SECTION 1510 - PIPE INSULATION

PART 1 - GENERAL

1.1 SCOPE OF WORK:

Extent of pipe insulation work shall be as shown on the plans. This specification shall apply to water or sewer lines as indicated on the plans.

1.2 SUBMITTALS:

Submittals shall include product data for each type of pipe insulation identifying k-value, thickness, and accessories.

1.3 DELIVERY, STORAGE, AND HANDLING:

General Protection: Protect pipe insulation from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

Subject to compliance with requirements, provide products by one of the following or an approved equal:

A. Glass Fiber:

1. CertainTeed Corporation.
2. Knauf Fiberglass GmbH.
3. Manville.
4. Owens-Corning Fiberglass Corporation.
5. USG Interiors, Inc. - Thermafiber Division.

B. Flexible Elastomeric Cellular:

1. Armstrong World Industries, Inc.
2. Halstead Industrial Products.
3. IMCOA.
4. Rubatex Corporation.

C. Cellular Glass:

1. Pittsburgh Corning Corporation FOAMGLAS Insulation.

2.2 INSULATING MATERIALS:

A. Glass Fiber:

1. Material: Inorganic glass fibers, bonded with a thermosetting resin.

2. Jacket: All-purpose, factory-applied, laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil having self-sealing lap.

3. Preformed Pipe Insulation: ASTM C 547, Class 1, rigid pipe insulation, jacketed.

a. Thermal Conductivity: 0.26 average maximum at 75 degrees F mean temperature.

b. Density: 10 average maximum.

4. Vapor Barrier Coating: Waterproof coating to be as recommended by insulation manufacturer for outside service.

B. Flexible Elastomeric Cellular:

1. Material: Flexible expanded closed-cell structure with smooth skin on both sides.

2. Form: Tubular materials conforming to ASTM C 534, Type I.

3. Thermal Conductivity: 0.30 average maximum at 75 degrees F.

4. Coating: Water-based latex enamel coating as recommended by insulation manufacturer.

C. Cellular Glass:

1. Insulation: Cellular glass block insulation conforming to ASTM C552, "Specification for Cellular Glass Block and Pipe Thermal Insulation".

2. Jacketing: Flexible, resilient membrane waterproof against most soil and water conditions. PITTWRAP Jacketing by Pittsburgh Corning Corporation or equal.

3. Asphalt Coating: PITTCOTE 300 Finish, by Pittsburgh Corning Corp. (or equal).

4. Reinforcing Fabric: PC Fabric 79, by Pittsburgh Corning Corp. (or equal).

5. Strapping Tape: Glass fiber reinforced, 1" width, Scotch Brand #880 by 3M, or equal.

6. Bore Coating: Hydrocal B-11, by U.S. Gypsum, or equal.

7. High Temperature Sealant: Maximum temperature limit, 500 degree F. RTV 736 by Dow Corning Corporation, or equal.

D. Thickness: Thickness of insulation shall be at least as shown in the table below, as recommended by the manufacturer.

MINIMUM PIPE INSULATION THICKNESS	
Nominal Pipe Diameter	**Insulation Thickness**
Less than 6"	As recommended by manufacturer
6" - 8"	2.5"
10" - 12"	3.5"
Greater than 12"	As recommended by manufacturer

2.3 ADHESIVES:

A. Adhesive for Glass Fiber Insulation:

1. Lagging Adhesive: MIL-A-3316C, nonflammable adhesive in the following Classes and Grades:

a. Class 1, Grade A for bonding glass cloth and tape to unfaced glass fiber insulation, sealing edges of glass fiber insulation, and bonding lagging cloth to unfaced glass fiber insulation.
b. Class 2, Grade A for bonding glass fiber insulation to metal surfaces.

2. Adhesive: Produced under the UL Classification and Follow-up service.

a. Type: Nonflammable, solvent-based.

b. Service Temperature Range: Minus 20 to 180 degrees F.

