

**PART 1 – GENERAL**

These standards and procedures apply to the design and installation of chilled water system and accessories.

**1.01      DESIGN CRITERIA**

**A. Drawings and Specifications:**

1. Indicate unit dimensions, weight loading, required clearances, electrical characteristics and connection requirements.
2. Include equipment schedules: Identification tag, capacities, Balancing requirements, electrical requirements, weights, etc.
3. Indicate service access requirements on plans.
4. Indicate control valves and DDC control panel locations.
5. System shall be designed to utilize operation of water side economizer.
6. Provide Chilled water flow diagram (pumps, piping distribution, coils, water flow, etc.).
7. Provide valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.
8. Provide isolation valves on all equipment. Locate valves, control valves, balancing valves and control components for accessibility.
9. Piping shall be provided with complete drainage of system with hose bibbs at low points.
10. Provide floor drains or sinks (with trap primers) near equipment for drainage, relief valve discharge, and air vent discharge.
11. Provide automatic air vents to all high points of system. Pipe to floor drain.
12. Safety/Relief Valves: Pipe to floor sink.
13. Pipe Expansion: Indicate pipe expansion loops, guides and anchors.
14. Testing: Hydrostatic testing at 150 percent above maximum operating pressure or 100 psi minimum, whichever is greater.

**B. Design:**

1. Piping: Size piping distribution system to match future capacity provided at pumping assembly. Maximum water velocity = 8-feet per second, maximum water pressure drop 4-feet per 100 lf.
2. Chilled Water Cooling (Summer Condition): Design for 50°F entering chilled water and 16°FΔt.
3. Chilled Water Cooling (Winter Condition): Design for 52°F entering chilled water and 16°FΔt.
4. Expansion Compensation: Design piping, including mains, branches, risers and run-outs, with sufficient offsets to allow for free expansion and contraction, and sufficient to prevent leaks and over-stressing of piping system. Provide expansion compensators where required when offsets are not adequate for free expansion and contraction, in accessible locations to allow for servicing or replacement.
5. All chilled water piping systems shall be designed and constructed to meet ASME B31.1 Power Piping.
6. All chilled water systems shall be tested for minimum of 2 hours at 1-1/2 times design working pressure or 150 psig, whichever is greater.
7. Glycol Chilled Water systems shall be provided with insulated supports to prevent heat transfer and condensation on surfaces. Guides and anchors shall be designed to withstand loads imposed by at all locations including expansion joints.
8. Controls: Direct Digital Controls shall be utilized. Air handling unit coil valve actuators shall be pneumatic with existing compressed air system extended. Fan coil control valves shall be electric.
9. Vibration Isolation and Seismic Restraints: Provide vibration isolation and flexible connectors at pump assemblies with seismic restraints. Secure unit, components and accessories in accordance with seismic requirements per code.

10. Do Not Use the following:

- a. Grooved piping
- b. Dielectric Unions
- c. DX Refrigeration Coils
- d. Condensing Units

**PART 2 - PRODUCTS**

**2.01      PIPING**

- A. Chilled Water Piping 2-inch and Smaller: ASTM B88 Type “L” hard drawn copper.
- B. Chilled Water Piping 2-1/2-inch – 10 inch: ASTM A53, (Schedule 40), Standard weight Grade B, electric resistance welded or seamless, black steel.
- C. Chilled Water Piping 12 inch and larger: ASTM A53, Standard weight Grade B, electric resistance welded or seamless, black steel.

**2.02      FITTINGS**

- A. 2-inch and Smaller: Wrought copper solder fittings and screwed adapters, ANSI B16.22. Cast bronze solder joint fittings and screwed adapters, ANSI B16.18. 95 percent tin, 5 percent antimony solder, ASTM B32.
- B. 2-1/2-inch and Larger: Wrought-Steel, ASTM A 234/A 234M, butt-weld or flanged.
- C. Dielectric Couplings threaded or sweat (unions not allowed) required at dissimilar metal junctures.

**2.03**

**2.04      UNDERGROUND SUPPLY AND RETURN PIPING**

Provide piping in accessible utilidor or tunnel. Do not use manufactured conduit system or pre-insulated piping without prior approval.

**2.05      HYDRONIC SPECIALTIES**

See Section 203000 “Basic Materials and Methods.”

**2.06      VALVES**

See Section 200400 “Valves.”

**2.07      CHILLED WATER PUMPS**

See Section 232123 “Pumps.”

**2.08      COILS**

ARI 410, counter-flow, Seamless copper tube with mechanically bonded aluminum fins, 10 fins per inch (maximum), stainless steel casing.

**2.09      METERING**

See Section 200920 “Direct Digital Controls.”

END OF SECTION