PART I - GENERAL

1.1 RELATED DOCUMENTS

A. Section 23 09 13 – Instrumentation and Control Devices for HVAC. [Note to AE: The requirements for flow meters for hydronic systems are listed in Section 23 09 13. Insert the flow meter requirements into the appropriate CSI section for inclusion into the Project Specifications.]

PART 2 - PRODUCTS

2.1 VALVES

A. Shut-Off Valves for Hydronic Systems (e.g. Chilled Water, Heating Hot Water, Condenser Water). See below for coil pack valves.

1. Size 2” and Smaller, Threaded or Solder-End Two-Piece Full-Port Ball Valve.
   a. 600 WOG.
   b. Shut-off class VI, bi-directional.
   c. Two-piece cast bronze body. Zinc level in bronze not to exceed 15% (yellow brass not acceptable).
   d. NPT or solder connections.
   e. 316 stainless steel full-port solid tunneled ball (hollow ball not acceptable).
   f. 316 stainless steel stem and nut.
   g. PTFE seats.
   h. Adjustable stem packing.
   i. Lever handle.
   j. Insulated piping applications: Provide stem extension with protective shield to allow operation without disturbing insulation.
   k. Approved manufacturers: Apollo, Milwaukee, Nibco, Watts.

2. Size 2 1/2” and 3”, Threaded or Solder-End Two-Piece Standard-Port Ball Valve.
   a. 600 WOG.
   b. Shut-off class VI, bi-directional.
   c. Two-piece cast bronze body. Zinc level in bronze not to exceed 15% (yellow brass not acceptable).
   d. NPT or solder connections.
   e. 316 stainless steel standard-port solid tunneled ball (hollow ball not acceptable).
   f. 316 stainless steel stem and nut.
   g. PTFE seats.
   h. Adjustable stem packing.
   i. Lever handle.
   j. Insulated piping applications: Provide stem extension with protective shield to allow operation without disturbing insulation.
   k. Approved manufacturers: Apollo, Milwaukee, Nibco, Watts.

3. Size 2 1/2” and Larger.
   a. 200 WOG.
b. Shut-off class VI, bi-directional.
c. Two-piece cast iron or ductile iron body.
d. Heat-fused epoxy coating on all interior and exterior surfaces.
e. Flanged connections.
f. Stainless steel full-port tunneled ball (TFE coated ball not acceptable).
g. PTFE seats (Nitrile or EPDM not acceptable).
h. Stainless steel stem.
i. Adjustable stem packing.
j. Lever handle.

4. Size 2 1/2" through 20", Resilient-Seated Butterfly Valve.
   a. Bi-directional bubble-tight shut-off rating for in-line service as well as dead-end service (with either mating flange removed): 200 PSIG for valves 12" and smaller, 150 PSIG for valves 14" and larger.
b. Ductile iron lug style body (cast iron or wafer style body not acceptable).
c. Heat-fused epoxy coating.
d. EPDM molded-in seat or cartridge-style seat with rigid backing ring. Boot-type seat acceptable only if valve/seat assembly satisfies specified shut-off rating (typically not the case).
e. Aluminum bronze or stainless steel disc.
f. 416 stainless steel shaft.
g. Manual actuator:
   1) Valves 6" and smaller: 10-position lever handle.
   2) Valves 8" and larger: Geared rotary hand-wheel operator.

5. Size 24" and Larger, Resilient-Seated Butterfly Valve (AWWA).
   a. Meets or exceeds AWWA standard C504.
b. AWWA Class 150B.
c. Bi-directional shut off pressure rating for in-line service: 150 PSIG.
d. Bi-directional shut off pressure rating for dead-end service (with either mating flange removed): 100 PSIG.
e. Cast iron or ductile iron body with flanged end connections.
f. Cast iron or ductile iron offset disc that provides uninterrupted 360 degree seating surface.
g. Epoxy coated disc and interior wetted surfaces.
h. Stainless steel disc edge.
i. EPDM resilient seat mechanically attached to valve body such that adjustment/replacement can be achieved without valve removal or disassembly (seats attached with epoxy not allowed).
j. Stainless steel shaft.
k. Adjustable shaft packing, replaceable without requiring valve disassembly.
l. Traveling nut type rotary hand wheel operator.
m. Approved manufacturers: Mosser, K-Flo, Pratt
2.2 "COIL PACK" MULTIFUNCTION VALVE ASSEMBLIES

