

SECTION 22 07 01 _PLUMBING INSULATION

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Part 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Piping system insulation.
 - 2. Equipment insulation.
 - 3. Pipe insulation jackets.
 - 4. Equipment insulation jackets.
 - 5. Insulation accessories including vapor retarders and accessories.

- B. The intent of these standards are to provide input to the design team on the University's preference of manufacturers, design, equipment options and quality assurance to maintain the longevity of its assets.

1.2 REFERENCES

- A. Section 22 05 00 Common Work for Piping Sections
- B. Section 22 05 01 Common Requirements for Piping Systems
- C. Section 22 11 00 – Domestic Water Systems

1.3 ENGINEERING AND DESIGN REQUIREMENTS

- D. It is the responsibility of the consulting engineer or design build contractor to calculate the required thickness of the insulation. The insulation thickness must also conform to the latest version of the International Energy Conservation Code and to ASHRAE standard 62.1. The insulation thickness must conform to the most stringent requirement whether it be the calculated thickness or the code requirement.

- B. All insulation shall have a maximum flame spread index of 25.

- C. All insulation shall have a maximum smoke developed index of 50.

1.4 SUBMITTALS

- A. Product Data: Submit product description, thermal characteristics, flame spread index, smoke developed index and list of materials and thickness for each service, and location.

1.5 CLOSE OUT SUBMITTALS

Not Applicable

1.6 QUALITY ASSURANCE

- A. Insulation shall be installed to provide an impenetrable vapor barrier around the object insulated. The insulation contractor shall fully adhere insulation to all surfaces so that there are no gaps between the insulation and the surface of the object insulated.
- B. Insulation shall not be compressed when installed upon objects. Insulator shall install insulation so that it maintains its original (specified) thickness.
- C. Insulation jacketing must maintain a continuous barrier around insulation. Insulation jacketing that has cuts, rips or breaks will not be accepted.
- D. Insulation jacketing must be clean and having its original reflectivity.
- E. Maintain temperature before, during and after installation for a minimum of 24 hours.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 MAN MADE MINERAL FIBER: **Insulation Code PI-1**

- A. Insulation: ASTM C457, Type I - pipe and tubing insulation
 1. Temperature ranges 0F to 850F
 2. 'K' factor: ASTM C177, 0.24 at 75 degrees F
 3. ASJ Vapor Retarder Jacket
 4. Moisture Vapor Transmission: 0.002 perm

2.2 MAN MADE MINERAL FIBER: **Insulation Code PI-2**

- A. Insulation: ASTM C1393, Type I – semi rigid fibrous glass board, Class 2
 1. Temperature ranges 0F to 850F
 2. 'K' factor: ASTM C177, 0.27 at 75 degrees F
 3. ASJ Vapor Retarder Jacket
 4. Moisture Vapor Transmission: 0.002 perm

2.2 CELLULAR POLYISOCYANURATE INSULATION: **Insulation Code PI-3**

- A. Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation: ASTM C591, Type III, compressive strength 50 psi
 1. Temperature ranges -297F to 250F
 2. 'K" factor: 0.19 at 75 degrees F.
 3. Fasteners: Fasten with fiber reinforced masking tape. For sized over 6" fasten with 18 gage stainless steel wires over fiber reinforced masking tape.

2.3 ELASTOMERIC CELLULAR FOAM: **Insulation Code PI-4**

- A. Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular form: ASTM C534; Type I, Tubular form.
- B. Elastomeric Foam Adhesive:
 1. Air dried, contact adhesive, compatible with insulation.

2.8 PIPE INSULATION AND EQUIPMENT JACKETS:

- C. PVC Plastic Jacket: **Insulation Jacket Code PJ-1**
 1. Product Description: Sheet material, color coded to match piping service.
 2. Moisture Vapor Transmission: ASTM E96; 0.002 perm-inches.
 3. Thickness: 30 mil.
 4. Connections: Brush on welding adhesive.
 5. Compatible with insulation.

