SECTION 15080

MECHANICAL INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. This section describes specific requirements that relate to the insulation of ducts, pipes and other surfaces of the mechanical installation.

1.2 DESCRIPTION

A. Require insulation as follows:

1. Insulate ductwork and piping as described this specification.

2. Insulate exposed handicapped plumbing fixture piping.

3. Provide duct sound insulation where necessary to meet noise criteria described in 15070.

PART 2 PRODUCTS

2.1 FIRE RATING OF MATERIALS

A. Provide all insulation products used aboveground in building with burning characteristics in compliance with NFPA Standards 90A and 90B: Flame Spread 25, Fuel Contributed 50, Smoke Developed 50. Tested according to UL 723, ASTM E84, or UL 255

B. Insulation specified for use underground and aboveground away from the building might have other burning characteristics. Use such products only where specifically required.

2.2 FIBERGLASS INSULATION

A. Piping: Provide insulation products as follows:

1. Thermal conductivity K equals 0.24 at 100 degrees F. mean temperature. ASTM C335.

2. Factory applied vapor-barrier flame retardant all service jacket and tape, with permeability rating equals 0.02 perms. ASTM E 96.

3. Temperature limits for fiberglass pipe insulation: 350 degrees F, unless otherwise indicated.

B. Ductwork: Provide insulation products as follows:

1. Flexible insulation: Average thermal conductivity K equals 0.24 at 75 degrees F. mean temperature at 1.5 pcf density. ASTM C335.

2. Rigid insulation: Average thermal conductivity K equals 0.24 at 75 degrees F. mean temperature at 3.0 pounds per cubic feet (pcf) density. ASTM C518.

3. Factory-applied vapor barrier flame-retardant Foil-Scrim-Kraft (FSK) or all-service jacket and tape, with permeability rating equals 0.02 perms. ASTM E 96.

4. Temperature limits for fiberglass duct insulation: 250 degrees F. unless otherwise indicated.

2.3 ENGINE EXHAUST INSULATION

A. Hydrous Calcium Silicate

1. Rigid type pre-formed to suit application.

2. Thermal conductivity K = 0.40 at 200 degrees F.

2.4 FLEXIBLE FOAM PLASTIC

A. Thermal Conductivity: 0.27.

B. Water Vapor Transmission: 0.08.

C. Flame-spread rating of 25 or less and a smoke-developed rating of 50 or less as tested by ASTM E 84 .

2.5 FIXTURE INSULATION ASSEMBLY

A. Protective, molded, fire-resistant foam insulation, single piece insulation manufactured specifically for plumbing fixture supplies and drains.

B. 4.5 lbs per cubic foot foam with insulation R factor 2, white fire retardant polyurethane integral skin, twist fasteners.

C. Skal+Gard, Model SG-100B, TCI Products, or approved equal.

2.6 CANVAS JACKETING

A. Insulating Lagging Canvas: Eight ounces per square yard minimum, fire-retardant material complying with fire ratings specified above. Manufacturer: Chas Harmon "Osnaberg", Claremont Company Inc., “Claretex”, or approved equal.

B. Lagging Adhesive: Plastic synthetic resin emulsion adhesive; watertight, mildew resistant, fire retardant. Manufacturer: Miracle LA69, Borden Aeorbol, Childers Chil-Perm CP or approved equal.

2.7 METAL JACKETING

A. 27 gauge (U.S. Standard) heavy corrugated aluminum.

B. Preformed fitting covers.

2.8 COATINGS

A. Coatings: UL labeled.

B. On cold or dual service lines, use vapor barrier type coatings.

2.9 PREFORMED FITTING COVERS

A. One piece premolded PVC jacketing and fitting covers specifically designed for the service intended.

B. Install per manufacturer's instructions and secure with manufacturer's color matching PVC tape.

PART 3 EXECUTION

3.1 GENERAL

A. Do not apply insulation materials until all surfaces to be covered are clean and dry and all foreign material such as rust, dirt, etc. is removed.

B. Keep insulation clean and dry during installation and during the application of any finish.

C. Do not permit installation insulation on pipe fittings, and pipe joints until the piping is tested and approved.

D. Do not permit installation of insulation on ducts or fittings until the ductwork has been tested and approved.

E. Do not apply under conditions of excessive humidity or at temperatures below 50 degrees F. or above 100 degrees F.

3.2 PIPE INSULATION REQUIREMENTS

A. Cold Piping:

1. Includes rainwater piping, domestic cold water, plumbing and other vents through roof, chilled water and other cold piping to zero degrees F.

    a. Insulate aboveground rain leaders from the roof drain to the point pipe penetrates building skin or below grade. Cover underside of roof drain.

    b. Insulate plumbing vents from three feet below the under deck of the roof to the termination above the roofline.

