230523 VALVES

PART 1: GENERAL

1.01 RELATED SECTIONS

A. Section 230500 – HVAC Basic Materials and Methods
B. Section 230510 – Chilled Water System
C. Section 230520 – Heat Generation
D. Section 238216 – Coils
E. Section 230900 – Building Automation and Control System Guidelines
F. Section 336100 – Chilled Water Utility Distribution System

1.02 SCOPE

A. This Standard applies to all HVAC and Plumbing Valves located inside the building perimeter, and to high pressure steam and condensate valves located within steam vaults outside the building perimeter.

B. For direct bury valves, please refer to the appropriate underground utility distribution system standards.

1.03 GENERAL

A. Unless otherwise noted, all valves for shut-off and bypass service shall be ball valves, 2-inch and below, and butterfly valves 2-1/2-inches and above. Ball valves are acceptable in 2-1/2-inch and 3-inch copper only.

B. Valves for balancing operations shall not be ball or butterfly.

C. End connections for NPS 2-inch and below shall be the same as is used for fittings. Use flanged valves for NPS 2-1/2-inches and above. Solder joints are also acceptable in 2-1/2-inch and 3-inch copper piping systems.

D. All valves shall be labeled with 1-1/2-inch brass tags bearing a letter to indicate the service and a number to indicate the valve. A permanent valve chart and system schematic diagram shall show the location of all valves.
E. A manufacturer's valve tag shall be on all valves identifying the valve type and major component materials.

F. Install valves after welding adjacent to valve is completed to protect seat and disk.

G. Insulated valves shall have extended handle stems.

H. All valves shall be fully bi-directional and suitable for dead end service.

I. Valve packing compression is to be independent of the stem, ball or handle systems. All valve stems are to be blowout proof. Packing shall be accessible without disturbing the insulation.

J. Plug or gate valves shall not be used on any services without approval by Facilities Engineering.

K. All valves used for vent or drain service on water systems shall have a brass hose connection with cap and chain.

L. Non-electric radiator control valves with valve mounted heads are not acceptable, except on cast iron radiators, where they shall be side mounted. Where used, thermostatic radiator valves shall be remote bulb and remote control head design. The control head shall be mounted on the radiation enclosure, if possible.

M. Valves for potable water service shall be lead free models meeting NSF/ANSI-61-8.

N. For special applications or deviations from this Standard, obtain approval from Facilities Engineering.

PART 2: PRODUCTS

2.01 BALL VALVES, GENERAL DUTY

A. For all water services, low pressure steam, low pressure condensate and all other normal non-corrosive services, ball valves shall be as follows:

1. Body: Bronze

2. Body Style: Standard Port, Two-Piece

3. Trim: 316 Stainless Steel Ball and Stem
4. Seat: Reinforced Teflon (RTFE), 15% glass filled double seal

5. Seat Working P/T Rating: 300 psig @ 250°F Minimum

6. Body Working P/T Rating: 300 psig @ 300°F Minimum

7. WOG Rating: 300 psig Minimum

8. Saturated Steam Rating: 150 psig Minimum

9. Actuator: Lever Handle

B. Models approved by Cornell Facilities Engineering. Coordinate with Facilities Engineering if other models are preferred. Valve Type V-1, HVAC service:

1. Apollo (Conbraco): 70-140, 70-240
3. Watts: B6000-SS, B6001-SS

C. Models approved by Cornell Facilities Engineering. Coordinate with Facilities Engineering if other models are preferred. Valve Type V-2, Potable Water Service:

1. Apollo (Conbraco): 70LF-140, 70LF-240
3. Watts: LFB6000-SS, LFB6001-SS

2.02 BALL VALVES, HIGH PRESSURE STEAM AND CONDENSATE

A. For high pressure steam, trap station, and condensate service, ball valves shall be as follows:

1. Body: ASTM A216 WCB Cast Steel or ASTM A351 CF8M 316 Stainless Steel

2. Body Style: Standard Port, Three-Piece, 4-bolt clamp Butt or socket weld connection

3. Trim: 316 Stainless Steel Ball and Stem

4. Seat: High Temperature RTFE, double seal
5. Seat Working P/T Rating: 100 psig @ 450°F Minimum
6. Body Working P/T Rating: 750 psig @ 100°F Minimum
7. WOG Rating: 400 psig Minimum
8. Steam Rating: 100 psig @ 450°F Minimum
9. Actuator: Lever Handle

B. Use carbon steel bodies when connecting to carbon steel piping systems, which are generally located within the building perimeter. Use stainless steel bodies when connecting to stainless steel piping systems, which are generally located outside the building perimeter.

C. Acceptable Models, Valve Type V-3:
   1. Metso Jamesbury: Series 4000
   2. SVF Flow Controls: Series N8
   3. JFlow Controls: Series 4600

2.03 BUTTERFLY VALVES, GENERAL

A. All lugged butterfly valves shall be fully bi-directional and bi-directionally dead-endable to the full pressure rating of the seat. This is defined to mean that the seat rating is not reduced when pressure is applied in either direction and the valve is capable of serving as a blank flange, when bolted to the end of a line from either side of the valve body and no mating flange is attached. The means of attaching the body to the pipe flange, and of attaching the seat ring to the body shall meet the ANSI class rating of the valve without mechanical failure. This requirement normally results in partially lugged butterfly valves not being acceptable.

