SECTION 230923.11 – CONTROL VALVES

A. Control valves assemblies shall be provided and delivered from a single manufacturer as a complete assembly. The manufacturer shall warrant all components for a period of 5 years, except where noted, from the date of production with the first two years unconditional.

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.]

B. Ball Valves with Single Port and Characterized Disk:

1. Pressure Rating for NPS 1 (DN 25) and smaller: 600 psi (4136 kPa).
2. Pressure Rating for NPS 1-1/4 (DN 32) through NPS 2 (DN 65): 400 psi (2758 kPa).
3. Pressure Rating for NPS 2-1/2 (DN 65) through NPS 6 (DN 150): 175 psi (1206 kPa).
4. Close-off Pressure for NPS 2 (DN 50) and smaller: 200 psig (1379 kPa).
5. Close-off Pressure for NPS 2-1/2 (DN65) through NPS 6 (DN150): 100 psig (689 kPa)
6. Media Temperature Range for NPS 6 (DN150) and smaller: Zero to 250 deg F (Minus 18 to plus 120 deg C).
7. Control Port Leakage: 0%
8. Body and Tail Piece for NPS 2 (DN 50) and smaller: Forged brass with nickel plating.
10. End Connections for NPS 2 (DN50) and smaller: NPT Female ends.
11. End Connections for NPS 2-1/2 (DN 65) through NPS 6 (DN 150): ANSI 125 type flange
12. Ball for NPS 3/4 (DN 20) and smaller: [chrome-plated brass] [or] [stainless steel].
13. Ball for NPS 1 (DN 25) through NPS 6 (DN 150): Stainless steel
14. Stem and Stem Extension:
   a. Material: stainless steel or brass to match ball.
   b. Blowout-proof design.
15. Ball Seats: Teflon PTFE.
16. Stem Seal: Dual EPDM O-rings (lubricated)
17. Characterizing Disc for NPS 2 (DN 50) and smaller: TEFZEL.
18. Characterizing Disc for NPS 2-1/2 (DN 65) through NPS 6 (DN 150): Stainless steel
20. Label each valve with following:
   a. Manufacturer's name and model number.
   b. Body size.
   c. Flow directional arrow.
C. High Temperature Ball Valves with Single Port and Characterized Disk:

1. Pressure Rating for NPS 1 (DN 25) and smaller: 600 psi (4136 kPa).
2. Close-off Pressure for NPS 1 (DN 25) and smaller: 200 psig (1379 kPa).
3. Water Media Temperature Range for NPS 1 (DN25) and smaller: 60 to 266 deg F (plus 16 to plus 130 deg C).
4. Steam Media Temperature Range for NPS 1 (DN 25) and smaller: Zero to 212 degF (Minus 18 to plus 100 deg C) at 15 psi inlet pressure.
5. Body and Tail Piece for NPS 1 (DN 25) and smaller: Forged brass with nickel plating.
6. End Connections for NPS 1 (DN25) and smaller: NPT female ends.
7. Ball for NPS 1 (DN 25) and smaller: Stainless steel.
8. Stem and Stem Extension:
   b. Blowout-proof design.
9. Ball Seats: ETFE.
10. Stem Seal: Dual EPDM O-rings (lubricated)
11. Characterizing Disc: TEFZEL.
13. Label each valve with following:
   a. Manufacturer's name and model number.
   b. Body size.
   c. Flow directional arrow.

D. Ball Valves with Two Ports and Characterized Disk:

1. Pressure Rating for NPS 1 (DN 25) and smaller: 600 psi (4136 kPa).
2. Pressure Rating for NPS 1-1/4 (DN 32) through NPS 2 (DN 50): 400 psi (2758 kPa).
4. Process Temperature Range: Zero to 250 deg F (Minus 18 to plus 120 deg C).
5. Control Port Leakage: 0%
8. Ball for NPS 3/4 (DN 20) and smaller: [chrome-plated brass] [or] [stainless steel].
9. Ball for NPS 1 (DN 25) through NPS 2 (DN 65): Stainless steel
10. Stem and Stem Extension:
   a. Material: stainless steel or brass to match ball.
   b. Blowout-proof design.
11. Ball Seats: Teflon PTFE.
12. Stem Seal: Dual EPDM O-rings (lubricated)
13. Characterizing Disc for NPS 1 (DN 25) and smaller: TEFZEL.
14. Characterizing Disc for NPS 1-1/4 (DN 32) through NPS 2 (DN 50): TEFZEL or stainless steel
16. Flow Characteristics for B-Port: Modified for constant common port flow.
17. Label each valve with following:
   a. Manufacturer's name and model number.
   b. Body size.
   c. Flow directional arrow

