

## SECTION 15511

### HYDRONIC PIPING AND SPECIALTIES

#### PART 1 - GENERAL

##### 1.01 SUMMARY

###### A. Section Includes:

1. Pipe Materials.
2. Fittings.
3. Specialty Items.
4. Glycol Antifreeze Protection.
5. Process Cooling

###### B. Related Sections:

1. Section 15010 - Basic Mechanical Requirements.
2. Section 15050 - Basic Mechanical Materials and Methods: Valve, pipe hangers, supports and accessories, identification of piping, freeze protection systems, welding, sleeves, plates and closures.
3. Section 15240 - Mechanical Sound and Vibration Control: Piping isolation hangers, supports, flexible piping connectors.
4. Section 15250 - Mechanical Insulation: Piping insulation.
5. Section 15540 - HVAC Pumps.
6. Section 15548 - HVAC Water Treatment: Pre-start up cleaning of HVAC piping systems, manifolds, solenoid water valves with strainers, pot feeders.
7. Section 15950 - Controls: Automatic control valves, aquastats, temperature sensing wells, flow switches.
8. Section 15990 - Testing, Adjusting and Balancing: Balancing of hydronic systems.

##### 1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM).
- B. American National Standards Institute (ANSI).
- C. American Society of Mechanical Engineers (ASME).
- D. American Welding Society (AWS).
- E. American Society of Heating, Refrigerating and Air Conditioning Engineers, (ASHRAE) Fundamentals Handbook.

##### 1.03 SYSTEM DESCRIPTION

###### A. Design Requirements:

1. Specify Type K hard drawn copper tube for open-loops and Schedule 40 black steel

- pipe or Type L for closed loops.
2. Obtain approval from UCCS to allow Contractor's option to use mechanical grooved pipe in accessible locations only for chilled and condenser water piping and mechanical equipment piping connections.
  3. Design piping systems with drain valves at main shut-off valves, low points of piping, bases of vertical risers and at equipment.
  4. We strongly encourage the installation of isolation valves. Specify and indicate location of isolation valves for all zones, risers, branches and equipment.
  5. Specify unions or flanges downstream of valves and at equipment and apparatus connections. Unions are not required for reheat coils and terminal units, BBRs, convectors, CUHs and UHs or 2-way valves associated with them.
  6. Specify manual air vents at all changes in elevation downward in direction of flow with full size air chamber and pipe down to accessible location with 1/4 inch copper tubing to a petcock.
  7. Specify diaphragm-type compression tanks, and where glycol is to be used in the system, specify a diaphragm which is compatible with glycol.
  8. Plain steel expansion tanks are unacceptable.
  9. Specify flow measuring and balancing device combinations of orifices, venturis, throttling valves and temperature and pressure taps to provide accurate flow measurement for manual balancing of hydronic systems. Test ports shall be on one side of the valve or be provided with a shut-off valve on the pressure side of the balancing valve. Balancing valves shall have full shut-off capability and memory stop. Valves shall be installed upstream of balancing ports to allow cleaning of ports.
  10. For BBR, in order to achieve adequate heat transfer, turbulent flow is necessary. Therefore, do not specify a flow rate below that which is necessary for turbulence in the specified BBR pipe size. Specify flow (GPM) at all locations of balancing devices.
  11. Automatic pressure-compensating variable-orifice type regulating valves to balance flow are unacceptable as substitutes for manual balancing of hydronic systems.
  12. In hydronic systems subject to freezing, the University requires "pumped coils". Inhibited ethylene glycol antifreeze solution (See 2.10 below) may be used only when approved by the University.
  13. Glycol system expansion tanks should be sized per ASHRAE recommendations.
  14. For initial fill of glycol systems, specify and require metering of volume to determine correct mix for specified concentration.
  15. For glycol-filled systems, specify that all components exposed to glycol shall be compatible with the specified glycol (especially the seals and gaskets).
  16. Provide the following system glycol concentrations:

Chilled Water System 35 percent  
Hot Water System 40 percent  
Reclaim Water System 40 percent  
Solar Water System 40 percent

17. Automatic glycol/water feeder systems are typically not required in University applications where antifreeze systems are used. Provide pressure sensor to alarm through central DDC.
18. System fill shall be performed by means of a temporary fill tank totally isolated from domestic water system. Fill connection shall be a female hose-end ball-valve. Supply shall be with a removable hose which can be connected to a male hose-end valve connected to a backflow prevention device.

