

SECTION 230923.11 – CONTROL VALVES

- A. Control valves assemblies shall be provided and delivered from a single manufacturer as a complete assembly.
- B. The manufacturer shall warrant all components for a period of 5 years from the date of production with the first two years unconditional.
- C. All valve assemblies shall be provided with a corrosion-resistant nameplate indicating.
 - 1. Manufacturer's name and model number.
 - 2. Body size.
 - 3. Flow directional arrow and/or port numbers.
 - 4. Production date.

1.1 BALL-STYLE CONTROL VALVES

- 1. Manufactured, brand labeled or distributed by Belimo.
 - 2. **NPS 2 (DN 50)** and Smaller: Provide a pipe package supplied by the valve manufacturer. The supply side of the coil shall contain a strainer/shut-off ball valve/drain [an integrated isolation ball valve/manual air vent] with P/T port. The return side of the coil shall contain a union fitting with a P/T port, ball-style control valve, an integrated manual balancing valve/union/isolation ball valve/manual air vent with P/T port. Shut-off valves as an integrated part of the ball-style control valve shall not be permitted. **[For ball valves with two ports, supply an integrated 100% port isolation valve/manual air vent with P/T port for field installation in the bypass of the circuit.] [A [12"] [24"] flexible hose set shall be provided for each coil supply and return connection.]**
- A. Pressure-Independent Ball Valves **NPS 3/4 (DN 20)** and Smaller:
 - 1. Performance:
 - a. Pressure Rating: **360 psig (2482 kPa)**.
 - b. Close-off pressure of **200 psig (1378 kPa)**.
 - c. Process Temperature Range: Between **36 deg F to 212 deg F (2 to 100 deg C)**.
 - 2. Body: Forged brass with NPT female ends.
 - 3. Ball: Stainless steel.
 - 4. Stem and Stem Extension: Stainless steel, blowout-proof design.
 - 5. Ball Seats: PTFE.
 - 6. Stem Seal: Dual EPDM O-rings (lubricated).
 - 7. Flow characteristic: Equal percentage
 - 8. Corrosion-resistant nameplate
 - 9. Integral Pressure Regulator: Located upstream of ball to regulate pressure, to maintain a constant pressure differential while operating within a pressure differential range of **5 to 50 psig (35 to 350 kPa)**. Two internal P/T ports shall be incorporated for differential pressure verification. Replaceable cartridges are not permitted.

B. Pressure-Independent Ball Valves **NPS 6 (DN 150)** and Smaller:

1. Performance:
 - a. Pressure Rating for **NPS 2 (DN 50)** and smaller: **360 psig (2482 kPa)**.
 - b. Pressure Rating for **NPS 2-1/2 (DN 65)** through **NPS 6 (DN 150)**: ANSI 125, Class B.
 - c. Close-off pressure for **NPS 2 (DN 50)** and smaller: **200 psi (1378 kPa)**.
 - d. Close-off pressure for **NPS 2-1/2 (DN 65)** through **NPS 6 (DN 150)**: **100 psig (689 kPa)**.
 - e. Process Temperature Range: Between **14 deg F to 250 deg F (Minus 10 to plus 120 deg C)**.
2. Body: **NPS 2 (DN 50)** and smaller Forged brass, nickel plated with NPT female ends.
3. Body: **NPS 2-1/2 (DN 65)** through **NPS 6 (DN 150)** Cast iron with pattern to mate with ANSI 125 flange.
4. Ball: Stainless steel.
5. Stem and Stem Extension: Stainless steel, blowout-proof design.
6. Ball Seats: Teflon PTFE.
7. Stem Seal: Dual EPDM O-rings (lubricated).
8. Flow Characteristic: Equal percentage.
9. Flow Meter: A characterized control valve shall be integrated with an ultrasonic flow sensor (accuracy +/- 2%) providing analog flow feedback. The valve shall reposition to maintain the required flow with a +/- 5% accuracy over a pressure differential range of **1 to 50 psig (7 to 350 kPa)**.
10. Glycol Compensation: The control valve assembly shall incorporate an algorithm to automatically compensate for the glycol concentration and be readable by a local device.