B. Adhesive for Flexible Elastomeric Cellular Insulation: Solvent-based, contact adhesive recommended by insulation manufacturer.

2.4 JACKETS (as applicable to insulation type):

A. General: ASTM C 921, Type 1, except as otherwise indicated.

B. PVC Jacketing: High-impact, ultra-violet-resistant PVC, 20-mils thick, roll stock ready for shop or field cutting and forming to indicated sizes.

1. Adhesive: As recommended by insulation manufacturer.

C. PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil-thick, high-impact, ultra-violet-resistant PVC.

1. Adhesive: As recommended by insulation manufacturer.

D. Aluminum Jacket: ASTM B 209, 3003 Alloy, H-14 temper, roll stock ready for shop or field cutting and forming to indicated sizes.

1. Finish and Thickness: Smooth finish, 0.010 inch thick.

2. Moisture Barrier: 1-mil, heat-bonded polyethylene and kraft paper.

3. Elbows: Preformed 45-degree and 90-degree, short- and long-radius elbows, same material, finish, and thickness as jacket.

2.5 ACCESSORIES AND ATTACHMENTS (as applicable to insulation type):

A. Glass Cloth and Tape: Woven glass fiber fabrics, plain weave, presized a minimum of 8 ounces per sq. yd.

1. Tape Width: 4 inches.

2. Cloth Standard: MIL-C-20079H, Type I.

3. Tape Standard: MIL-C-20079H, Type II.

B. Bands: 3/4-inch wide, in one of the following materials compatible with jacket:

1. Galvanized Steel: 0.005 inch thick.

2. Aluminum: 0.007 inch thick.

3. Brass: 0.01 inch thick.

4. Nickel-Copper Alloy: 0.005 inch thick.

C. Wire: 14-gage nickel copper alloy, 16-gage, soft-annealed stainless steel, or 16-gage, soft-annealed galvanized steel.

2.6 SEALING COMPOUNDS (as applicable to insulation type):

A. Vapor Barrier Compound: Water-based, fire-resistive composition.

1. Water Vapor Permeance: 0.08 perm maximum.

2. Temperature Range: Minus 20 to 180 degrees F.

B. Weatherproof Sealant: Flexible-elastomer-based, vapor-barrier sealant designed to seal metal joints.

1. Water Vapor Permeance: 0.02 perm maximum.

2. Temperature Range: Minus 50 to 250 degrees F.

3. Color: Aluminum.

PART 3 - EXECUTION

3.1 PREPARATION:

A. Surface Preparation: Clean, dry, and remove foreign materials such as rust, scale, and dirt.

3.2 INSTALLATION, GENERAL (as applicable to insulation type):

A. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either wet or dry conditions.

B. Install vapor barriers on insulated pipes having surface operating temperatures below 60 degrees F.

C. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.

D. Install insulation with smooth, straight, and even surfaces.

E. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier.

F. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier.

G. Seal Ends: Except for flexible elastomeric insulation, taper ends at 45 degree angle and seal with lagging adhesive. Cut ends of flexible elastomeric cellular insulation square and seal with adhesive.

H. Apply adhesives and coatings at the manufacturer's recommended coverage-per-gallon rate.

I. Keep insulation materials dry during application and finishing.

J. Tightly butt longitudinal seams and end joints. Bond with adhesive.

K. Apply insulation continuously over fittings, valves, and specialties, except as otherwise indicated.

L. Apply insulation with a minimum number of joints.

M. Apply insulation with integral jackets as follows:

1. Pull jacket tight and smooth.

2. Cover circumferential joints with butt strips, at least 3-inches wide, and of same material as insulation jacket. Secure with adhesive and outward clinching staples along both edges of butt strip and space 4 inches on center.

3. Longitudinal Seams: Overlap seams at least 1-1/2 inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches on center.

   a. Exception: Do not staple longitudinal laps on insulation applied to piping systems with surface temperatures at or below 35 degrees F.