- D. VentureClad: **Insulation Jacket Code PJ-2**
 - 1. VentureClad model 1579CW-E insulation jacketing tape with and aluminum stucco embossed finish.

- C. Stainless Steel Pipe Jacket: **Insulation Jacket Code PJ-3**
 - 1. ASTM A167 Type 304 stainless steel
 - 2. Thickness: 0.18 inch thick
 - 3. Finish: Smooth
 - 4. Metal Jacket Bands: 3/8" wide; 0.010 inch thick stainless steel

2.9 PUMP INSULATION:

- A. All pumps insulation shall be formed into a box surrounding the pump and fabricated from polystyrene board (engineer to determine required thickness). Polystyrene board shall be covered VentureClad model 1577CW-WM tape. Edges and corners of the box shall be connected via wooden skewers and shall be sealed with and adhesive similar to Childers CP-97 Fibros Adhesive. Tape all seams and joints with FSK tape. See attachments A and B for more detail.

2.10 Valve Insulation:

All Domestic water valves shall be insulated per systems insulation requirements.

2.11 APPROVED INSULATION MANUFACTURERS:

- 1. Armstrong
- 2. Certain-Teed
- 3. Dow Chemical
- 4. HiTherm
- 5. Johns Manville
- 6. Owens Corning
- 7. Pittsburg Corning
- 8. Specialty Products & Insulation
- 7. Venture Products

Part 3 EXECUTION

2.1 EXAMINATION

- A. Verify piping and equipment has been tested before applying insulation materials.
- B. Verify surfaces are clean and dry, with foreign material removed.

2.2 INSTALLATION

- A. Verify field measurements prior to fabrication.
- B. Insulate entire piping system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints:
 - 1. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with fitting covers.
- C. Inserts and Shields:
 - 1. Application: Piping or Equipment
 - 2. Shields: Minimum 12inches Long Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert location: Between support shield and piping and under finish jacket.
 - 4. Inserts (Domestic Cold Water and Rain Water Collectors): Armaflex Ultima (Wood Dowels or Wood Blocking are not allowed)
 - 5. Inserts (Domestic Hot Water): 12" long minimum Calcium Silicate (Wood Dowels or Wood Blocking are not allowed)
- D. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent fire stopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions.
- E. All vapor barrier and jacket seams shall be located located at 3 or 9 o'clock position on side of horizontal piping and with overlap facing down to shed water or on bottom side of horizontal duct.
- F. Heat Traced Piping: Size insulation large enough to enclose pipe and heat tracer.
- G. Factory Insulated Equipment: Do not insulate.
- H. Exposed Piping and Equipment: Locate insulation and cover seams in least visible locations.

- I. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
- J. Finish insulation at supports, protrusions, and interruptions.
- K. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.
- L. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation for easy removal and replacement without damage.
- M. All piping routed interior to the building and in concealed spaces does not require a jacket.

3.3 SCHEDULES

N. Pipe Insulation Schedule:

Piping System	Insulation Code	Jacket Code
Domestic Hot Water – Interior to Building Exposed	PI-1	PJ-1 PJ-3*
Domestic Hot Water – Interior to Building Concealed	PI-1	None Required
Domestic Cold Water – Interior to Building Exposed	PI-4	PJ-1 PJ-3*
Domestic Cold Water – Interior to Building Concealed	PI-4	None Required
Domestic Cold Water – Exterior to Building	PI-3	PJ-2
Horizontal Rain Water Conductors – Interior to Building Exposed and Concealed	PI-4	None Required

O. Equipment Insulation Schedule:

Equipment	Insulation Code	Jacket Code
Shell & Tube Heat Exchanger	PI-1	PJ-1 PJ-3*
Domestic Hot Water Expansion Tank	PI-2	PJ-1 PJ-3*

Domestic Cold Water Expansion Tank	PI-4	PJ-1 PJ-3*
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* Use stainless steel jacket if room temperature exceeds 120F and where volatile or corrosive chemicals are stored.

ATTACHMENT A – PUMP INSULATION PHOTOGRAPH



ATTACHMENT A – PUMP INSULATION DETAIL

