PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Mechanical insulation for piping, ductwork, and equipment.

B. Related Sections:

1. Section 15900 - Ductwork and Accessories: Duct lining.

2. Section 15050 - Basic Mechanical Materials and Methods: Insulation protection saddles and shields.

1.02 SYSTEM DESCRIPTION

A. Design Requirements:

1. Insulation thickness in agreement with the minimum thickness suggested in ASHRAE Standard 90A.

2. If more than one type of insulation material is available for satisfying technical requirements, then price-performance should be evaluated and maximized in actual selection.

3. Weigh need to insulate unions, flanges, valves, control devices and similar items where maintenance access is needed. Give consideration to:

   a. Energy conservation.

   b. Where heat gain to space or ductwork is objectionable.

   c. Where condensation must be prevented.

   d. Equipment maintainability.

4. Review conclusions with University's Department of Facilities Management project representative for final design approval.

5. Specify removable insulation for chilled water pumps.

6. Specify teflon-coated, Velcro closure, removable insulation jackets for steam and condensate equipment applications including high-pressure valves, expansion joints, high-pressure strainers, condensate pumps, and regulators.
1.03 QUALITY ASSURANCE

A. Installer qualifications: Three years minimum successful installation experience on projects with mechanical insulation similar in scope and nature to that required for the project.

B. Requirements for energy conservation: All insulation shall be in accordance with ASHRAE Standard 90A.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Armacell
B. Certain-Teed
C. Knauf
D. NOMACO
E. Owens-Corning
F. Schuller (Johns-Manville)

2.02 MATERIALS

A. Insulation:
   1. Fiberglass.
   2. Calcium Silicate.
   3. Flexible Closed-Cell.

B. Adhesives, Sealants, and Vapor Barrier Coatings:

   1. Specify that materials must be paintable where painting is required.

   **LEED EQc4.1: Low-Emitting Materials:**
   All interior adhesives and sealants must meet or exceed VOC limit requirements of South Coast Air Quality Management District Rule #1168 and sealants used as fillers must meet requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51.

   **LEED EQ.4.2: Low-Emitting Materials**
   All interior paints and coatings must meet or exceed VOC limit requirements of Green Seal GS-11 and GS-03

   a. Vapor Barrier Coatings—used in conjunction with reinforcing mesh to coat insulation on below ambient services temperatures. Permeance shall be no
greater than 0.08 perms at 45 mils dry as tested by ASTM E96/ASTM F1249. Foster 30-65; Childers CP-34; Vimasco 749

b. Reinforcing Mesh—used in conjunction with coatings/mastics to reinforce. 10x10 polyester or fiberglass mesh. Foster Mast A Fab; Childers Chil Glas #10; Vimasco Elastafab 894

c. Lagging Adhesives—used in conjunction with canvas or glass lagging cloth to protect equipment/piping indoors. Foster 30-36 Sealfas; Childers CP-50AMV1 Chil Seal; Vimasco 714.

d. Weather Barrier Mastic—used outdoors to protect above ambient insulation from weather. Foster 46-50 Weatherite; Childers CP-10 Vi Cryl; Vimasco 714

e. Fiberglass Adhesive—used bond low density fibrous insulation to metal surfaces. Shall meet ASTM C 916 Type II. Foster 85-60; Childers CP-127; Vimasco 795

f. Elastomeric Insulation Adhesive—used to bond elastomeric insulation. Foster 85-75; Childers CP-82; K Flex 373

g. Elastomeric Insulation Coating—water based coating used to protect outside of elastomeric insulation. Foster 30-64; K Flex 374; Armacell WB finish

h. Metal Jacketing Sealant—used as a sealant on metal jacketing seams to prevent water entry. Foster 95-44; Childers CP-76; Pittsburgh Corning PC 727

2.03 PERFORMANCE CRITERIA

A. Insulation and accessory materials to meet the following criteria:

1. Insulation Materials: Non-combustible as defined in National Fire Protection Association Pamphlet 220 and Underwriters' Laboratory Listed or Labeled.

2. Flame/Smoke Ratings: Composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) flame-spread rating 25 or less, smoke-developed rating 50 or less, as tested by ANSI/ASTM E-84 (NFPA 255) method.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Clean and neat appearance. Use full lengths, not cut pieces.

B. Do not insulate cleanouts, access openings or identification plates. Neatly bevel insulation and finishes up to edges of such openings and seal edges as required.

3.02 SPECIFIC INSTALLATION REQUIREMENTS

A. General:
1. Prepare from following list (expand per job requirements) a schedule of mechanical insulation showing systems insulated, types, thickness for various sizes, temperatures and special conditions and schedule on Drawings or include in Specifications.

2. Detail on Drawings special removable insulation covers for equipment. For example, enclose chilled water pump bodies in insulated sheet metal split case housings to provide easy maintenance of pumps without damage to insulation.

3. Where pipe insulation has the hanger on the outside of the insulation jacket, supply 180 degree calcium-silicate insert with metal shield for 1-inch and larger pipe; metal shield only for ¾-inch and smaller.

4. For all below ambient piping systems, coat elbows, fittings, valves and flanges with vapor barrier coating and reinforcing mesh to prevent moisture ingress. Coat all ASJ (all service jacket) vapor retarder and duct wrap seams with vapor barrier coating.

B. Plumbing System:

1. Domestic cold water.

2. Roof and overflow drains (horizontal only but including drain bowls and initial vertical drop to horizontal). All roof drain lines are considered cold pipe. Refer to spec 15050-5 7c.

3. Domestic hot and tempered supply and circulating water.

4. Domestic water heaters, storage tanks and Accumulators (not factory insulated).

5. Under lavatories: pre-molded insulation to meet ADA requirements.

6. Chilled Drinking Water.

7. Fittings.

C. Heating System:

1. Heating Water Supply and Return


3. Low Pressure Steam Piping.

4. Medium Pressure Steam Piping.

5. High Pressure Steam Piping.

6. Steam Condensate and Boiler Feed Water.

7. Fittings.
8. Valves.

9. Steam valves, strainers, expansion joints, and bucket traps: Specify factory-made removable

D. Chilling Systems:


2. Heat Reclaim Coil Header.

3. Fittings.

4. Valves.

5. Cold Condensate Drain Piping (first 10 feet).


7. Refrigerant and Brine Piping below 40 degree F.

8. Refrigerant Hot Gas Piping (Only within buildings or where exposure is likely to cause accidental burn injury).


E. Air Distribution Systems:


2. Exterior surfaces of Supply and Return Air Plenums not indicated to be lined.

3. Exterior surfaces of exposed Supply Ductwork not lined.

4. Concealed Supply Ductwork not lined.

5. Rigid Spiral Supply Air Ductwork.

6. Kitchen Exhaust Ductwork or Chase, whichever is more viable.

F. Other Systems:

1. Engine Exhaust and Muffler inside building.

2. Piping with heat tracer exposed to freezing.
G. Protective jacket

1. Piping Insulation exposed to weather and where abrasion is likely. Review type of jacket with University.

END OF SECTION 15250