* 1. SURGE ANTICIPATING RELIEF VALVE

A. Supply a *insert size* Singer Model *specify model as 106/S106/206/S206* –RPS-RR Surge Anticipating on Rate of Rise Pressure Relief Valve.

* 1. The valve shall be equipped with the following available options:
     1. *specify*
     2. *specify*
     3. *specify*.
  2. Singer Valve schematic *specify*.

1. Function: The valve shall be a pilot operated surge anticipating pressure relief control valve, which will detect and open in response to a rapid increase in system pressure, as associated with a returning surge resulting from a sudden pump shut down due to power loss or pump failure. The control valve shall also open quickly when the inlet pressure meets or exceeds a predetermined high pressure relief pilot pressure setting. The control valve shall open to dissipate a return pressure surge and remain open to relieve damaging overpressure. The valve shall close smoothly at an adjustable speed when system pressure is recovered below the high pressure relief pilot setting.
2. Operation: The rate of rise pressure pilot shall be a normally closed Singer Model 81-RPD Differential Pressure Relief Pilot. The rate of rise pilot system, comprising of a fixed restriction, gas charged accumulator and differential pressure pilot, shall sense and react to a rapid increase in system pressure, opening the 81-RPD pilot to relieve the bonnet pressure which opens the main valve. The high pressure relief pilot shall be a normally closed Singer Model 81-RP Pressure Relief Pilot that remains closed when the system pressure is below the pilot setting. When the system pressure is above the 81-RP pilot setting the pilot opens to relieve the bonnet pressure which opens the main valve. Upon restoration of the system pressure below the setting of the 81-RP pilot and with the 81-RPD pilot closed, the main valve closes, at an adjustable closing speed to prevent valve closing surges. No valve stroke limiting devices shall be required or used. Pressure gauges and pilot isolation ball valves shall be provided for a field test system to verify valve operation under a dynamic rise in pressure for test purposes.
   1. Quality Assurance
3. The control valve shall be tested prior to shipment. The standard test shall include a functional stroke test and 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 differential pressure relief pilot shall be a Singer Model 81-RPD normally closed pilot with a spring to adjust the differential pressure setting.
21. The 81-RPD pilot trim, consisting of a seat ring, stem and inner valve, shall be constructed of AISI 316 stainless steel.
22. The 81-RPD adjustable pilot spring range shall be supplied with a spring range of 5-25psi (0.35-1.72 bar). The pilot shall be factory preset at 10psid (0.7 bar).
23. The pilot body and spring casing shall be constructed of *specify material (ASTM B62 bronze or ASTM A351 CF8M stainless steel*.
24. A stainless steel bladder accumulator with mounting bracket shall be provided, factory pre-charged to 25% of the high pressure relief pilot setpoint.
25. The high pressure relief pilot shall be a Singer Model 81-RP normally closed pilot with a spring to adjust the pressure setting.
26. The 81-RP pilot trim, consisting of a seat ring, stem and inner valve, shall be constructed of AISI 316 stainless steel.
27. The 81-RP adjustable pilot spring range shall be supplied with a spring range of *specify range (20 to 200psi (1.38-13.8 bar), 5-50psi (0.345-3.45 bar), 10-80psi (0.7-5.5 bar) or 100-300psi (6.9-20.7 bar))*. The pilot shall be factory preset at *specify setpoint* psi.
28. The pilot body and spring casing shall be constructed of *specify material (ASTM B62 bronze or ASTM A351 CF8M stainless steel*.
29. An adjustable needle valve closing speed control shall be supplied as *specify material ASTM B16 brass or AISI 316 stainless steel*.
30. The pilot fittings shall be supplied as *specify material ASTM B16 brass or AISI 316 stainless steel*.
31. 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*.
32. (4) pilot isolation and testing ball valves shall be supplied as standard. Pilot ball valves shall be constructed of *specify material B16 brass or 316 stainless steel* with stainless steel handle operator.
33. A pilot strainer shall be supplied as standard. Strainer material to 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.
    1. Control Valve Components – Available Options

A. *specify.*