# GENERAL

## SECTION INCLUDES

### Piping insulation.

### Jackets and accessories.

## REFERENCE SECTION 23 05 00 FOR THE FOLLOWING:

### Quality assurance.

#### Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255, and UL 723.

#### References.

### Submittals.

### LEED Submittal

### [Note to A/E: Edit to suit any LEED certification requirements]

### Operation and maintenance manuals.

### Project record documents.

### Environmental requirements

#### Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

#### Maintain temperature during and after installation for minimum period of 24 hours.

# PRODUCTS

## GLASS FIBER

### Insulation: ASTM C547; rigid molded, noncombustible.

#### 'k' ((btu\*in)/(hr\*ft2\*deg F)) value : ASTM C335

|  |  |
| --- | --- |
| Temperature (degrees F) | Maximum 'k' value (btu\*in)/(hr\*ft2\*deg F)) |
| 75 | 0.23 |
| 100 | 0.24 |
| 150 | 0.25 |
| 200 | 0.28 |
| 300 | 0.34 |
| 400 | 0.42 |
| 500 | 0.51 |

#### Minimum Service Temperature: 0 degrees F.

#### Maximum Service Temperature: 1000 degrees F.

#### Maximum Moisture Absorption: 0.2% by volume.

### Vapor Barrier Jacket

#### ASTM C1136, White kraft paper reinforced with glass fiber yarn and bonded to aluminized film.

#### Moisture Vapor Transmission: ASTM E96; 0.02 perms.

#### Secure with self-sealing longitudinal laps and butt strips.

#### Secure with outward clinch expanding staples and vapor barrier mastic.

### Vapor Barrier Lap Adhesive: MIL-A-3316C, Class 2, Grade A compliant. Compatible with insulation. VOC Limit 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

### Insulating Cement: ASTM C195; hydraulic setting on mineral wool. VOC Limit 70 g/L (multipurpose construction adhesive).

### Fibrous Glass Fabric: Cloth, untreated; 9 oz./sq. yd. weight with 1.0 lb./cu ft. density blanket.

### Indoor Vapor Barrier Finish: Vinyl emulsion type acrylic, compatible with insulation, white color. VOC Limit 50 g/L.

## CELLULAR FOAM

### Insulation: ASTM C534; flexible, cellular elastomeric, molded or sheet.

#### 'k' ((btu\*in)/(hr\*ft2\*deg F)) value: ASTM C177 or C518; 0.22 to 0.28 at 60 degrees F.

#### Minimum Service Temperature: ‑20 degrees F.

#### Maximum Service Temperature: 180 degrees F.

#### Maximum Moisture Absorption: ASTM C209; 0.2 percent by volume.

#### Moisture Vapor Transmission: ASTM E96; 0.08 perm inches.

#### Maximum Flame Spread: ASTM E84; 25.

#### Maximum Smoke Developed: ASTM E84; 50.

#### Connection: Waterproof vapor barrier adhesive.

#### Provide documentation indicating that product contains no urea formaldehyde.

#### Fittings: Pre-fabricated closed cell fittings of like material and thickness as adjacent pipe insulation.

#### In all exposed finished areas without jacketing, provide white insulation, otherwise use black.

### Elastomeric Foam Adhesive: MIL-A-24179A, Type II, Class I, compliant. Air dried, contact adhesive, compatible with insulation. VOC Limit: 50 g/L or less when calculated according to 40 CFR 59, Subpart D.

## INSULATION BLANKETS FOR STEAM AND CONDENSATE FLANGED VALVES AND EXPANSION JOINTS

### Insulation: Tight-fitting, reusable insulation blanket consisting of high-density insulation (fiberglass, mineral wool, ceramic fiber) covered on outside with coated glass fabric having heavy adjustable straps with buckles. Inside of blanket shall be covered with fabric suitable to specified temperature of stainless steel square mesh woven wire cloth. Insulation shall be a minimum of 1-1/2” thick and shall be suitable for temperatures up to 500 Deg. F.

## JACKETS

### PVC Plastic

#### Jacket: ASTM C921, One piece molded type fitting covers and sheet material, white color.

##### Minimum Service Temperature: 0 degrees F.

##### Maximum Service Temperature: 150 degrees F.

##### Moisture Vapor Transmission: ASTM E96; 0.002 perm inches.

##### Maximum Flame Spread: ASTM E84; 25.

##### Maximum Smoke Developed: ASTM E84; 50.

##### Thickness: 20 mil.

##### Connections: Brush on welding adhesive or pressure sensitive color matching vinyl tape.

#### Covering Adhesive Mastic: Compatible with insulation and PVC jacket. VOC Limit 50 g/L according to 40 CFR 59, Subpart D (EPA Method 24).

