

5. Minimum 20 mm (0.75 inch) thick insulation for pneumatic control lines for a minimum distance of 6 m (20 feet) from discharge side of the refrigerated dryer.
  6. Use Class S (Sheet), 20 mm (3/4 inch) thick for the following:
    - a. Chilled water pumps
    - b. Bottom and sides of metal basins for winterized cooling towers (where basin water is heated).
  7. Exposed, unlined supply and return ductwork exposed to outdoor weather: 50 mm (2 inch) thick insulation faced with a multi-layer vapor barrier with a water vapor permeance of 0.00 perms.
- I. Calcium Silicate:
1. Minimum thickness in millimeter (inches) specified in the schedule at the end of this section for piping.

**3.3 COMMISSIONING**

- A. Provide commissioning documentation in accordance with the requirements of section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.
- B. Components provided under this section of the specification will be tested as part of a larger system. Refer to section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

**3.4 PIPE INSULATION SCHEDULE**

Provide insulation for piping systems as scheduled below:

Insulation Thickness Millimeters (Inches)					
		Nominal Pipe Size Millimeters (Inches)			
Operating Temperature Range/Service	Insulation Material	Less than	25 - 32	38 - 75	100 (4)
		25 (1)	(1 - 1¼)	(1½ - 3)	and Above
122-177 degrees C (251-350 degrees F) (HPS, MPS)	Mineral Fiber (Above ground piping only)	75 (3)	100 (4)	113 (4.5)	113 (4.5)
93-260 degrees C (200-500 degrees F) (HPS, HPR)	Calcium Silicate	100 (4)	125 (5)	150 (6)	150 (6)

100-121 degrees C (212-250 degrees F) (HPR, MPR, LPS, Condensate receivers and flash tanks)	Mineral Fiber (Above ground piping only)	62 (2.5)	62 (2.5)	75 (3.0)	75 (3.0)
100-121 degrees C (212-250 degrees F) (HPR, MPR, LPS, Condensate receivers and flash tanks)	Rigid Cellular Phenolic Foam	50 (2.0)	50 (2.0)	75 (3.0)	75 (3.0)
38-94 degrees C (100-200 degrees F) (LPR, PCR, HS, HR, SHW, SHWR, SLS, SLR, STW, STWR)	Mineral Fiber (Above ground piping only)	50 (2.0)	50 (2.0)	50 (2.0)	50 (2.0)
38-99 degrees C (100-211 degrees F) (LPR, PCR, HS, HR, SHW, SHWR, SLS, SLR, STW, STWR)	Rigid Cellular Phenolic Foam	38 (1.5)	38 (1.5)	50 (2.0)	50 (2.0)
39-99 degrees C (100-211 degrees F) (LPR, PCR, HS, HR, SHW, SHWR, SLS, SLR, STW, STWR)	Polyiso- cyanurate Closed-Cell Rigid (Exterior Locations only)	38 (1.5)	38 (1.5)	----	----
<b>Insulation Thickness Millimeters (Inches)</b>					
			<b>Nominal Pipe Size Millimeters (Inches)</b>		
38-94 degrees C (100-200 degrees F) (LPR, PCR, HS, HR, STW, STWR)	Flexible Elastomeric Cellular Thermal (Above ground piping only)	50 (2.0)	50 (2.0)	----	----
4-16 degrees C (40-60 degrees F) (CHS, CHR, and RS for DX refrigeration)	Rigid Cellular Phenolic Foam	38 (1.5)	38 (1.5)	38 (1.5)	38 (1.5)
4-16 degrees C (40-60 degrees F) (CHS and CHR within pipe chase and underground)	Cellular Glass Closed- Cell	50 (2.0)	50 (2.0)	75 (3.0)	75 (3.0)

4-16 degrees C (40-60 degrees F) (CHS, CHR, and RS for DX refrigeration)	Cellular Glass Closed- Cell	50 (2.0)	50 (2.0)	50 (2.0)	50 (2.0)
4-16 degrees C (40-60 degrees F) (CHS, CHR, (where underground)	Polyiso- cyanurate Closed-Cell Rigid	38 (1.5)	38 (1.5)	50 (2.0)	50 (2.0)
4-16 degrees C (40-60 degrees F) (CHS, CHR, and RS for DX refrigeration)	Polyiso- cyanurate Closed-Cell Rigid (Exterior Locations only)	38 (1.5)	38 (1.5)	38 (1.5)	38 (1.5)
(40-60 degrees F) (CHS, CHR for flexible connections/hoses, and RS for DX refrigeration)	Flexible Elastomeric Cellular Thermal (Above ground piping only)	38 (1.5)	38 (1.5)	38 (1.5)	38 (1.5)
(Condensation Control)  (Cooling coil condensate, SCW, and FCW)	Mineral fiber	25 (1.0)	25 (1.0)	25 (1.0)	25 (1.0)

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