



# Division 230700

# HVAC Insulation

## DESIGN GUIDE

## 1 General

### 1.1 General

- A. All systems with operating temperatures below ambient shall have insulation systems with continuous vapor barriers.

## 2 Materials

### 2.1 Glass Fiber Pipe Insulation

- A. Insulation: rigid molded; noncombustible
- B. Vapor Barrier Jacket: White kraft paper with glass fiber yarn; bonded to aluminized film vapor barrier with pressure sensitive tape lap sealing system.
- C. Fitting covers: one-piece molded type fitting covers and sheet material; off-white color. Connections made with pressure sensitive color matching vinyl tape

### 2.2 Closed Cell Glass Foam Pipe Insulation

- A. Insulation: homogenous, closed cell glass structure that resists moisture in liquid and vapor forms, is non-combustible, corrosion resistant, vermin resistant, high compressive strength and suitable for temperatures between -450- and 900-degrees F.
- B. Jacketing: Coverings as recommended by the manufacturer.



## 2.3 Cellular Foam Pipe Insulation

- A. Insulation: Flexible, cellular elastomeric, molded pipe insulation.
- B. Finish: UV resistant vapor barrier protective coating when exposed to daylight.
- C. Fittings: Made to order fabricated fittings.

## 2.4 Glass Fiber, Flexible Blanket Duct Wrap

- A. Non-combustible fiberglass blanket with Foil Scrim Kraft or Class 1 vinyl vapor barrier jacket.

## 2.5 Glass Fiber, Flexible Duct Liner

- A. Flexible, non-combustible bonded glass fiber blanket with black matt surface for damage resistance. Surface coating with EPA registered anti-microbial agent that will not support growth of fungus or bacteria; anti-microbial agent shall be tested in accordance with fungi test ASTM C665, fungi test ASTM G21, bacterial test ASTM G22. Insulation coating shall be formaldehyde free.
- B. Waterproof fire-retardant adhesive with mechanical fastener pins.

## 2.6 Lace-on Blankets

- A. Materials: stainless steel knitted wire mesh inner liner, high density fiberglass insulation; oil and water resistant exterior protective fabric.
- B. Construction: Blankets shall be sewn together. Lacing anchors shall be stainless steel secured with stainless steel washers. Stainless steel wire draw cords.

## 2.7 Reusable Valve Covers-Indoors

- A. Outer jacket shall be made of material equal to DuPont Tychem® QC, overlapping and completely covering the insulation with seams joined by tabs made from hook and loop fasteners (Velcro). Butt ends shall have sewn- in-place elastic.



- B. Insulation: fiberglass blanket.
- C. Suitable for continuous operation at 200 degrees Fahrenheit.

## 2.8 Jackets

- A. PVC
- B. Aluminum

# 3 Execution

## 3.1 General

- A. Install insulation per manufacturer's recommendations.
- B. Insulate steam, steam condensate, heating, refrigerant, and chilled systems in accordance with the Washington State Energy Code.
- C. Insulate metal pipe drains running through conditioned spaces.
- D. Systems piping systems include equipment, valves and piping.
- E. Insulation on all cold-water systems shall be applied with a continuous unbroken vapor seal. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- F. Continue insulation with vapor barrier through penetrations.
- G. On insulated piping with vapor barrier, insulate fittings, valves, unions, flanges, strainers, flexible connections and expansion joints.  
Exception:
  - 1. Nameplates and ASME Stamps: Bevel and seal insulation around with a mastic. Do not insulate over.

## 3.2 Steam and Hydronic Pipe

- A. Within buildings:



1. Cover pipe with glass fiber insulation in thickness required by the energy code. Provide heavy density insulation inserts where required between shield and pipe so that insulation is not crushed from weight of pipe. Locate between shield and pipe. Cover fitting insulation with one piece PVC fitting covers.
- B. Outside buildings and in vaults and utility tunnels and where insulation is exposed to potential crushing:
  1. Insulate with closed-cell glass foam insulation.
  2. Outside chilled water piping shall be protected with weatherproof/UV proof jacketing and weather protection recommended by the manufacturer.
- C. When vapor barrier is required, adhere factory applied vapor barrier jacket lap smoothly and securely at longitudinal laps with pressure sensitive strip. Adhere self-sealing butt joint strips over end joints. No staples will be allowed.
- D. Insulate fittings and joints with molded insulation of like material and thickness of adjacent pipe with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
- E. Provide galvanized steel shields between pipe hangers or pipe hangers rolls and insulation.

### **3.3 Refrigerant Piping**

- A. Insulate with closed cell foam insulation.

### **3.4 Duct Insulation**

- A. Install insulation per manufacturer's recommendations.
- B. Install in accordance with manufacturer's recommendations and SMACNA HVAC Duct Construction Standards, Metal and Flexible, latest edition.
- C. Insulate duct systems in accordance with the Washington State Energy Code.
- D. Duct wrap



1. When systems are required to be insulated, insulate through walls, sleeves, hangers and other duct penetrations. Insulate entire system including fittings, joints, and flanges.
2. Overlap all joints and completely seal with vapor barrier tape.
3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping. Seal and bevel the ends of the insulation.

E. Duct liner

1. Duct liner may be used in lieu of duct wrap where systems require insulation.
2. Duct liner shall not be utilized on outside air ductwork or ductwork downstream of humidifiers as these are subject to exposure to moisture and snow.
3. Install matt faced surface facing the air stream side. Adhere insulation with fire resistive adhesive for 100 % coverage.
4. Accurately cut liner, point all joints, and thoroughly coat connecting ends with fire resistive adhesive. Butt joints tightly. Top and bottom sections of insulation shall overlap sides. All exposed edges shall be sealed (buttered).
5. If insulation is installed without horizontal, longitudinal, and end joints sealed and buttered together, installation will be rejected, and work removed and replaced with work that conforms to this specification.
6. Secure insulation with mechanical liner fasteners. Refer to SMACNA Standards for spacing.
7. Seal liner surface penetrations with adhesive.



### **3.5 Lace-on Blankets**

- A. Use for oversized equipment, high temperature valves and outdoor valves.

### **3.6 Reusable Valve Covers**

- A. For use on valves and small equipment requiring service for indoor installation for systems less than 200 degrees F.
- B. Outer jacket shall overlap adjoining sections of pipe insulation.
- C. Installation shall not require the use of any special hand tools.

### **3.7 Jackets**

- A. For pipe exposed in crawl spaces or tunnels or attics which may be subject to personnel contact and damage, provide with high density insulation and PVC jacket.
- B. For pipe exposed in finished, occupiable spaces, finish pipe with PVC or aluminum jacketing.
- C. Exterior ductwork that is insulated shall be protected with heavy gauge aluminum jacket securely fastened. Light gauge and embossed aluminum is not acceptable due to high winds and long term durability.

### **3.8 ADA Fixtures**

- A. Insulate hot lines and drainpipe with neatly installed removable insulation.

## **4 Appendix**

### **4.1 Reserved for future.**