# EXECUTION

## EXAMINATION

### Verify that piping has been tested before applying insulation materials.

### Verify that surfaces are clean, foreign material removed, and dry.

## INSTALLATION

### Install materials in accordance with manufacturer's instructions.

### **Painting of cellular foam insulation is not allowed.**

### On exposed piping, locate insulation and cover seams in least visible locations. For cellular foam insulation tape ALL visible seams with tape matching insulation color.

### Fiberglass insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature:

#### Provide vapor barrier jackets, factory applied or field applied.

#### Insulate fittings, joints, flanges, unions, strainers, flexible connectors, and valves with molded insulation of like material and thickness as adjacent pipe. PVC or aluminum covers are required in all exposed locations as in mechanical rooms.

#### Finish with glass cloth and vapor barrier adhesive.

#### Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.

#### Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

### Cellular foam insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature:

#### Insulate fittings, joints, flanges, unions, strainers, flexible connectors, and valves with molded insulation of like material and thickness as adjacent pipe. PVC or aluminum covers are required in all exposed locations as in mechanical rooms.

#### Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.

#### Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

### Fiberglass insulated pipes conveying fluids above ambient temperature:

#### Provide vapor barrier jackets, factory applied or field applied.

#### Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. PVC covers are required in all exposed locations.

#### Finish with glass cloth and adhesive.

#### Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.

#### For hot piping conveying fluids, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

#### For steam and condensate piping, insulate flanges and unions.

### Inserts and Shields:

#### Refer to Section 23 05 29 for additional information.

#### Application: Piping 1 inch diameter or larger.

#### Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.

#### Insert Location: Between support shield and piping and under the finish jacket.

#### Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.

#### Insert Material: ASTM C640 cork, hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

#### Provide inserts and/or shields per manufacturer recommendations for cellular foam insulation applications in order to maintain continuous insulation throughout the pipe system. The removal of sections of cellular foam insulation to accommodate pipe supports is not acceptable. Manufacturer products specifically designed for supporting insulation and maintaining the integrity of the insulation system at pipe hanger locations, such Armaflex Armafix Insulation Pipe Hangers, are acceptable.

### Finish insulation at supports, protrusions, and interruptions.

### For pipe exposed below 6 feet above finished floor, finish with PVC jacket and PVC fitting covers. This includes all spaces including mechanical rooms.

### All valves in insulated systems shall have valve stem extensions. Insulation installer shall notify the contractor and Owner if valves without stem extensions are encountered. All valves without stem extensions in areas where stem extensions are required shall be replaced.

### Install insulation blanket on steam and condensate valves.

### Provide insulation clearance and access to valves and fittings in hangers and from structure and other equipment. Insulation shall be continuous through all hangers and supports. Refer to Section 23 07 19.

### Foam or closed cell insulation on black or galvanized iron pipe operating below ambient temperature is not permitted.

## GLASS FIBER INSULATION SCHEDULE

PIPING SYSTEM: PIPE SIZE: THICKNESS:

Heating Water Supply and Return 1-1/2" & smaller 1-1/2"

Heating Water Supply and Return 2" & larger 2"

Chilled Water All sizes 1”

Heat Recovery Water All sizes 1”

Air Terminal Unit Reheat Coil Return Bends 1” & smaller 1-1/2”

Steam & Steam Condensate 1-1/2” & smaller 1-1/2”

Steam & Steam Condensate 2" & larger 3"

Condensate Pump Steam Vent All sizes 1-1/2”

Steam Vent All sizes 1-1/2”

Piping Exposed to Freezing w/ Heat Tracing All sizes 1”

(Provide with stainless steel metal jacket in

outside conditions)

## CELLULAR FOAM INSULATION SCHEDULE

PIPING SYSTEM: PIPE SIZE: THICKNESS:

Cold Condensate Drains (below ambient) All sizes 1"

Refrigerant Suction Line All sizes 1”

Refrigerant Liquid Line (in spaces

120 degrees and greater) All sizes 1”

Fan Coil Unit Condensate All sizes 1”

Chilled Water / Heat Recovery Coil Return Bends All sizes 1"

END OF SECTION 23 07 19