

DIVISION 15 - MECHANICAL

Section 15250 - Mechanical Insulation

Introduction

Insulation products associated with:

- PIPING, DUCTWORK

Part 1 - General

- Use wrapped supply ductwork, except in acoustically critical applications where liner may be used only after written permission is given by the University. Lined ducts shall not be used in medical areas, clean rooms, or all high velocity supply ductwork.
- These requirements apply to building and tunnel piping. For direct buried chilled water piping discuss with the University.

Part 2 - Products

- Pipe Insulation Schedule (minimum insulation thickness)

Fluid Design Operating Range (°F)	Conductivity Range Btu•in./(h•ft ² •°F)	Mean Rating Temperature °F	Nominal Pipe Diameter (in.)				
			Less than 1	1 to 1 1/2	1 1/2 to 4	4 to 8	8" and larger
Above 350°F	0.32 - 0.34	250	4.5	5.0	5.0	5.0	5.0
251-350°F	0.29 – 0.32	200	3.0	4.0	4.5	4.5	4.5
201-250°F	0.27 – 0.30	150	2.5	2.5	2.5	3.0	3.0
141-200°	0.25 – 0.29	125	1.5	1.5	2.0	2.0	2.0
105-140°F	0.21 – 0.28	100	1.0	1.0	1.5	1.5	1.5
56 - 104°F	No Insulation Required						
40-55°F	0.21 – 0.27	75	0.5	1.0	1.0	1.0	1.0
Below 40°F	0.20-0.26	50	1.0	1.0	1.0	1.0	1.5

Note:
For insulation outside the stated conductivity range, the minimum thickness (T) shall be determined as follows:
 $T = r\{(1 + t/r)K/k - 1\}$ where T = minimum insulation thickness (in.), r = actual outside radius of pipe (in.), t = insulation thickness listed in this table for applicable fluid temperature and pipe size, K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu•in./h•ft²•°F); and k = the upper value of the conductivity range listed in this table for the applicable fluid temperature.

- Chilled Water Piping
 - All branch lines that are final connections to equipment 2" and below, valves, strainers and other piping appurtenances shall be insulated with closed cell foam insulation. Application shall be per Armaflex North American Application Manual. Extra care shall be taken to maintain the required Vapor barrier to prevent condensation.
 - All exposed metal surfaces shall be insulated when located above ceilings.
 - All chilled water ball valves operating below dew point are to be provided with insulated tee-handles such as NIBCO NIB-SEAL, Apollo Therma-Seal or equivalent.
 - Chilled water mains shall be insulated with fiberglass pipe insulation per schedule and applied per all manufacturer's instructions for piping operating below 45 degrees except tempered chilled water above dew point in chilled beam applications.

- Duct Insulation (minimum)
 - 2" fiberglass with foil back wrap with a minimum density of 0.75 lb./ft³.
 - 1" fiberglass duct liner with heavy duty surface, (see Part 1 - General).
 - Exterior ductwork to be insulated and lagged with aluminum jacketing.

- Pipe Insulation Jacket
 - Interior, concealed - fiberglass, All Service Jacket (ASJ). PVC jacket for chilled water in indirectly conditioned or potentially humid spaces.
 - Interior exposed or in equipment rooms –
 - Cover hot piping less than 10 feet above finish floor with 8 oz. Canvas jacket sealed with water based lagging adhesive and sizing compound, like Foster 30-30.
 - Chilled water piping- cover with PVC jacket
 - Tunnel piping
 - Steam and condensate -Canvas jacket sealed with water based lagging adhesive and sizing compound, like Foster 30-30
 - Chilled water - PVC jacketed
 - Exterior piping - fiberglass ASJ covered with embossed aluminum jacket with banding at joints and sealed with 25 year clear silicone.
 - Any insulated pipework installed within an air handling unit to be covered with PVC jacket.

- Equipment Insulation
 - Rigid, foil faced, fiberglass with a minimum density of 3.0 lb./ft³. Cold equipment (where fluid temperature is below 50 degrees F) shall be insulated with closed cell foam insulation. (Aramaflex or equal Misc. Product).

- Closed cell foam insulation which meets smoke developed/flare spread ratings of 50/25 may be used where allowed by the code.

Part 3 - Execution

- Provide fitted insulation which can be removed and reused around equipment, valves, flanges, etc.
- Use Z-strips on all leading edges of duct liner, (when permitted).
- Insulated fittings, i.e., elbows, tees, Y's to be packed and fitted with PVC covers or pre-molded insulation and PVC covers if applicable.
- Install insulation per Manufacturers Installation Manual and latest edition MICA Standards.
- Use welded pins for ductwork insulation attachment. No mechanical or glued attachments allowed.
- For pipe sizes greater than 1¼" provide calcium silicate inserts and metal shields to protect the insulation at each support. Provide solid inserts for smaller pipe sizes.
- Domestic hot water piping shall be insulated.
- Cooling system condensate drain lines shall be insulated where pipe is subject to potential sweating, including roof and area drains carrying condensate.
- Piping carrying fluid below 65°F and all steam piping to be insulated continuously through clamping, support and sleeving.

- All supply duct work to be insulated. - Ductwork downstream of terminal boxes exposed within the conditioned space may be uninsulated.

END OF SECTION 15250