[Note to AE: Although UIUC Standards typically require bronze body ball valves, forged brass components are deemed adequate for this specific application. Similarly, UIUC Standards typically require multi-turn globe style balance valves, calibrated orifice type are deemed adequate for this application. The use of balance valves at terminal units is typically disallowed. They are included in this specification for atypical applications only. Flexible hoses are not allowed. They have not yet been embraced by the University for these applications.]

A. Forged brass construction.

B. All components rated 600 WOG.

C. All components rated 250 degrees F. minimum

D. NPT or solder connections.

E. Ball valves.
   1. Shut-off class VI, bi-directional.
   2. Stainless steel ball and stem.
   3. PTFE seats

F. Wye strainer.
   1. 20 mesh stainless steel screen.
   2. Blow-down/drain valve.
   3. Ball valve per spec above.
   4. Hose adapter and cap.
   5. Union.

G. Balance valve (provide only if indicated elsewhere in documents).
   2. Calibrated multi-turn globe style preferred.
      (a) Memory stop.
      (b) P/T ports.
   3. Calibrated orifice type allowed.
      (a) Memory stop.
      (b) P/T ports.
      (c) Ball valve per spec above.
   4. Union.

H. Adapter/tail-piece
   1. Union with P/T plug, drain, and/or vent

I. Air vent.
   1. Tool-less type preferred (e.g. ball valve).
   2. “Coin vent” or “screwdriver vent” allowed if no option.

J. P/T test plugs.
   1. See section by same name in 23 05 19 Meters and Gauges for HVAC Piping.

K. Elastomers.
   1. Unions, valve stem seals.
(a) Viton O-ring.
   (i) Rated 325 degrees F.

2. Hose adapter cap seal, other seals.
   (a) EPDM gaskets/seal.
   (i) Rated 250 degrees F minimum.

L. Insulated piping applications: Provide stem extensions to allow operation without disturbing insulation.

M. Basis of design: Nexus

2.3 AIR/DIRT SEPARATOR

[Note to AE: It is the intent of the University to provide an in-line air/dirt separator in each closed loop hydronic system in lieu of a traditional air separator (e.g. B&G Rolairtrol).]

A. Coated steel housing.
B. Pressure rating: 150 PSIG.
C. Temperature rating: 250 degrees F.
D. Two-piece flanged housing with bottom blow-down connection.
E. Straight-through design.
F. Stainless steel or copper coalescing medium.
G. Vertical, cylindrical medium configuration, filling entire vessel.
H. Skim valve.
I. High capacity automatic air vent.
J. Pipe connections.
   1. 2" and smaller: NPT.
   2. 2 ½" and larger: Flanged.
K. Proper function not reliant upon the following:
   1. Fluid velocity.
   2. Centrifugal action.
   3. Pressure change.
L. Performance.
   1. 99% dissolved air removal.
   2. Particulate removal to 5 micron.
M. Approved manufacturers.
   1. Armstrong.
   2. Spirotherm.
   3. Thrush.

2.4 HYDRONIC FILL UNIT

[Note to AE: For many years the installation of permanently mounted fill units has been disallowed. Yet in recent years the University has come to see value in providing units that can readily be made portable if so desired. This specification addresses such equipment. It is acknowledged that some projects do not allow installation of portable equipment. Thus the following specification does not directly address the issue of portability.]

