SECTION 230700 - MECHANICAL INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Qualitative requirements for interior and exterior pipe and pipe specialty/equipment insulation, jacketing and accessories.

B. Qualitative requirements for interior duct, plenum, and equipment insulation, jackets, and accessories.

1.2 SUBMITTALS

A. Submit shop drawings and product data per applicable Division I Specification.

B. Submittals are required and shall include product data noting materials, thickness for each service, aged thermal qualities, and accessories.

1.3 QUALITY ASSURANCE

A. Fire performance characteristics in accordance with ASTM E 84 for flame spread of 25 and smoke developed of 50.

B. Materials and installation in accordance with NFPA 255 and UL 723.

C. Installed R-value shall meet the requirements of ASHRAE Standard 90.1, this specification, and they shall be provided to eliminate condensation, whichever requires a greater R-value.

1.4 WARRANTY

A. Contractor shall warranty entire systems and equipment for a period of one (1) year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Pipe and Pipe Specialty/Equipment Insulation

1. Armacell
2. Rubatex
3. Owens Corning
4. Johns Manville (Manville)
5. Knauf

B. Duct and Equipment Insulation

1. Owens Corning

2. Johns Manville (Manville)

3. Knauf

4. Certain-Teed Corporation

2.2 MATERIALS

A. Glass Fiber: With ASJ jacket (unless noted otherwise) and with vapor-barrier.

1. Preformed Pipe Insulation: ASTM C 547, Class I, rigid, minimum density to be 3.5 pcf, Owens Corning SSL II with ASJ Max jacket (or equal).

2. Board Insulation: ASTM C 612, Type 2, rigid and semi-rigid. Minimum density to be 6 pcf. Owens Corning 705 or equal.

3. Blanket: ASTM C 553, Type II, Class F-1, with FSK vapor barrier jacket, minimum density to be 1 pcf, Owens Corning Type 100 SOFTR Duct Wrap FRK or equal.

4. Adhesive: UL Classification; Nonflammable, and as recommended by insulation manufacturers.

5. Pre-formed Pipe and Tank Insulation: ASTM C1393, Owens Corning Fiberglas Pipe and Tank with ASJ Max jacket

6. Maximum “K” Value: 0.27 at 75 degrees F.

B. Flexible Elastomeric Cellular: Flexible cellular elastomeric material, molded or sheet.

1. Preformed: ASTM C534, Type II.

2. Adhesive: Waterproof vapor retarder, as recommended by insulation manufacturer.

3. Maximum “K” Value: 0.245 at 75 degrees F.

4. Armacell or Rubatex.

C. Duct Liner Insulation

1. Material: Liner Board, ASTM C518.

2. Coating: ASTM C1071 (Mircobial growth resistant).

3. Adhesive: UL listed waterproof, as recommended by insulation manufacturer.

4. Fasteners: Galvanized steel pins, welded or mechanically fastened.

5. Maximum “K” Value: 0.23 at 75 degrees F.

6. Owens Corning QUIETR Duct Liner or equal.

D. Insulating Cements

1. Mineral fiber, hydraulic-setting insulating and finishing cement.

2. Expanded or exfoliated vermiculite.

3. Must be compatible with insulation/jacket.

E. Adhesives: MIL-A-3316C, Classes 1 and 2, Grade A, and must be compatible with insulation/jacketing.

F. Field applied jackets shall be as follows:

1. Jacketing for Insulated Outdoor Ductwork: Self-adhesive, 3M Venture Clad 1579GCW Insulation Jacketing, or equal, zero permeability, vapor barrier, minimum 140 lb/inch tensile strength, aluminum color.

G. N/A

H. Products shall not contain asbestos, lead, mercury, or mercury compounds.

I. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

J. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

K. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Leak test piping, equipment and ductwork system before installing insulation systems.

3.2 INSTALLATION

A. Install materials in accordance with manufacturer’s recommendations and in conformance with the in-force building and mechanical codes and industry standards.

B. Where a vapor barrier is called for, it shall be continuous.

C. Provide proper support, insulation, and finishing at hanger systems.

D. Ductwork shall be externally insulated for all applications except for specific sound attenuation means as called for on drawings or as specified within documents.

F. Insulated cold pipes and equipment conveying fluids below ambient temperature:

1. Provide vapor barrier jackets, factory applied where possible, field applied otherwise.

2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe.