B. Packing shall be able to be tightened without removing the insulation.

C. External disc position indicators shall be provided.

D. Valves must be fully factory assembled, set and tested.

E. Gear operators on steam valves shall be spaced 4-inches above packing assembly.

F. Install all steam valves with the stem at least 30° off vertical to protect the bottom bearing from debris.
G. On all butterfly valve actuators located greater than 5-feet above the floor, install chainwheels to 5-feet above the floor when the design engineer determines valve service is critical.

H. Handwheel gear operators shall be provided on all butterfly valves for low and high pressure steam and condensate service. This is to allow for slow opening, which minimizes the hydraulic, thermal, flow shock, and differential shock stresses on the system due to water hammer. The handwheel gear operator is slow acting. Proper warm-up procedures shall be followed to prevent water hammer.

2.04 BUTTERFLY VALVES, GENERAL DUTY

A. For all water services and all other normal non-corrosive services, butterfly valves shall be single offset, and have the following requirements:

1. Body: Ductile Iron or Cast Iron
2. Body Style: Fully lugged
3. Trim: 316 or 17-4 pH Stainless Steel
4. Disc: Stainless Steel
5. Seat: EPDM
6. Seat Working P/T Rating: 150 psig @ 250F Minimum
8. Actuator: Under 4" – Locking Lever Handle
   4" and Above – Handwheel Gear Operator

B. Acceptable Models, Valve Type V-4:

1. Keystone: Series 60
2. Nibco: LD-3022
3. Watts: BF-03

C. Please note: In order to provide the standard required body/disc materials, it is often necessary to exceed the ANSI 150 Body Working P/T rating.
2.05 BUTTERFLY VALVES, HIGH PERFORMANCE, CHILLED WATER BUILDING ENTRANCE

A. For the chilled water building entrance, butterfly valves shall be double offset, and have the following requirements:

1. Body: Ductile Iron or Carbon Steel
2. Body Style: Tapped Lug (full flange)
3. Trim: 316 Stainless Steel
4. Disc: 316 Stainless Steel
5. Seat: PTFE
6. Seat Working P/T Rating: 100 psig @ 375°F Minimum
8. Actuator: Under 4" – Locking Lever Handle
   4" and Above – Handwheel Gear Operator

B. Acceptable Models, Valve Type V-5:

1. Keystone: K-LOK F362
2. Metso Jamesbury: 815L
3. Tri-Seal Contromatics: QF-1151

2.06 BUTTERFLY VALVES, HIGH PERFORMANCE, LOW PRESSURE STEAM AND CONDENSATE

A. For low pressure steam and condensate, butterfly valves shall be double offset, and have the following requirements:

1. Body: ASTM A216, WCB Carbon Steel
2. Body Style: Single Flange Lugged
3. Trim: 316 Stainless Steel
4. Disc: 316 Stainless Steel
5. Seat: RPTFE
6. Seat Working P/T Rating: 100 psig @ 450°F Minimum
8. Actuator: Handwheel Gear Operator

B. Acceptable Models, Valve Type V-6:
   1. Keystone: K-LOK F362
   2. Metso Jamesbury: 815L
   3. Tri-Seal Contromatics: QF-1151

2.07 BUTTERFLY VALVES, HIGH PERFORMANCE, HIGH PRESSURE STEAM AND CONDENSATE

A. For high pressure steam and condensate, butterfly valves shall be triple offset, and have the following requirements:
   1. Body: ASTM A216, WCB Carbon Steel
   2. Body Style: Double Flanged, ISO 5272 Short Pattern
   3. Trim: Stainless Steel
   4. Disc: 316 Stainless Steel, ASTM A351 CF8M
   5. Seal: Stainless Steel
   6. Shaft Packing: Graphite
   7. Seat Working P/T Rating: 100 psig @ 450°F Minimum
   9. Actuator: Handwheel Gear Operator

B. Acceptable Models, Valve Type V-7:
   1. Adams: MAK
   2. Miller: Quadax
   3. Pentair Vannessa: Series 30,000
   4. Weir: Tricentric
   5. Zwick Tri-Con: Model I1
2.08 GAUGE VALVES
   A. Provide ball valves for shut-off on all pressure gauges at the gauge and separate 1/2" (one half inch) ball valves for the various taps to the gauge on a manifold gauge.

2.09 CHECK VALVES
   A. Two inches (2") and under: 45˚ swing check, screwed end.
   B. Two and one half inches (2-1/2") and over: Non-slam type globe style lift check, non-slam type tilting disc or wafer body non-slam type lift check. Double disc or bi-folding disc type valves are not acceptable.

2.10 AIR VENT VALVES
   A. On chilled water and glycol service use manual vents only. Do not use automatic vents.