

15251 - PIPE INSULATION FOR HVAC SYSTEMS

A. DESIGN CRITERIA

Comply with more stringent of following latest edition of Energy Conservation and Construction Code of New York State, *New York City Building Code*, ASHRAE and this Guideline.

B. GENERAL INSTALLATION REQUIREMENTS

1. Insulation shall be applied to clean, dry surfaces at ambient room conditions. Do not install damaged insulation. Damaged insulation shall be removed from the job site. Any water-damaged insulation shall be removed and replaced by the Contractor at no additional cost.
2. Insulation on cold surfaces where vapor barrier jackets are used shall be applied with a continuous, unbroken vapor seal. Hangers, supports, anchors, etc. that are secured directly to cold piping shall be adequately insulated and vapor sealed to prevent condensation.
3. The use of duct tape *and / or aluminum wrap tape* for patching insulation is prohibited.
4. Insulation shall not be installed until the piping system has been tested to the satisfaction of the University, and is signed off.
5. Existing insulation damaged or removed shall be replaced with material and workmanship as that specified for the new work.

C. SPECIFIC INSTALLATION REQUIREMENTS

1. Insulation Thickness and Type

<u>Service</u>	<u>Pipe Size</u>	<u>Thickness</u>	<u>Runouts*</u>	<u>Type</u>
High Pressure Steam (above 15 psig)	Up to 1½" 2" & Larger	2½" 3"	- -	A A
Low Pressure Steam (15 psig & below)	Up to 1½" 2" & Larger	1½" 3"	1 1½"	B B
Steam Condensate Return (above 15 psig)	Up to 1½" 2" & Larger	1½" 2½"	- -	A A
Steam Condensate Return (15 psig & below) Pumped Condensate Hot Water (Heating)	Up to 1½" 2" & Larger	1½" 2"	1" 1½"	B B
Chilled Water	Up to 1½" 2" & Larger	1" 1½"	¾" 1"	C C
Refrigerant	Up to 1½" 2" & Larger	1" 1½"	- -	D D
AC Unit Drains and other piping subject to sweating	All	¾"	-	C

*Runouts are piping directly connected to a terminal unit and not exceeding 6'-0" in length.

a. Type A Calcium Silicate For Hot Pipes

- 1) All high pressure (above 15 psig) steam and condensate return piping and fittings shall be insulated with 11 lb/ft³ calcium silicate insulation with a thermal conductivity of 0.41 at 200°F. mean temperature. Glass cloth shall be applied on insulation with an approved adhesive and secured with aluminum bands 12" on center.
- 2) Insulate fittings, flanges, valves, etc. for services where calcium silicate insulation with mineral wool cement of equal thickness to the pipe insulation and finished with glass cloth.

b. Type B Glass Fiber For Hot Pipes

- 1) Insulation shall be glass fiber with a maximum thermal conductivity of .24 at 75°F. mean temperature with factory applied all-service jacket.
- 2) Insulation shall be rigid, molded, one-piece, fiberglass insulation that is bonded with thermosetting resin, similar to Manville Micro-Lok with AP-T Plus Jacket.
- 3) The longitudinal lap of the All Purpose Jacket shall have a pressure sensitive tape lap sealing system. Butt joints shall be sealed using manufacturer supplied butt strips.
- 4) Insulation shall be capable of continuous service at a pipe temperature of 450°F. without oxidation, burnout of binders, or development of odors or smoke.
- 5) All fittings, valves, flanges and pipe terminations.
 - a) Where manufactured, use factory premolded fittings (of the same material and thickness as the pipe insulation) for fittings, flanges and valves.
 - b) Where premolded insulation fittings are not manufactured, insulate fittings, flanges and valves with mitered segments of the same density as the adjoining pipe covering.
 - c) Flange insulation shall extend a minimum of 1" beyond the end of the bolts, and the bolt area shall be filled with mineral wool cement.

c. Type C Glass Fiber For Cold Pipes

- 1) Same material and application techniques as Type B with the following addition.
Vapor Barrier Jacket: Seal longitudinal joints with vapor barrier adhesive, transverse joints sealed with vapor barrier strips and adhesives. Ends of pipe insulation sealed off with vapor barrier adhesive at all flanges, valves and fittings, and at not more than 20 feet on continuous runs of pipe.
- 2) Maintain integrity of vapor barrier jackets on pipe insulation, and protect to prevent puncture or other damage. Special care must be made to maintain the vapor barrier at PVC fittings.