E. Ball Valves with Six Ports and Two Characterized Disks:
1. Pressure Rating for NPS 3/4” (DN 20) and Smaller: 232 psi (1600 kPa).
2. Close-off Pressure: 50 psig (345 kPa).
3. Process Temperature Range: 43 degF to 180 deg (6 to 82 deg C).
5. End Connections: NPT.
6. Ball for NPS 3/4 (DN 20) and Smaller: Chrome-plated brass.
7. Stem and Stem Extension:
   a. Material: brass to match ball.
   b. Blowout-proof design.
8. Ball Seats: Teflon PTFE.
9. Stem Seal: EPDM O-rings (lubricated)
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. Label each valve with following:
   a. Manufacturer's name and model number.
   b. Body size.
   c. Flow directional arrow
   d. Port numbers

1.2 ELECTRIC AND ELECTRONIC CONTROL VALVE ACTUATORS

A. Manufactured, brand labeled or distributed by Belimo.

B. The valve assembly (control valve and actuator) shall be provided and delivered from a single manufacturer.

C. Agency Listings: ISO 9001, cULus, CE, CSA, and UL 2043The manufacturer shall warrant all components for a period of 5 years from the date of production with the first two years unconditional.

D. Actuators for Hydronic Control Valves: Capable of closing valve against system pump shutoff head.

E. Actuators for Steam Control Valves: Shutoff against [1.2] [1.5] <Insert number> times steam design pressure.

F. Position indicator and graduated scale on each actuator.

G. Type: Motor operated, with gears, electric and electronic. Overload protected electronically throughout rotation.

H. Voltage: [Voltage selection delegated to professional designing control system] [24-V ac] [120-V ac] <Insert requirement>.

I. Deliver torque required for continuous uniform movement of controlled device from limit to limit when operated at rated voltage at the valve close-off pressure for system design.
J. Function properly within a range of 80 to 120 percent of nameplate voltage.

K. Two-Position Actuators: Single direction, fail safe or reversing type.

L. Modulating Actuators:
   1. Operation: Capable of stopping at all points across full range, and starting in either direction from any point in range.
   2. Control Input Signal:
      a. Three Point, Tristate, or Floating Point: Clockwise and counter-clockwise inputs. One input drives actuator to open position and other input drives actuator to close position. No signal of either input remains in last position.
      b. Proportional: Actuator drives proportional to input signal and modulates throughout its angle of rotation. Suitable for [zero- to 10-] [or] [2- to 10-]V dc [and] [4- to 20-mA] signals.
      c. Pulse Width Modulation (PWM): Actuator drives to a specified position according to pulse duration (length) of signal from a dry contact closure, triac sink, or source controller.
      d. Programmable Multi-Function:
         1) Control Input, Position Feedback, Mechanical Travel, and Running Time: Factory or field software programmable without the use of actuator mounted switches.
         2) Adaptation: Upon adjustment of operating parameters. Adaptation shall be initiated to adapt the input, feedback and run time, to the actual mechanical angle of rotation or travel.
         3) Diagnostic: Feedback of hunting or oscillation, mechanical overload, mechanical travel, and mechanical load limit.
         4) Service Data: Include, at a minimum, number of hours powered and number of hours in motion.

M. Position Feedback:
   1. [Equip] [Where indicated, equip] two-position actuators with limits switches or other positive means of a position indication signal for remote monitoring of [open] [and] [close] position.
   2. [Equip] [Where indicated, equip] modulating actuators with a position feedback through [current] [or] [voltage] signal for remote monitoring.
   3. Provide a position indicator and graduated scale on each actuator indicating open and closed travel limits.

N. Fail-Safe:
   1. Where indicated, provide actuator to fail to an end position.
   2. Mechanical spring return mechanism to drive controlled device to an end position (open or close) on loss of power.
   3. Electronic fail-safe shall incorporate an active balancing circuit to maintain equal charging rates among the Super Capacitors. The power fail position shall be adjustable between 0 to 100% in 10 degree increments with a 2 second [Insert timing between 0-10 seconds] operational delay.

O. Integral Overload Protection:
   1. Provide electronic overload protection throughout the entire operating range in both directions.
P. Valve Attachment:
1. Attach actuator to valve drive shaft in a way that ensures maximum transfer of power and torque without slippage.
2. Actuators shall be capable of being mechanically and electrically paralleled to increase torque if required.
3. V-bolt dual nut clamp with a V-shaped toothed cradle; directly couple and mount to the valve bonnet stem; or ISO-style direct-coupled mounting pad.

Q. Temperature and Humidity:
1. Temperature: Suitable for operating temperature range encountered by application with minimum operating temperature range of [minus 22 to plus 122 deg F (minus 30 to plus 50 deg C)] <Insert temperature range>.
2. Humidity: Suitable for humidity range encountered by application; non-condensing environment.

R. Enclosure:
1. Suitable for ambient conditions encountered by application.
2. NEMA Type 2 for indoor and protected applications.
3. NEMA Type 4 or Type 4X for outdoor and unprotected applications.
4. Provide actuator enclosure with heater and control where required by application.

S. Stroke Time:
1. Operate valve from fully closed to fully open within [15] [60] [75] [90] [150] <Insert number> seconds.
2. Operate valve from fully open to fully closed within [15] [60] [75] [90] [150] <Insert number> seconds.

1.3 Select operating speed to be compatible with equipment and system operation.