3. Finish fitting insulation with preformed PVC fitting covers and vapor barrier adhesive.

4. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.

5. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

G. For insulated pipes conveying fluids above ambient temperature:

1. Provide standard jackets, with vapor barrier factory applied.

2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe.

3. Finish fitting insulation with preformed PVC fitting covers and adhesive.

4. For hot piping and equipment conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

H. Insulated ductwork conveying air below ambient temperature:

1. Provide insulation with factory applied vapor barrier jackets.

2. Finish with compatible and matching tape and vapor barrier jacket.

3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.

4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

I. Insulated ductwork conveying air above ambient temperature:

1. Provide factory applied jacket, with or without vapor barrier, and finish with matching compatible tape.

2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

J. Finish insulation at supports, protrusions, and interruptions.

K. All duct insulation shall be applied so that there is no fiberglass exposed to any air streams without filters downstream. All fiberglass insulation, including all exposed edges, shall be coated with a suitable, ASHRAE 62.1 rated, material provided between fiberglass and the air stream.

M. Following items are not insulated:

a. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections.

b. Vibration control devices.

c. Testing laboratory labels and stamps.

d. Nameplates and data plates.

e. Factory insulated access panels and doors in air distribution systems.

f. Factory insulated equipment such as boilers.

3.2 INSULATION AND FINISH JACKETING REQUIREMENTS

A. Drip pan piping and auxiliary drip pans, cold refrigerant piping, cold condensate piping, and auxiliary drain piping: ½" thick flexible elastomeric cellular pipe insulation. Seal all joints and seams with Armacell #520 (or equal compatible product) adhesive. Insulate valves and fittings to match adjacent pipe insulation. If flexible elastomeric insulation used outdoors, it shall be finished with two coats of insulation manufacturer's weather-proofing coating. Vapor barrier to be created.

B. Other exposed ducts in air-conditioned spaces: No insulation required unless noted on drawings.

C. All concealed round and rectangular supply air or return air ducts, all supply air ductwork located in return air ceiling plenums, reheat coils, and all exhaust and relief air ducts within 10' of the exterior, all outside air intakes from outside to unit mixing boxes, filter boxes, or preheat coils, and ducted combustion air intakes: Insulate with 1.5" thick fiberglass wrap with flame retardant FSK facing. Wrap insulation tightly on the duct with all joints butted. Adhere insulation with 4" strips of bonding adhesive at 8" o.c. Tape all joints and seams with 4" wide tape and vapor barrier adhesive. Vapor barrier to be created.

D. Ducts lined for sound: Insulate with 1" thick fiberglass duct liner. Install with metal nosing on exposed upstream edges of supply duct.

E. HW heating piping: ASJ jacketed fiberglass pipe insulation, 1.5" thick for up thru 1.25" pipe sizes, 2" thickness for larger sizes.

F. CHW piping indoors: ASJ jacketed fiberglass pipe insulation, minimum 1" thickness. Vapor barrier to be created.

G. CHW piping outdoors: Jacketed per Section O fiberglass pipe insulation, minimum 2" thickness. Vapor barrier to be created.

H. Refrigerant Hot Gas Piping Indoors: ASJ jacketed fiberglass pipe insulation, 1" thick.

I. Cold mechanical equipment: ASJ jacketed fiberglass insulation, same thickness as adjoining pipe. Vapor barrier to be created.

J. Hot mechanical equipment: ASJ jacketed fiberglass insulation, same thickness as adjoining

pipe.

K. Hot condensate or dump water (such as from steam humidifiers and condensing boilers: Insulate same as for HW heating piping above.

L. HVAC and plumbing gas appliance flues (if flues not factory insulated): Minimum 1" thick ASJ jacketed fiberglass pipe or pipe and tank insulation.

O. Provide Field Applied Insulation Protective Jacketing as follows (to be provided in addition to requirements listed above):

1. Exposed piping in mechanical rooms, stairwells, entryways, vestibules, and as otherwise subject to abuse, jacket with PVC on straight lengths and with PVC fitting covers on fittings. Seal all joints and seams.

2. Outdoor insulated hydronic and glycol piping, and other components such as CRAC dry cooler expansion tanks, jacket with self -adhesive 3M Ventureclad or equal.

END OF SECTION 230700