2. Insulate with sectional fiberglass and provide a completely sealed vapor barrier. Provide insulation thickness per Insulation Thickness Table.

3. Insulate valves, fittings, tanks, and air separators except where indicated.

B. Hot Piping:

1. Includes domestic hot water supply and recirculation, and hydronic heating.

2. Insulate with sectional fiberglass. Provide insulation thickness per Insulation Thickness Table.

3. Do not insulate valves, unions, flanges and similar components unless indicated.

C. Buried Piping: Insulate with flexible foam plastic insulation, glue all seams with manufacturer's recommended cement.

D. Outdoor piping: Insulate with flexible foam plastic insulation, glue all seams with manufacturer's recommended cement. Provide metal jacketing.

E. Insulation Thickness Table (All units are in inches)

Fluid Design Operating Temperature Range	Runouts up to 2"	3/4" to 1-1/2"	2" to 2-1/2"	3 to 6	8" and up
Heating Systems (Water and Glycol Solutions)					
141 degrees F -200 degrees F	0.5*	1	1.5	2	2
Domestic (Hot Hater and Hot Water Circulation)					
105 degrees F -140 degrees F	0.5*	1.0	1.5	1.5	2
Cooling Systems (Chilled water and Glycol Solutions)					
40 degrees F -55 degrees F	0.5	0.5	1.0	1.0	1.0
Below 40 degrees F	1.0	1.0	1.5	1.5	1.5
Domestic Cold Water					
	.5	.5	1	1.5	1.5
Rainleaders, Plumbing vents through roof					
	1.0	1.0	1.5	1.5	1.5

*Only runouts less than 12 feet long.

F. In addition to specified jackets, provide heavy corrugated aluminum jacket on piping insulation anywhere piping is exposed below eight feet zero inches above floor in public areas, or outdoors.

G. Locate pipe hangers and rollers outside insulation. Provide insulation saddles or sheet metal shields, around insulation. On pipes two inches and larger, within the area of each insulation shield, use calcium silicate or cellular glass on the lower half of the insulation, equal in thickness to adjacent insulation.

H. Insulate fittings, valves and flanges to the same thickness as the pipe insulation.

I. Pre-formed fitting covers may be substituted for the tape and adhesive covering. Cement and tape fitting covers on cold piping to provide a positive vapor barrier.

3.3 DUCT INSULATION REQUIREMENTS

A. Insulate ductwork as follows:

1. Outside air ducts from air intake to equipment connection with two-inch fiberglass, except for the exposed outside air duct serving AHU -1M as shown where insulation shall be three inches.

2. Exhaust or relief ducts from the point of discharge to back draft or automatic damper, and as indicated, with two inches fiberglass.

3. Supply ductwork: entire system when there is mechanical cooling, otherwise where shown on medium/high velocity trunk schedule, and as indicated, with one-inch fiberglass.

4. Return ductwork passing through unheated space, in mechanical rooms and as indicated with one-inch fiberglass.

B. Insulation Type and Finish:

1. Rigid or semi-rigid board where canvas or metal jacket is required. May also be used in place of blanket insulation where practical.

2. Blanket insulation where rigid board is not specified or indicated. Proper installation is critical. Loose joints and sagging insulation shall require reinsulation of entire branch or main duct before acceptance and during warranty period.

3. Canvas jacket over board insulation in mechanical and boiler rooms, where exposed in finished rooms and where indicated.

4. Ductwork insulation to have a completely sealed vapor barrier, except segmental insulation on medium/high velocity trunk ducts and warm air ducts in concealed spaces, where approved.

3.4 DUCT SOUND INSULATION REQUIREMENTS

A. Install in accordance with manufacturer's installation instructions. Completed installation shall be fastened tightly to ductwork and free of sags.

3.5 ENGINE EXHAUST REQUIREMENTS

A. Provide minimum two-inch calcium silicate insulation.

B. Provide metal jacketing on all insulation.

3.6 PLUMBING FIXTURE INSULATION REQUIREMENTS

A. Insulate hot water supply and waste piping exposed beneath sink and lavatory fixtures designated on drawings or specified in Section 15400 as intended for use by the handicapped. Install in accordance with ANSI A117.1.

3.7 PAINTING

A. Paint all exposed insulation in utility and service areas, baggage handling areas, and mechanical rooms. Color shall be white or light gray.

END OF SECTION