- 3) Cover valves, fittings and similar items in each piping system with insulation as applied to adjoining pipe run. Extra care must be taken on piping appurtenances to insure a tight fit to the piping system. Valve extension stems require elastomeric insulation that is tight-fitting to the adjoining fiberglass system insulation. Pumps, strainers, air separators, drain valves, etc. must be totally encapsulated with elastomeric insulation.
 - 4) All fittings, valves, flanges and pipe terminations
 - a) Where manufactured, use factory premolded fittings (of the same material and thickness as the pipe insulation) for fittings, flanges and valves.
 - b) Where premolded insulation fittings are not manufactured, insulate fittings, flanges and valves with mitered segments of the same density as the adjoining pipe covering.
 - c) Flange insulation shall extend a minimum of 1" beyond the end of the bolts, and the bolt area shall be filled with mineral wool cement.
 - 5) Vapor Barrier is to be maintained at all riser clamps and pipe hangers.
 - a) Vapor dam insert is to be used every 9 feet in vertical risers.
 - b) When staples are used to seal insulation joints, staples MUST be covered by CP-11.
- d. Type D Foam Insulation
- 1) Insulation shall be premolded flexible elastomeric foam plastic with 2 lb/ft³ density and maximum thermal conductivity of .030 at mean temperature of 100°F. suitable operating range between -40°F. to 200°F.
 - 2) Slip pipe insulation over pipe or slit the insulation and apply around pipe. Insulate fittings and valves with fabricated covers of some thickness. Miter all joints and seal with adhesive. Longitudinal seams to be located on top centerline of pipe.
2. Non-Fire-Rated Penetrations
- a. Wherever piping penetrates walls, partitions, floor slabs, etc., the space between the piping and the sleeve shall be packed with filler and sealed with type non-hardening compound, complying with UL 1479 (ASTM E-814) and UL 723.
 - b. There shall be no insulation joints located within the wall penetrations.
3. Fire-Rated Penetrations
- Piping through fire-rated walls and slabs shall be provided with a Schedule 40 steel pipe sleeve. Insulation is to be omitted through the fire rated wall and slabs and the annular space between the sleeve and pipe shall be filled to prevent flame spread. Refer to Firestopping Section.

4. Protection of Insulation

- a. Protect pipe covering at hangers, guides, and roller supports with 16 gauge galvanized metal shields or saddles (at least 3 times the insulation diameter in length and 1/3 the insulation circumference in width) on the outside of the insulation and vapor barrier. Hold shields in place with straps. Do not pierce the insulation with hangers. Fill each pipe covering protection saddle with same insulation as specified for respective pipe or with suitable insulating cement.
- b. Insulation "inserts" shall be installed at hangers for glass fiber insulated piping 3" and larger and as an option to reduce shield length on pipes below 3". Inserts between the pipe and pipe hangers shall consist of either high density fiberglass (7 lb/ft³) or calcium silicate insulation of equal thickness to the adjoining insulation and shall be provided with vapor barrier where required. Inserts shall have sufficient compressive strength so that when used in combination with a sheet metal shield, they support the weight of the pipe and the fluid in it without crushing the insulation.
- c. Shield Lengths

Pipe Diameter	Shield Length With Insert	Shield Length Without Insert
3" and below	6"	12"
4" to 6"	8"	18"
8" and larger	12"	24"

- d. Inserts shall be a minimum of 6" longer than shield length, be half round where pipe is hung and full round where clamped. A second shield will be required on clamped pipes that have vapor barriers.
- e. Pipes Subject To Freezing and Piping Exposed to Outdoors: Cover any piping subject to freezing with an additional layer of 2" glass fiber insulation of the same finish scheduled for the particular service when not subject to freezing, but not less than 3" total thickness. Cover insulated piping exposed to outdoors in addition to finishes scheduled with an aluminum jacket similar to Manville "Metal-Lok" or as approved, including all fittings.
- f. Insulate heat-traced pipes as indicated for pipes subject to freezing. Cover with an aluminum jacket, as specified for piping exposed to the outdoors.
- g. Exposed insulated piping within 36" of a mechanical equipment room floor and other open areas subject to abuse such as parking garages shall be protected with an aluminum insulation jacket similar to "Johns-Manville" "Metal-Lok."
- h. Insulation that may be in contact with chain operators for valves must be shielded.

END OF SECTION