A. Factory packaged assembly.
B. Non-metallic cabinet; completely enclosed.
C. Steel structural base frame with corrosion resistant coating.
D. Free standing floor supported, unanchored.
E. Non-metallic mixing tank.
F. Integral air gap compliant with Illinois Plumbing Code.
G. Peripheral/regenerative turbine pump.
H. Pump suction strainer.
I. Suction and discharge isolation valves.
J. 120V single phase, 60 Hz with male plug-in connector.
K. Packaged controls with low water cut-out.
L. Suitable for use with 100% glycol.
M. Pump fill pressure: 65 PSIG min.
N. Tank capacity: 40 gallon min.
O. Weight: 200 lb max.
P. Basis of Design: Armstrong Model GLA.

2.5 FLOW METER
A. Chilled water flow meter shall comply with the requirements listed in Section 23 09 13 - Instrumentation and Control Devices for HVAC.

PART 3 - EXECUTION
3.1 VALVES
A. Valve Orientation.
   1. Ball Valve.
      a. Valve may be installed in any position except with stem oriented vertically downward (i.e. with handle at bottom).
      b. Valve shall be installed such that the direction of flow indication on the valve body and/or product literature, if any, matches the actual direction of fluid flow through the valve.
   2. Butterfly Valve.
      a. Valve shall be installed such that the shaft is oriented horizontally. In no case shall the valve be installed such that the shaft is oriented vertically downward (i.e. with the actuator at the bottom).
      b. Valve shall be installed such that the direction of flow indication on the valve body and/or product literature, if any, matches the actual direction of fluid flow through the valve.

B. Valve Insulation.
   1. Insulated piping applications.
      a. Valves in insulated piping systems shall have the body, flanges, etc., completely insulated. The practice of leaving heating valves and associated unions/flanges un-insulated is not acceptable.
      b. Insulated valves shall be equipped with extended stems and protective shields as required to allow operation without disturbing insulation.
      c. Valves shall be provided with lock-out trim where indicated on the drawings. Extended stems are not required on valves with lock out trim.
3.2 "COIL PACK" MULTIFUNCTION VALVE ASSEMBLIES

A. Configuration
   1. Configure valve assembly with isolation valves in supply and return piping such that all components can be isolated from system piping.

B. Strainer Assembly.
   1. Provide strainer assembly with isolation valve, union, blow-down/drain, hose adapter, cap in supply piping near coil inlet.

C. Adapters.
   1. Provide union/adapter in return piping near coil outlet.
   2. Install control valve (specified elsewhere).
   3. Provide union/adapter and isolation valve in return piping downstream of control valve.

D. Vents and Drains
   1. Provide air vent at high point of coil outlet.
   2. Provide drain at low point of coil inlet.

E. P/T plugs
   1. Provide P/T plugs at coil inlet and outlet for pressure and temperature measurement.

3.3 AIR/DIRT SEPARATOR

A. Provide one air/dirt separator for each closed loop hydronic system. [Note to AE: Indicate in project documents.]

B. For hot water heating applications, install air/dirt separator in-line between hot water heat exchanger (hot water convertor) and pump suction connection. [Note to AE: Indicate in project drawings.]

C. For chilled water cooling applications install air/dirt separator in return main upstream of chiller (not applicable to systems served by central chilled water system).

D. Support separator indirectly via hangers supporting adjacent piping.

E. Provide full size piping from bottom blow-down valve to floor drain. Provide pipe union or flanged connection near valve.

3.4 HYDRONIC FILL UNIT

A. Provide one hydronic fill unit for each closed loop hydronic system. Base curb not required. Do not anchor. [Note to AE: Indicate in project documents.]

B. Connect unit to system fill connection, water source and glycol source with contractor grade reinforced rubber hose. Provide standard 3/4” hose connections on each end of hose.

3.5 FLOW METER

A. Installation of chilled water flow meter shall comply with the requirements listed in Section 23 09 13 - Instrumentation and Control Devices for HVAC.

END OF SECTION 23 21 13

This section of the U of I Facilities Standards establishes minimum requirements only. It should not be used as a complete specification.