4. Vapor Barrier Coatings: Where vapor barriers are indicated, apply on seams and joints, over staples, and at ends butt to flanges, unions, valves, and fittings.

5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor barrier coating.

6. Repair damaged insulation jackets, except metal jackets, by applying jacket material around the damaged jacket. Adhere, staple, and seal. Extend the patch at least 2 inches in both directions beyond the damaged insulation jacket and around the entire circumference of the pipe.

N. Exterior Wall Penetrations: For penetrations of below grade exterior walls, terminate insulation flush with mechanical sleeve seal. Seal terminations with vapor barrier coating.

O. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions. Apply an aluminum jacket with a factory-applied moisture barrier over insulation. Extend 2 inches from both surfaces of wall or partition. Secure the aluminum jacket with metal bands at both ends. Seal the ends of the jacket with vapor barrier coating. Seal around penetration with joint sealer.

P. Fire-Rated Walls and Partitions Penetrations: Terminate insulation at penetrations through fire-rated walls and partitions. Seal insulation ends with vapor barrier coating. Seal around penetration with fire-stopping or fire-resistant joint sealer.

Q. Floor Penetrations: Terminate insulation at underside of floor assembly and at floor support at top of floor.

3.3 BELOW GROUND PIPE INSULATION INSTALLATION (as applicable to insulation type):

A. General: The following are additional requirements for insulation applied to piping installed below ground.

B. Terminate insulation at anchor blocks.

C. Apply insulation continuously through sleeves and manholes, except as specified above for exterior wall penetrations.

D. Finishing: Apply 3 coats of asphaltic mastic to a finish thickness of 3/16 inch over insulation materials. Apply 10 x 10 mesh glass cloth between coats. Overlap edges of glass cloth by 2 inches.

3.4 GLASS FIBER INSULATION INSTALLATION:

A. Bond insulation to pipe with lagging adhesive.

B. Seal exposed ends with lagging adhesive.

C. Seal seams and joints with vapor barrier compound.

3.5 FLEXIBLE ELASTOMERIC CELLULAR INSULATION INSTALLATION:

A. Slip insulation on the pipe before making connections wherever possible. Seal joints with adhesive.

Where the slip-on technique is not possible, cut one side longitudinally and apply to the pipe. Seal seams and joints with adhesive.

B. Valves, Fittings, and Flanges: Cut insulation segments from pipe or sheet insulation. Bond to valve, fitting, and flange and seal joints with adhesive.

1. Miter cut materials to cover soldered elbows and tees.

2. Fabricate sleeve fitting covers from flexible elastomeric cellular insulation for screwed valves, fittings, and specialties. Miter cut materials. Overlap adjoining pipe insulation.

3.6 JACKETS (as applicable to insulation type):

A. Foil and Paper Jackets (FP): Install jackets drawn tight. Install lap or butt strips at joints with material same as jacket. Secure with adhesive. Install jackets with 1-1/2-inch laps at longitudinal joints and 3-inch-wide butt strips at end joints.

1. Seal openings, punctures, and breaks in vapor barrier jackets and exposed insulation with vapor barrier compound.

B. Interior Exposed Insulation: Install continuous aluminum jackets or PVC jackets.

C. Exterior Exposed Insulation: Install continuous aluminum jackets or PVC jackets and seal all joints and seams with waterproof sealant.

D. Install metal jacket with 2-inch overlap at longitudinal and butt joints. Overlap longitudinal joints to shed water. Seal butt joints with weatherproof sealant as recommended by insulation manufacturer. Secure jacket with stainless-steel draw bands 12 inches on center and at butt joints.

E. Install the PVC jacket with 1-inch overlap at longitudinal and butt joints and seal with adhesive.

PART 4 - BASIS OF PAYMENT

Payment for furnishing and installing pipe insulation shall be made per linear foot installed on each size pipe as shown on the proposal forms.

END OF SECTION