

1 PART 1 GENERAL**2 DESCRIPTION**

3 The requirements of this section apply to the insulation of mechanical equipment specified elsewhere in these
4 specifications.

5
6 Related Work: The requirements of Section 23 05 00, Common HVAC Materials and Methods, also apply to
7 this section.

**8
9 QUALITY ASSURANCE**

10 Insulation Thickness and Thermal Performance: Comply with provisions of the State of Oregon Energy Code.

11
12 Composite (Insulation, Jacket or Facing and Adhesives) Fire and Smoke Hazard Ratings: Not to exceed a
13 flame spread of 25 or smoke development of 50 and containing less than 0.1% by weight deca-PDE fire
14 retardant.

15
16 Component Ratings of Accessories (Adhesives, Mastics, Cements, Tapes, Finishing Cloth for Fittings): Same
17 as "B" requirements above and permanently treated. No water soluble treatments.

**18
19 PRODUCT DELIVERY, STORAGE AND HANDLING**

20 General: In addition to the requirements specified in Section 23 05 00, the following apply:

21 Deliver insulation, coverings, cements, adhesives and coatings to the site in factory-fabricated containers with
22 the manufacturer's stamp or label affixed showing fire hazard ratings of the products. Store insulation in
23 original wrappings and protect from weather and construction traffic.

24 Protect insulation against dirt, water, chemical and mechanical damage. Do not install damaged insulation.
25 Remove such insulation from project site.

**26
27 SUBMITTALS**

28 Submit catalog data and performance characteristics for each product specified.

29 PART 2 PRODUCTS**30 ACCEPTABLE MANUFACTURERS**

31 Insulating Manufacturers: Johns Manville, Knauf, Armstrong, Owens-Corning, Pittsburgh Corning, Pabco,
32 Imcoa or Certain Teed. Johns Manville products are listed unless indicated otherwise.

33
34 Adhesive Manufacturers: Foster, 3M, Insul-Coustic, Borden, Kingco or Armstrong.

**35
36 PIPING INSULATION**

37 Interior and Exterior Piping Systems 50 to 850 Deg. F: Glass fiber preformed pipe insulation with a minimum
38 K-value of 0.23 at 75 Deg. F, a minimum density of 3.5 pounds per cubic foot within all-service vapor barrier
39 jacket, vinyl or pre-sized finish and pressure sensitive seal containing less than 0.1% by weight deca-PDE fire
40 retardant.

**41
42 DUCT INSULATION**

43 Interior Above Grade Ductwork: Glass fiber formaldehyde-free blanket with "FSK" facing, k value = 0.31 at 75
44 deg. F, 0.2 perms, and UL 25/50 surface burning rating. Johns Manville "Microlite."

**45
46 INSULATION ACCESSORIES**

47 Insulation Compounds and Materials: Provide rivets, staples, bands, adhesives, cements, coatings, sealers,
48 welded studs, etc., as recommended by the manufacturers for the insulation and conditions specified except
49 staples not permitted on chilled water lines.

50
51 PVC Protective Jacketing and Valve and Pipe Fitting Covers: Johns Manville Zeston 2000, Proto LoSmoke,
52 or Ceel-Co Ceel-Tite 100 Series with precut fitting fiberglass insulation or approved.

53
54 Jacket Lap Sealing Adhesives: Foster Drion 85-75 contact cement or approved substitute.

55

- 1 Saddles and Shields: Unless otherwise indicated and except as specified in piping system specification
 2 sections, install the following types:
 3 Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that
 4 matches adjoining insulation.
 5 Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing
 6 insulation.
 7 Thermal-Hanger Shield Inserts: For supporting insulated pipe, 360-degree insert of high-density,
 8 100-psi (690-kPa) minimum compressive strength, water-repellent-treated calcium silicate or cellular-
 9 glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-
 10 degree sheet metal shield.

11 **PART 3 EXECUTION**

12 **PIPING INSULATION**

13 General: Do not insulate underground piping except at joints and fittings on preinsulated piping unless
 14 indicated otherwise.

