

SECTION 222500 – PLUMBING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. General provisions and other plumbing systems are specified in other Sections of Division 22.
- B. Refer to Section 220010, Plumbing General, for a list of plumbing Sections included in this specification.
- C. This Section covers thermal insulation for plumbing piping and equipment.
 - 1. All horizontal primary and secondary rainwater piping shall be insulated.
- D. Items not to be insulated:
 - 1. Chrome plated water supplies to plumbing fixtures. See Section 224200, Plumbing Fixtures for insulation of water supplies to ADA fixtures.
 - 2. Underground domestic cold water piping.
 - 3. Vents from pressure relief valves.

1.2 QUALITY ASSURANCE

- A. Conform to the following:
 - 1. North Carolina State Energy Conservation Code-2018.
 - 2. North Carolina State Plumbing Code-2018.
 - 3. International Energy Conservation Code-2009.
- B. Products of the manufacturers listed will be acceptable for use for the specific functions specified herein. Materials shall be compatible with the materials to which they are applied, and shall not corrode, soften or otherwise attack such material in either the wet or dry state.
- C. Materials shall be applied subject to their temperature limits. Methods of application of insulating materials or finishes not specified in detail herein shall be in accordance with the particular manufacturer's published recommendations.
- D. Insulation shall be applied by experienced workers regularly employed for this type of work.

1.3 RATINGS

- A. Insulation and accessories, unless specifically excepted herein, shall have a maximum composite flame spread rating of 25 and a maximum smoke developed rating of 50. Materials that are factory-applied shall be tested as assembled. Materials which are field-applied may be tested individually. No fugitive or corrosive treatments shall be employed to impart flame resistance.
- B. Flame spread and smoke developed ratings shall be in accordance with ASTM E84-2019b. Products or their shipping cartons shall bear a label indicating flame spread and smoke developed ratings.
- C. Treatment of pipe jackets to impart flame and smoke safety shall be permanent. The use of water-soluble treatments is prohibited.
- D. Vapor retarders shall have a maximum permeance of 0.02 perm at 73.4°F.

1.4 ALTERNATE THICKNESSES

- A. Specified thicknesses may be increased or reduced for insulation materials having thermal resistivity, K-values, different from those listed. Submit calculations in accordance with ASHRAE/IES 90.1-2019, and documentation of product performance.

PART 2 - PRODUCTS

2.1 INSULATION

- A. Fiberglass Pipe and Blanket Insulation:
 - 1. Pipe insulation: maximum K-value for preformed pipe insulation: 0.23 Btu·in/(h·ft²·°F) at 75°F.
 - a. Manufacturer: CertainTeed, Johns Manville, Knauf, Manson Insulation, or Owens Corning.
 - 2. Blanket insulation: maximum K-value for blanket insulation: 0.28 Btu·in/(h·ft²·°F) at 75°F.
 - a. Manufacturer: CertainTeed, Johns Manville, Knauf, Manson Insulation, or Owens Corning.

2.2 ACCESSORIES

- A. Adhesives and Mastics:
 - 1. Manufacturer: Aeroflex, Armacell, Childers, Epolux, Foster, Marathon, Pittsburgh Corning PC 88, Pittsburgh Corning Pittcote 300 (interior) or 404 (exterior), or Vimasco.
- B. Insulating Cement:
 - 1. Mineral wool type, asbestos free, maximum K-value of 0.20 Btu·in/(h·ft²·°F) at 75°F.
 - 2. Manufacturer: Industrial Insulation Group CalCoat-127, or Ramco Ramcote 1200.
- C. Glass fabric: 10 x 10 threads per square inch construction white fiberglass scrim fabric.
- D. Tape: pressure sensitive, foil-scrim-kraft backed.
- E. PVC Fitting Jackets:
 - 1. High impact, UV resistant, 30 mil thick, white polyvinyl chloride (PVC) fitting jackets with formaldehyde-free insulation inserts, and stainless steel attachments. Provide additional insulation inserts as required for larger pipes. Flame and smoke ratings shall comply with Paragraph 1.04, Ratings.
 - 2. Manufacturer: Johns Manville Zeston 2000 PVC, or Knauf Proto.
- F. Coal Tar:
 - 1. Self-priming, cold-applied type.
 - 2. Manufacturer: Koppers Bitumastic 50.

2.3 ALUMINUM JACKETING

- A. Piping and tanks: corrugated aluminum jackets, 0.016" thick with an embossed finish, and a factory heat laminated 3 mil moisture retarder film on the inner surface, and meeting ASTM B209-2014.
- B. Fittings: stamped 2-piece (matching halves) aluminum fitting covers and end caps, 0.024" thick, with a factory heat lamination moisture retarder film on the inner surface.

PART 3 - EXECUTION

3.1 GENERAL

- A. Surfaces to be insulated shall be clean, dry, and free of foreign material, rust, scale and dirt when insulation is applied.
- B. Perform pressure and leakage tests and submit results required by other Sections before applying insulation.
- C. Where existing insulation is damaged due to the new work, repair damage to match existing work or replace damaged portion with insulation specified for new work.
- D. On piping where temperature maintenance cable is specified, to ensure the insulation's adequate fit, increase the insulation size as required to comply with the cable manufacturer's installation instructions.

