* 1. PUMP CONTROL VALVE

A. Supply a *insert size* Singer Model *specify model as 106/S106/206/S206* –PG-BPC Single Chamber, In-Line Pump Control Valve.

* 1. The valve shall be equipped with the following available options:
		1. IDC-Internal Drop Check assembly.
		2. *specify*
		3. *specify*.
	2. Singer Valve schematic *specify*.
1. Function: The valve shall be a pilot operated single chamber pump control valve installed on the discharge side of the booster pump to prevent surges associated with the normal starting and stopping of the pump. The pump control valve functions as a non-modulating, two position valve, either open or fully closed. The booster pump shall start and stop against a closed pump control valve. On pump start, with the control valve in a closed position, the pilot solenoid is energized to open the control valve at a controlled and adjustable rate, until fully open. Upon command to stop the pump, the control valve pilot solenoid is de-energized, allowing the valve to close at a controlled and adjustable rate. When the valve is sufficiently closed, a valve mounted position limit switch shall be actuated, signalling the pump to shut down. In the event of a power or pump failure, while the pump is running, the control valve shall close to prevent reverse flow through the control valve.
2. Operation: The control valve pilot system consists of a 3-way solenoid pilot that when de-energized shall ensure that any available pilot pressure, inlet or outlet, shall hydraulically maintain the valve in a closed position by applying pressure to the bonnet chamber. Separate open and closing flow control pilot valves shall allow the open and closing speeds of the control valve to be adjusted to eliminate surges on pump start and stop cycles. Should a pressure reversal occur, the valve shall close drip tight to prevent reverse flow by way of pilot check valves.
	1. Quality Assurance
3. The control valve shall be tested prior to shipment. The standard test shall include a functional stroke, pressure and leak test of valve body, seat, fitted pilots and accessories.
4. The control valve shall be covered by a minimum three (3) year warranty against defects in materials and workmanship. The 316 stainless steel seat ring shall be covered by a lifetime guarantee.
5. All control valve maintenance and repairs shall be possible without removing the main valve body from the line, when installed in accordance with manufacturer’s recommendations.
	1. Main Valve
6. The main valve shall be a Singer *specify main valve model number (106/S106/206/S206)* -PG single chamber, diaphragm actuated *specify (full/reduced)* port model.
7. Main valves, 6” (150mm) and larger, shall provide smooth frictionless motion to ensure a low flow stability to *specify minimum USGPM or L/s*, achieved using SRD-Single Rolling Diaphragm technology.
8. The main valve, bonnet and removable stem cap shall be constructed of ASTM A536 (Grade 65/45/12) ductile iron.
9. Main valves of 2.5” (65mm) and larger shall have a removable stem cap for access to the main valve stem for alignment check, spring installation and ease of service and assembly.
10. The main valve bonnet shall be located using two or more locating guide pins to maintain the inner valve assembly alignment and for ease of maintenance.
11. The main valve trim, consisting of seat ring and stem shall be constructed of AISI 316 stainless steel. The valve stem shall have wrench flats for ease of maintenance.
12. The main valve shall provide a drip-tight seal using a mechanically retained resilient disc, having a rectangular cross section, against the stationary AISI 316 stainless steel seat ring.
13. The stationary AISI 316 stainless steel seat ring of main valves 2.5” (65mm) and larger shall be held in place using Spiralock® self locking screws and seat ring retainers.
14. All internal and external ferrous components, including all mating surfaces, shall be coated with an NSF-61 approved fusion bonded epoxy to a minimum of 10 mils DFT-Dry Film Thickness.
15. The main valve elastomers: diaphragm, resilient disc and seals, shall be of EPDM or Buna-N.
16. All main valve fasteners (bolts, nuts, studs, cap screws) shall be supplied as AISI 18-8 or 304 stainless steel. All bonnet bolts shall be fitted with stainless steel washers to prevent damage to the bonnet coating.
17. Valve shall have flanged, threaded or grooved end connections. Flanged connections shall be *specify ANSI/ASME B16.42 Class 150#/300# or ISO 7005-2 PN10/16/25/40* flange drilled, faced and rated. Threaded connections shall be *specify NPT or BSPT*.
18. Due to the potential for noise, vibration and erosion damage from cavitation, the valve manufacturer shall provide, upon request, a computerized sizing and cavitation analysis, using independent third party software. Cavitation analysis shall provide the status of cavitation based on customer supplied parameters as to valve size, flow rate requirements and pressure conditions. The cavitation analysis shall also provide information as to Cv factor, percent of valve lift, cavitation index and noise level.
19. The valve manufacturer shall be able to supply cavitation control trim which shall be engineered to be optimized to the actual operating parameters of the control valve application and warranted to perform correctly and prevent main valve cavitation damage under the stated conditions. Orifice plates or other non-engineered cavitation control devices shall not be used to prevent or minimize valve cavitation.
	1. Pilot Controls
20. The 3-way solenoid pilot shall be *specify manufacturer and model*, with *specify voltage and frequency*, coil, having a maximum *specify psi* working pressure. The solenoid pilot body shall be *specify material brass or stainless steel.*
21. The opening and closing speed controls shall be micrometer needle valves, supplied as *specifiy material brass or stainless steel* construction.
22. The highest available pilot supply pressure, from the control valve inlet or outlet port, shall be ensured using pilot check valves, supplied as *specify model and material as brass or stainless steel* construction.
23. The pilot fittings shall be supplied as *specific material ASTM B16 brass or AISI 316 stainless steel*.
24. The pilot tubing shall be supplied as *specify material ASTM B280 seamless copper or AISI 316 stainless steel or PTFE lined flexible braided stainless steel*.
25. Pilot isolation ball valves shall be supplied as standard. Pilot isolation ball valves shall be constructed of *specify material B16 brass or 316 stainless steel* with stainless steel handle operator.
26. Dual supply pilot strainers shall be supplied as standard. Strainer material shall be ASTM A351 CF8M stainless steel with a 40-mesh or 80-mesh 316 stainless steel screen. The external pilot strainer shall have a removable plug for easy maintenance access to the pilot screen and have provision for installation of a ball valve for pilot screen flushing.
27. A Singer Model X129 Limit Switch Indicator shall be supplied as standard. The valve position indicator switch is actuated by the opening and closing of the main valve. The actuating position shall be fully adjustable over the entire valve stroke. The limit switch assembly shall be supplied with (1) SPDT-Single Pole Double Throw, Honeywell OP-AR switch having a NEMA 4 rating. The limit switch actuation stem rod shall be AISI 316 stainless steel, threaded or pinned to the main valve stem. The indicator rod shall move within an adapter busing of *specify material as brass or stainless steel* having Buna-N seals. A vent screw shall be provided to purge any air that may become trapped within the main valve bonnet and stem cap. The limit switch shall be actuated with the main valve in a closed position.
	1. Control Valve Components – Available Options

A. IDC-Internal Drop Check assembly. The control valve shall be equipped with a mechanical check feature as part of the control valve trim which shall ensure quick, silent and positive valve shut-off to prevent reverse flow and reduce surge events. The IDC operates completely independently of the pilot system.