Pins
 - 4. Thread: Kevlar/Stainless Steel Thread
- B. Acoustical Applications, Less than 450 Degrees F.
 - 1. Additionally Provide 2 lb. Mass Loaded Vinyl
- C. Locations: Provide where shown on drawings or otherwise indicated in documents.

[Note to PSC: Clearly indicate location and type of custom covers on drawings and/or elsewhere within documents. Use sparingly; custom covers are costly and typically have long lead times.]

2.7 MATERIAL PROPERTIES

- A. Insulation material shall satisfy material property requirements of referenced ASTM standard. For convenient summary of referenced ASTM standards, see *Insulation*

- B. All insulation materials, including jackets, tapes, adhesives and coatings, shall meet *ASTM E84 25/50 Flame Spread/Smoke Development* requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

1. General Requirements.
 1. Install insulation after equipment has been inspected and tested unless otherwise authorized by the PSC.
 2. Fit and secure insulation tightly to equipment.
 3. Insulate all equipment surfaces not factory insulated and with media design temperature above 105 deg. F, below 60 deg. F or below dew point of ambient air. When fluid is below dew point of ambient air, insulation shall have uninterrupted vapor barrier.
 4. Do not allow insulation to remain unsealed, vulnerable to entrance of moisture.
 5. Do not add insulation to factory-insulated surfaces.
 6. Do not insulate over nameplates or ASME stamps. Bevel and seal insulation around such, unless omitting insulation would cause condensation problem. When such is the case, appropriate tagging shall be provided to identify the presence of these items.
 7. Provide field fabricated removable covers on equipment as required to provide ready access to components requiring periodic maintenance or repair.
 8. Provide custom manufactured removable covers as indicated in Application Schedule.
 9. Provide custom manufactured removable covers as indicated in Application Schedule.
[Note to PSC: There are a limited number of applications for these.]
 10. At a minimum, provide removable covers as identified in schedule.
 11. Provide sheet metal corner protection angles where insulation extends to floor or is similarly vulnerable to damage.
2. Specific Requirements for Insulation Type.
 1. Type R - Rigid Fiberglass Board.
 - a. Mechanically fasten to equipment.
 2. Type E - Cellular Flexible Elastomeric Foam.
 - a. Form fit insulation tightly to equipment.
 - b. Fully adhere insulation to non-cylindrical equipment (e.g. pumps).
 - c. Generously adhere insulation to cylindrical equipment (e.g. water heaters, expansion tanks).
3. Additional Requirements for Outdoor Installations.
 1. Ensure insulation jacket is sealed waterproof, vapor tight.
 2. Provide tightly fitted metal lagging with overlapped sections properly oriented for prevailing weather.
 3. Mechanically attach lagging sections. Seal all seams and penetrations watertight.
 4. With approval of PSC: In lieu of metal lagging provide FMAS flexible metallic adhesive system (specification provided above) with factory fabricated aluminum fitting covers. Apply pressure to FMAS with spreading tool to ensure maximum adherence.

[Note to PSC: Edit text above as required to ensure clarity of lagging requirements. If metal lagging is required delete references to FMAS or vice-versa. Or, allow FMAS as an approved option as stated/indicated. Discuss with Owner prior to finalizing design.]

3.2 APPLICATION SCHEDULE

SERVICE	INSULATION TYPE	JACKET TYPE	LAGGING	FINISH	MINIMUM THICKNESS
Domestic Water Meter	E	None	None	None	Same as adjacent piping
Domestic Booster Pump	E	None	None	None	1"
Domestic Water Heater - Insulate All Bare Surfaces - Provide field fabricated removable covers as required for periodic lime removal	R	FSK	None	FM	3" (or as clearance allows)
Domestic Hot Water Circulation Pump Body - Provide field fabricated removable cover	R	FSK	None	FM	1"
Domestic Hot Water Expansion Tank	R	FSK	None	FM	2"
Domestic Hot Water Storage Tank	R	FSK	None	FM	2"
Outdoor Cold Equipment	E	None	ALUM or FMAS	None	1 1/2" Default

[Note to PSC: Thicknesses indicated are minimum values. Use Manufacturer's thickness calculation tool to determine required insulation thickness for project-specific temperature and humidity conditions. Increase scheduled insulation thickness as required.]

[Note to PSC: Edit lagging requirement for outdoor cold equipment as deemed appropriate for project. As shown, Application Schedule currently indicates Contractor option for aluminum lagging or FMAS.]

[Note to PSC: If custom manufactured removable covers are desired in lieu of field fabricated covers edit Application Schedule accordingly. A specification for such covers has been provided. If leaving certain components uninsulated is more appropriate for specific project, edit accordingly. System size, component size, location and water temperature shall be taken into account.]

Notes:

1. Manufacturer's thickness guide or calculation shall be used to determine required minimum insulation thickness for ambient temperature and humidity conditions. Applied insulation thickness shall meet or exceed this value. Thickness may exceed scheduled value. Discuss with PSC prior to bidding. *[Note to PSC: Perform required calculations, edit schedule accordingly and delete this note. Note is provided for projects with no PSC.]*

2. Insulation thickness may be reduced only as required to accommodate tight clearances and other practical limitations.
3. For repairs, insulation thickness shall match existing.

END OF SECTION **22** 07 16

This section of the *U of I Facilities Standards* establishes minimum requirements only.
It should not be used as a complete specification.