15 Heating Water Piping: Insulate with glass fiber or elastomeric pipe covering:

17 <u>Size</u>	<u>Thickness</u>
18 1/2" to 1-1/2"	1-1/2"
19 2" to 3"	2"
20 4" and larger	2-1/2"

21 Pipe Fittings:

- 22 Insulate and finish all fittings including valve bodies, bonnets, unions, flanges and expansion joints
 23 with precut fiberglass insulation and preformed PVC covers sealed to adjacent insulation jacket for
 24 continuous vapor barrier covering over all fittings.
 25 Provide removable/reusable insulation covers on 4" and larger valves, unions, flanges, pump casings,
 26 strainers and similar fittings or equipment requiring periodic service.
 27

28 Protective Covering: Install continuous protective PVC or metal covering on all piping and fittings in
 29 mechanical rooms below 8' AFF, and where insulation may be subject to damage. Install with rivets or
 30 cement seams and joints.
 31

32 Insulated Piping: Comply with the following.

33 Attach clamps and spacers to piping.

34 Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

35 Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with
 36 clamp sized to match OD of insert.

37 Do not exceed pipe stress limits according to ASME B31.9.

38 Install MSS SP-58, Type 39 or Type 40 protection saddles, if insulation without vapor barrier is
 39 indicated. Fill interior voids with insulation that matches adjoining insulation.

40 Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe
 41 NPS 4 (DN100) and larger if pipe is installed on rollers.

42 Shield Dimensions for Pipe: Not less than the following.

43 NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches (305 mm) long and 0.048 inch (1.22 mm)
 44 thick.

45 NPS 4 (DN100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.

46 NPS 5 and NPS 6 (DN125 and DN150): 18 inches (457 mm) long and 0.06 inch (1.52 mm)
 47 thick.

48 NPS 8 and NPS 14 (DN200 and DN350): 24 inches (610 mm) long and 0.075 inch (1.91
 49 mm) thick.

50 NPS 16 and NPS 24 (DN400 and DN600): 24 inches (610 mm) long and 0.105 inch (2.67
 51 mm) thick.

52 Pipes NPS 8 (DN200) and Larger: Include wood inserts.

53 Insert Material: Length at least as long as protective shield.

54 Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
 55
 56

1 Piping Insulation Lap Seams and Butt Joints: Install insulation jacket in accordance with manufacturer's
2 recommendation. Where jacket joint and lap seams have not adhered, remove affected section of insulation
3 and reinstall or apply lap sealing adhesive in accordance with manufacturer's instructions.
4

5 **DUCTWORK INSULATION**

6 Ductwork: Insulate the following:

7 All supply ductwork.

8 All supply and return ductwork in systems routed in unconditioned spaces or exposed to the outside
9 conditions.

10 All outside air intake ducts.

11 All ductwork required to be insulated by code.

12 All relief ducts.
13

14 Insulation Thickness: Select board and blanket insulation of thickness required to provide the following
15 installed R-value.

16 All heating or cooling system supply and return ducts located on the exterior of the insulated building
17 envelope and all outside air intake ducts.

18 R-8

19 All heating and cooling system supply ducts located inside of building envelope or in unconditioned
20 spaces, R-5.

21 All heating and cooling system return ducts located in vented spaces, R-8.
22

23 Fittings: Wire and duct adhesive as required. To prevent sagging on all rectangular or square ducts over 24"
24 wide, install Gramweld or equal welding pins on the bottom. Maximum spacing 18" on center in both
25 directions.
26

27 Installation: Applied with butt joints, all seams sealed with vapor seal mastic or taped with 2" wide vapor-
28 proof, pressure-sensitive tape. Seal all penetrations with vapor barrier adhesive.
29

30 Internally Lined Ductwork: Where internally lined ductwork is indicated on the Drawings and/or specified, no
31 exterior insulation is required. Select duct lining to provide the required R-value. Carefully lap the ends of the
32 exterior insulation a minimum of 6" past the interior insulation unless otherwise shown. Seal the end of vapor
33 barrier jacket to the duct with mastic where the vapor barrier is required. Duct lining is specified in Section 23
34 30 00.
35
36
37

END OF SECTION