C. Pressure-Independent Ball Valves with Six Ports and Two Characterized Disks **NPS 3/4 (DN 20)** and Smaller:

1. Pressure Rating: **232 psi (1600 kPa)**.
2. Close-off Pressure: **50 psig (350 kPa)**.
3. Process Temperature Range: **43 deg F to 180 deg F (6 to 82 deg C)**.
4. Body and Tail Piece: Forged brass with nickel plating.
5. End Connections: NPT.
6. Ball: Chrome-plated brass.
7. Stem and Stem Extension:
 - a. Material: Forged brass with nickel plating.
 - b. Blowout-proof design.
8. Ball Seats: Teflon PTFE.
9. Stem Seal: EPDM O-rings (lubricated)
10. Characterizing Disc: Chrome plated steel.
11. Flow Characteristics: Linear.
12. Leakage: 0%
13. Controllable Flow Range: Sequence 1 is 0 to 30 degree angle; Dead zone is 30 to 60 degree angle; Sequence 2 is 60 to 90 degree angle.
14. Flow Meter: A characterized control valve shall be integrated with an ultrasonic flow sensor (accuracy +/- 2%) providing analog flow feedback. The valve shall reposition to maintain the required flow with a +/- 6% accuracy over a pressure differential range of **1 to 15 psig (7 to 110 kPa)**.

15. Glycol Compensation: The control valve assembly shall incorporate an algorithm to automatically compensate for the glycol concentration and be readable by a local device.
- D. Pressure-Independent Ball Valves with Coil Optimization Technology **NPS 6 (DN 150)** and Smaller:
1. Performance:
 - a. Pressure Rating for **NPS 2 (DN 50)** and smaller: **360 psig (2482 kPa)**.
 - b. Pressure Rating for **NPS 2-1/2 (DN 65)** through **NPS 6 (DN 150)**: ANSI 125, Class B.
 - c. Close-off pressure for **NPS 2 (DN 50)** and smaller: **200 psi (1378 kPa)**.
 - d. Close-off pressure for **NPS 2-1/2 (DN 65)** through **NPS 6 (DN 150)**: **100 psig (689 kPa)**.
 - e. Process Temperature Range: Between **14 deg F to 212 deg F (minus 10 to plus 120 deg C)**.
 2. Body: **NPS 2 (DN 50)** and smaller Forged brass, nickel plated with NPT female ends.
 3. Body: **NPS 2-1/2 (DN 65)** through **NPS 6 (DN 150)** Cast iron with pattern to mate with ANSI 125 flange.
 4. Ball: Stainless steel.
 5. Stem and Stem Extension: Stainless steel, blowout-proof design.
 6. Ball Seats: Teflon PTFE.
 7. Stem Seal: Dual EPDM O-rings (lubricated).
 8. Flow Characteristic: Equal percentage.
 9. Flow Meter and Temperature Sensors: A characterized control valve shall be integrated with an ultrasonic flow sensor (accuracy +/- 2%) providing analog flow feedback and two temperature sensors providing feedback of coil inlet and outlet water temperatures. The valve shall reposition to maintain the required flow with a +/- 5% accuracy over a pressure differential range of **1 to 50 psig (7 to 345 kPa)**.
 10. Coil Optimization: Software shall control the valve to avoid the coil differential temperature from falling below a programmed setpoint. Real-time data and configuration of valve operating parameters shall be available by BTL listed BACnet MS/TP, BACnet/IP, MODBUS or HTTP. Monitored points shall include inlet and outlet coil water temperatures, absolute flow, absolute valve position, absolute coil power and total heating/cooling energy in BTU/hr. Configuration points shall include valve, flow and power settings. Historical trend data shall be stored for up to 13 months and be retrievable in a standard time-stamped format.
 11. Glycol Monitoring: The control valve assembly shall incorporate an algorithm to automatically calculate the glycol concentration and be readable by a local device, BACnet or MODBUS.
 12. **[Cloud Technology: Owner provided internet connection for valve connection to cloud technology for cloud based analytics providing coil and system optimization. Manufacturer shall provide quarterly performance reports, automatic or manual coil optimization setpoint determination, and software updates. A minimum connection time to the cloud for lifetime data access including Delta T and flow shall be required. Warranty shall be extended to 7 years with the first two years unconditional.]**

1.2 GLOBE-STYLE CONTROL VALVES

- A. Pressure-Independent ANSI 250 Globe Valves **2-1/2 (DN 65) through NPS 6 (DN 150)**:

1. Performance:
 - a. Pressure Rating: ANSI 250.
 - b. Close-off pressure: **135 psig (931 kPa)**.
 - c. Process Temperature Range: Between **14 deg F to 250 deg F (minus 10 to plus 120 deg C)**.
 2. Globe Style: Single port.
 3. Body: Cast iron.
 4. End Connections: ANSI 250.
 5. Packing: EPDM NLP.
 6. Plug, Seat, and Stem: Stainless steel.
 7. Leakage: ANSI Class IV.
 8. Flow Characteristic: Equal percentage.
 9. Integrated Flow Meter: A globe valve shall be integrated with an ultrasonic flow sensor (accuracy +/- 2%) providing analog flow feedback. The valve shall reposition to maintain the required flow with a +/- 5% accuracy over a pressure differential range of **1 to 50 psig (7 to 345 kPa)**.
 10. Glycol Compensation: The control valve assembly shall incorporate an algorithm to automatically compensate for the glycol concentration and be readable by a local device.
- B. Pressure-Independent ANSI 250 Globe Valves with Coil Optimization Technology **2-1/2 (DN 65) through NPS 6 (DN 150)**:
1. Performance:
 - a. Pressure Rating: ANSI 250.
 - b. Close-off pressure: **135 psig (931 kPa)**.
 - c. Process Temperature Range: Between **14 deg F to 250 deg F (minus 10 to plus 120 deg C)**.
 2. Globe Style: Single port.
 3. Body: Cast iron.
 4. End Connections: ANSI 250.
 5. Packing: EPDM NLP.
 6. Plug, Seat, and Stem: Stainless steel.
 7. Leakage: ANSI Class IV.
 8. Flow Characteristic: Equal percentage.
 9. Flow Meter and Temperature Sensors: A globe valve shall be integrated with an ultrasonic flow sensor (accuracy +/- 2%) providing analog flow feedback and two temperature sensors providing feedback of coil inlet and outlet water temperatures. The valve shall reposition to maintain the required flow with a +/- 5% accuracy over a pressure differential range of **1 to 50 psig (7 to 345 kPa)**.
 10. Coil Optimization: Software shall control the valve to avoid the coil differential temperature from falling below a programmed setpoint. Real-time data and configuration of valve operating parameters shall be available by BTL listed BACnet MS/TP, BACnet/IP, MODBUS or HTTP. Monitored points shall include inlet and outlet coil water temperatures, absolute flow, absolute valve position, absolute coil power and total heating/cooling energy in BTU/hr. Configuration points shall include valve, flow and power settings. Historical trend data shall be stored for up to 13 months and be retrievable in a standard time-stamped format.
 11. Glycol Monitoring: The control valve assembly shall incorporate an algorithm to automatically calculate the glycol concentration and be readable by a local device, BACnet or MODBUS.
 12. **[Cloud Technology: Owner provided internet connection for valve connection to cloud technology for cloud based analytics providing coil and system optimization.**

Manufacturer shall provide quarterly performance reports, automatic or manual coil optimization setpoint determination, and software updates. A minimum connection time to the cloud for lifetime data access including Delta T and flow shall be required. Warranty shall be extended to 7 years with the first two years unconditional.]

SPECIFYING PRESSURE INDEPENDENT CONTROL VALVES REQUIRE THE FOLLOWING ADDITIONS TO SECTIONS 232113 AND 230593.

To be inserted into Section 232113 – HYDRONIC PIPING

2.6 CONTROL VALVES

K. Calibrated Balancing Valves and Automatic Flow-Control Valves shall not be used on equipment where pressure independent control valves are installed.

To be inserted into Section 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

3.11 PROCEDURE FOR HYDRONIC SYSTEMS

H. Systems installed with pressure independent control valves shall not require terminal level hydronic system balancing. **[Field verify installation and operating differential pressure range of all pressure independent control valves.] [Total system flow shall be verified to be within +/-10% of system design.] [10%] [20%] [25%] <Insert Percentage> of the total installed product shall be randomly checked for individual conformance. Exact locations of tested product to be coordinated with the design engineer.] Any individual adjustments for the pressure independent valve assembly (valve and actuator combination) for field conditions shall be performed using the pressure independent control valve manufacturer's documented procedure following the guidelines of the National Environmental Balancing Bureau (NEBB) and the Testing Adjusting Balancing Bureau (TABB)]**