DESIGN GUIDELINE 220719
MECHANICAL INSULATION

General

Insulation of pipe and duct systems to avoid condensation or to provide personnel protection is required. Cost-benefit analysis and ASHRAE 90A should be used to determine which additional systems should be insulated and the appropriate insulation thickness. A continuous vapor barrier jacket must be provided when condensation is possible. This normally means that hangers and riser clamps may not be in contact with the piping. Insulation of the complete system, including air separators, suction diffusers, chilled water pump casings, shot feeder, airflow measuring stations, etc., is required when condensation is possible.

For normal maintenance and inspection activities, insulation should be segmented for removal without damage to adjacent insulation.

Insulation exposed to outside shall be a weather resistant system, with durable, UV stable, waterproof finish.

Insulation exposed to high physical abuse, such as piping near the floors which is regularly walked over, shall be adequately protected with pre-molded, heavy gage, PVC covers, reinforcing shields, catwalks etc., to ensure the long-term integrity of the insulation system.

Insulation materials should meet applicable requirements of NFPA 90A, and MICA/ NIAC "National Commercial and Industrial Insulation Standards".

Related Sections

U-M Design Guideline Sections:
Codes and Regulatory Agencies

U-M Master Specification Sections:
Section 220553 - Mechanical Identification
Section 221113 - Piping Materials and Methods

Piping Insulation Materials Requirements

General

Fiberglass pipe insulation shall be rigid, pre-molded to size of piping on which it is used.

Indoor Piping

For "hot piping" carrying fluids at 110F and above: Insulate pipe and fittings (excluding unions and valves) using fiberglass insulation with ASJ (all service jacket, with integral vapor

barrier). Closed cell expanded foam insulation (similar to Armaflex) may be used on domestic hot water piping.

For "cold piping" carrying fluids below 70F: Insulate pipe, fitting, valves, unions, flanges and all cold surfaces using fiberglass (with ASJ), or closed cell expanded foam. Ensure all cold surfaces are insulated, and that continuity of vapor barrier is maintained.

Piping carrying fluids between 70F and 110F does not require insulation. Condenser water piping should be considered "cold piping" if used for free cooling.

Indoor pipe insulation can be presized rigid board fiberglass with paintable jacket. Exposed insulation in finished areas should be painted as described in Section 220553.

Tunnel Piping

Piping insulation in tunnels shall include dimpled aluminum jacketing.

Outdoor Piping

For outdoor piping, use insulating materials similar to those stated for indoor use, but add aluminum jacket for fiberglass insulation and premium quality weather resistant coating for expanded foam insulation.

Outdoor compressed air piping should be heat traced and insulated if piping is in service during the winter and if the pressure dew-point is above minus 20F.

Underground Piping

For hot piping (carrying fluid above 110F), a carrier pipe inside a steel or fiberglass jacket pipe, with foam insulation between, is preferred.

Chilled water piping is typically run as uninsulated ductile iron pipe. If ductile iron pipe is not used, consider a carrier pipe inside a PVC jacket with expanded urethane insulation between.

Refer to Section 221113 for pipe material requirements.

Ductwork Insulation Material Requirements

General

Acoustic duct lining should not be used unless part of a double wall duct system with a mylar barrier between the inner duct wall and liner face.

Indoor Ductwork

Indoor ductwork in concealed areas (above ceilings and in closed shafts), may be insulated with blanket type fiberglass insulation with jacket.

Indoor ductwork in exposed areas (such as mechanical rooms, labs with exposed ceilings etc.) should be insulated using rigid board fiberglass with paintable jacket. See Section 220553 for painting requirements.

Particular attention shall be paid to "cold ductwork" to ensure duct supports will not cause condensation.

Exhaust duct shall not be insulated.

Need for insulation on return air ductwork should be evaluated based on air stream and ambient conditions. Typically, air conditioned return duct in unconditioned mechanical rooms should be insulated.

Outdoor Ductwork

Outdoor duct insulation should be high density foam plastic, or rigid fiberglass, mastic sealed and painted with weather resistant finish.

Underground Ductwork

Requirements should be reviewed on a case by case basis with Project Coordinator

Equipment Insulation

Insulate all cold equipment to prevent condensation for the following:

- Chilled water pumps
- Chiller shells and water boxes

Insulate hot equipment as required for personnel protection and on the following equipment:

- Domestic hot water storage tanks
- Large condensate receivers

Installation Requirements

Insulation at joints should not be applied until after pipe, duct and equipment have been final installed, tested, cleaned, and inspected.

All exposed edges of insulation shall be sealed.