3.2 INSULATION FOR TEMPERED, HOT, AND HOT WATER CIRCULATING PIPE

- A. Insulate the following pipe with preformed fiberglass pipe insulation of the thickness indicated, with vapor retarder and white all service jacket with self-sealing lap:

	Fluid Design Operating Temperature Range, °F	<u>Insulation Thickness, Inches</u>	
		<u>0.5"- 1.25"</u>	<u>1.5"- 6"</u>
Hot water and hot water circulating	110 to 140	1	1.5
High temperature hot water	141 to 180	1.5	2

- 1. Install insulation with jacket drawn tight and side laps and end joint butt strips secured. End joint butt strips shall be minimum 3" wide and of material identical to jacket. Seal ends of insulation at fittings, valves, and riser clamps.
- B. Insulate fittings, flanges, strainers, unions, and valve bodies with packing nut and stem left open, with preformed or mitered fiberglass. Wire fiberglass in-place and cover with a smoothing coat of insulating cement. Finish with glass fabric embedded into a coat of white breather mastic. Glass fabric shall overlap adjoining insulation at least 2".
 - 1. Cover exposed fittings with glass fabric and mastic.

3.3 INSULATION FOR COLD PIPE

- A. Insulate the following pipe with preformed fiberglass pipe insulation of the thickness indicated, with vapor retarder, white all service jacket, and self-sealing lap:

Domestic cold water above grade, 0.5" thick.
 Water cooler waste, trap, and waste arm to vertical stack, 1" thick.
 Chilled drinking water, supply and return, 1" thick.
 Branch waste, including drain and P-trap, receiving drainage from air conditioning and boiler equipment, 1.5" thick.

Exposed horizontal rainwater, and secondary (emergency overflow) rainwater, including connections to roof drains and vertical leaders within the top floor, 1" thick.

1. Install insulation with jacket drawn tight with side-laps and end joint butt strips secured. End joint butt strips shall be same material as jacket, and not less than 3" wide. Seal ends of insulation at fittings, valves, and riser clamps.

- B. Insulate fittings, flanges, strainers, unions, and valve bodies with packing nut and stem left open, with preformed or mitered fiberglass. Wire fiberglass in-place and vapor seal with a layer of glass fabric embedded between two 0.063" coats of white vapor retarder mastic. Glass fabric shall overlap adjoining insulation at least 2".

3.4 ACCESSORIES

- A. Adhesives and Mastics:

1. Seal open ends of insulation with a thick mastic coating.

- B. Insulating Cement:

1. Install a minimum 0.5" thick coat with a smooth finish, and even with the adjacent insulation.

- C. Glass Fabric:

1. For piping fittings and valves use tape form and for water storage tanks use sheet form.

- D. Tape:

1. When applied to jacket insulation, wrap tape as tight as possible without crushing the insulation jacket.

- E. Fitting Jackets:

1. Installation in mechanical rooms and exterior locations only.

- F. Coal Tar:

1. Apply to underground piping to:
 - a. Isolate copper from masonry or concrete flooring.
 - b. Repair slightly damaged pipe-wrap for gas piping.
 - c. Repair slightly damaged cellular glass insulation jacketing.

3.5 INSTALLATION

- A. Install insulation after piping has been tested and approved.
- B. Insulation shall be clean and dry during installation and during application of any finish.
- C. Provide removable and replaceable covers on equipment, and removable ends of strainers requiring insulation, that must be opened periodically for inspection, cleaning, or repair.
- D. Install insulation materials with smooth and even surfaces, jackets drawn tight and cemented down smoothly at longitudinal and end laps. Do not use scrap pieces of insulation where a full length section will fit.

- E. Install insulation, jackets and coatings continuous through openings and sleeves in nonrated construction. For penetrations of fire- or smoke-rated construction, insulation shall be butted tightly against firestops specified in Section 220010, Plumbing General. Tape butt joints.
- F. Banding wires shall have the twisted terminals turned down toward the insulation without damaging the vapor retarder.

3.6 INSULATION PROTECTION

- A. Protect interior fiberglass piping insulation exposed to damage with a corrugated aluminum jacket. Locate the longitudinal joints to shed water, and secure with aluminum bands at end joints and every 12" on center. Tightly abut end joints together. Install aluminum fitting-covers over fittings, overlapping the adjacent butt ends of the piping's aluminum jacket. Secure with aluminum bands.
- B. Protect interior site insulated tanks with a corrugated aluminum jackets. Install jacketing taut around tank overlapping seams by 3", and tightly abutting end joints together. Secure with aluminum bands at end joints and every 12" on center.
- C. Protect exterior piping insulation, except flexible elastomeric, with a corrugated aluminum jacket. Locate the longitudinal joints to shed water, and secure with aluminum bands at end joints and every 12" on center. Provide a 2" overlap at each end joint and seal with joint sealant. Install aluminum fitting-covers over fittings, overlapping the adjacent butt ends of the piping's aluminum jacket. Seal with joint sealant, and secure fitting covers with aluminum bands.
- D. Protect exterior flexible elastomeric insulation with a UV resistant white acrylic latex coating.

END OF SECTION 222500