19. All pressure relief valves in glycol systems shall drain into feeder tank (if present) or relief reservoir.
20. Temperature gauges across coils and pressure gauges across pumps are required. P&T taps are not sufficient. Use brass piping. Black iron is not acceptable because it rusts and plugs up. Specify shut-off valves at gages.
21. Specify that test and balance ports in chilled-water systems be long enough to extend beyond insulation. Cutting-back the insulation or covering the ports is not acceptable.
22. Process cooling systems are required in order to avoid water-wasting cooling.
23. For process-cooling systems, specify hose-end drain cock between equipment connector and return shut-off valve. (This is to purge air after connecting equipment).
24. When multiple/stacked chilled-water coils are required, specify reverse-return manifolds. This has proven to be necessary at low-flow conditions where using balancing valves has allowed freezing conditions because the valves are not linear for all flow conditions.
25. For outdoor underground chilled-water installations, it is acceptable to use un-insulated plastic piping, either C900 PVC with ductile-ion joints, or equivalent polyethylene at least 4 feet deep.

## PART 2 - PRODUCTS

### 2.01 PIPING MATERIALS

#### A. Pipe:

1. Black steel, Schedule 40, standard fittings.
2. Exterior uninsulated underground chilled-water: 2900 PVC with ductile-ion fittings. High density polyethylene (HDPE)
3. For exterior insulated underground chilled-water: HDPE manufactured by PermaPipe or Thermacore Process, Inc.

#### B. Tube:

1. Type K, hard copper for open loops, Type L for closed loops. Solder fittings with antimony-free and lead-free solder with shear strength not less than 7250 PSI. Canfield lead-free optional. Pipe diameters of 2" and above shall be brazed with filler material of no less than 15% silver.
2. Hot-water copper tubing shall have copper-clad clamps or plastic isolators at clamps.
3. Chilled-water piping shall have full insulation where clamped.

#### 4. Pro-press (optional) process.

#### C. Mechanical Grooved Pipe:

##### 1. Manufacturers:

ITT Grinnell Corporation GRUVLOCK.  
Victaulic  
Central

##### 2. Grooved Pipe:

- a. Black steel, Schedule 40, standard square cut or roll grooved to coupling manufacturer's specification and recommendations for the specified application.

## 2.02 RELIEF VALVES

### A. Manufacturers:

Kunkle  
Lonegren  
Lunkenheimer  
McDonnell and Miller  
Watts

- B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

## 2.03 DIAPHRAGM - TYPE COMPRESSION TANKS

### A. Manufacturers:

Amtrol  
American Tube and Controls.  
Bell and Gossett  
John Wood Co.  
Taco

- B. Tested and stamped in accordance with Section 8D of ANSI/ ASME Code.

## 2.04 AIR SEPARATORS

### A. Manufacturers:

Spirovent (Preferred) \*

Amtrol  
Armstrong  
Bell and Gossett  
Taco

\*Housing wants only this manufacturer.

## 2.05 STRAINERS

### A. Manufacturers:

Armstrong  
AW Cash  
Boylston  
Hoffman  
ITT  
Keckley  
Mueller

Plenty

- B. Basket Strainers: Duplex, quick-opening covers, stainless-steel baskets, single-handle or hand-wheel operation of valve.

## 2.06 PUMP SUCTION FITTINGS

### A. Manufacturers:

- Allis Chalmers
- Armstrong
- Aurora
- Bell and Gossett
- Peerless
- Taco
- Weinman

- B. Fitting to match specified pump.

## 2.07 COMBINATION PUMP DISCHARGE VALVES

### A. Manufacturers:

- Armstrong
- Bell and Gossett

## 2.08 FLOW INDICATOR SWITCHES

### A. Manufacturer:

- McDonnell and Miller
- Mueller

## 2.09 FLOW MEASURING AND BALANCING DEVICES

### A. Manufacturers:

#### 1. Manual Balancing

- No longer acceptable: Bell and Gossett "Circuit Setters"

- Flow Design "Flowset"

- Gerand

- Griswold "Quickset"

- Nexus

- Nibco globe-style with isolation valve

- Presco

### B. Design notes:

1. Mechanical Consultant shall add to specifications. "Mechanical contractor shall obtain approval in writing from Balancing contractor for all balancing devices."

2. All specified balancing valves shall have test ports on one side of the valve.

## 2.10 INHIBITED GLYCOL

- A. Manufacturer: The Dow Chemical Company
- B. Product: Dowtherm 4000 Heat Transfer Fluid (Ethylene Glycol) for hot water systems; Dowtherm SR-1 for chilled-water systems. Dowfrost HD (Propylene Glycol) may be used if authorized or required due to concerns about cross-contamination or toxicity.

## 2.11 VALVES

- A. The University requires ball valves with stainless steel ball and trim, Teflon seats, seals and gland nuts, or high-quality butterfly valves, instead of gate valves.

## 2.12 WATER METERS - CHILLED WATER

- A. Manufacturers (Vortex - shedding flowmeter):

EMCO Vortex PhD  
Controlotron

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. In general, for project specifications, remove "Design Requirements" sub-paragraph A in Part 1, paragraph 1.03 "System Description" of this Design Guide and use list to expand on specific requirements of installation for each product specified.

END OF SECTION